

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
White Sands Test Facility
P.O. Box 20
Las Cruces, NM 88004-0020



June 29, 2015

Reply to Attn of: RE-15-071

Mr. John E. Kieling, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

Subject: NASA WSTF 200 Area HWTL (SWMU 10) Investigation Work Plan and Historical Information Summary

This transmittal provides the Investigation Work Plan (IWP) and Historical Information Summary (HIS) for the WSTF 200 Area Hazardous Waste Transmission Line (HWTL; SWMU 10). The IWP and HIS were prepared in accordance with the WSTF Hazardous Waste Permit.

The Executive Summaries for the IWP and HIS are included as Enclosure 1. Bound paper copies of the IWP and HIS are provided as Enclosure 2. Enclosure 3 provides electronic versions of the IWP and HIS on a CD-ROM.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

If you have any questions or comments concerning this submittal, please contact me at 575-524-5024.

A handwritten signature in black ink, appearing to read "Tim J. Davis".

Timothy J. Davis
Chief, Environmental Office

3 Enclosures

cc:
Ms. Vicky Baca
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

Historical Information Summary Executive Summary

This report summarizes information regarding historical site operations, facilities, hazardous chemical use, and hazardous waste management practices in order to identify any releases or potential releases of hazardous substances or hazardous waste to the environment from the 200 Area Hazardous Waste Transmission Lines (HWTLs; SWMU 10) at the NASA White Sands Test Facility (WSTF).

The HWTLs were a network of 3-inch (in.) stainless steel and Polyvinyl chloride (PVC) underground pipe lines that connected the 200 Area Clean Room and 200 Area Chemistry Laboratories (Metallurgy Laboratory, Photography, and Etching Room) to a common header located south of the South Highbay, which extended south of the 200 Area wastewater lagoon, and terminated at the 600 Area Hazardous Waste Management Unit (HWMU) Impoundment (600 Area Closure). The HWTLs were an interim solution for the 200 Area Laboratory Complex waste management until the construction of the 200 Area Evaporation Treatment Unit (ETU).

The HWTLs were constructed in April 1986 and were placed in the same trench as the wastewater lagoon overflow pipeline. NASA began discharging wastes from the 200 Area Laboratory Complex into the HWTL immediately after construction on May 19, 1986. On June 16, 1986, NASA received a Notice of Noncompliance issued from the EPA stating that NASA had lost interim operating status for the 600 Area Impoundments due to an inadequate groundwater monitoring system. All waste discharges to the 600 Area Impoundments were immediately ceased to comply with the EPA notice. Wastes continued being discharged through the HWTLs to a 4,000-gallon (gal) capacity portable tank truck located adjacent to the 600 Area Impoundments (NASA, 1986i). Wastes from the 4,000-gal truck were then shipped off site for disposal at an EPA-permitted incineration facility (NASA, 1986c). After a leak occurred (July 30, 1986) in the HWTLs at the stainless steel/PVC connection joint (near the South Highbay), NASA ceased using the 3-in. PVC portion of the HWTLs that extended from south of the South Highbay to the 600 Area HWMU Impoundments. In September 1986, the PVC portion of the HWTLs was triple-rinsed and abandoned in-place.

NASA continued using the upper 3-in. stainless steel portion of the lines to discharge wastes into a series of mobile tanks located adjacent to the South Highbay; a 1,000 gal mobile tank and then two 6,000 gal mobile tanks. In 1988, NASA completed the construction of the ETU and reconfigured and replaced the HWTLs with polypropylene drain lines known as the hazardous waste drain line (HWDL) in the 200 Area Laboratory Complex and connected the 800 Area Hazardous Fluid Testing Area (HFTA) to discharge into the ETU. There are no records that indicate if the 3-in. stainless steel lines were removed or abandoned in-place. Common practice at the time would suggest the lines were abandoned in place.

Investigation Work Plan Executive Summary

The National Aeronautics and Space Administration (NASA) is required by the White Sands Test Facility (WSTF) Hazardous Waste Permit (Permit; NMED, 2009) issued by the New Mexico Environment Department (NMED) to develop investigation work plans (IWPs) for identified closed hazardous waste management units (HWMUs) and solid waste management units (SWMUs) at WSTF. SWMU 10, the 200 Area Hazardous Waste Transmission Lines (HWTLS), are identified in the Permit and addressed in this IWP. A Historical Information Summary (HIS) was developed for SWMU 10 and is being submitted concurrently with this IWP.

The 200 Area HWTLS were constructed to transfer waste from the industrialized 200 Area Chemistry Laboratory complex to the 600 Area HWMU impoundments (Closure) by gravity flow over a total distance of approximately 3,750 feet (ft). Typical wastes transferred using the HWTLS were diluted hazardous constituents and possibly contained spent halogenated solvents, heavy metals, and solvents. The HWTLS operated as designed from May 19, 1986 until June 16, 1986, when NASA received a Notice of Noncompliance issued from the EPA. At least a portion of the HWTLS continued use until 1988, when the 200 Area Evaporation Tank Unit (ETU) was completed and began use. Evidence located during HIS research indicated that there were several waste spills associated with use of the HWTLS.

This IWP describes the activities required to investigate SWMU 10 to confirm that no hazardous constituents exist above background and regulatory levels in the soil within and adjacent to the SWMU. Pre-investigation activities including the performance of a site survey using ground-penetrating radar (GPR), potholing, and GIS to map the investigation area will be conducted to provide site characterization data. These activities will provide information for preliminary planning activities and help refine removal and excavation (if applicable), site investigation, and site restoration requirements.

NASA intends to investigate and collect supporting data to confirm that hazardous constituents do not exist in the soil within and adjacent to SWMU 10 above established cleanup levels. Site restoration that includes surface grading and pipeline removal will be conducted after the investigation. All PVC transmission line sections, where feasible, will be removed. Stainless steel sections may be inaccessible, reducing the potential for removal. Sections that cannot be removed will be abandoned or plugged and abandoned until the 200 Area is ultimately decommissioned. The land surface will be returned to its approximate original elevation.

Following NMED approval of this IWP, NASA anticipates to start the investigation following the closure of the 200 and 600 Area wastewater lagoon and sewer line.

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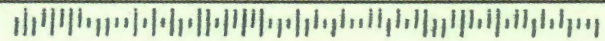


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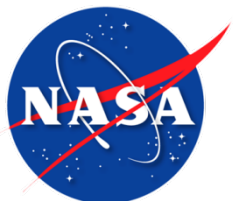
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National Aeronautics and
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200 Area Hazardous Waste Transmission Lines (SWMU 10) Historical Information Summary

June 2015

NM8800019434
NASA Johnson Space Center White Sands Test Facility
12600 NASA Road Las Cruces, New Mexico 88012

Executive Summary

This report summarizes information regarding historical site operations, facilities, hazardous chemical use, and hazardous waste management practices in order to identify any releases or potential releases of hazardous substances or hazardous waste to the environment from the 200 Area Hazardous Waste Transmission Lines (HWTLs; SWMU 10) at the NASA White Sands Test Facility (WSTF).

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List of Acronyms

AIR	Abbreviated Investigation Report
AIWP	Abbreviated Investigation Work Plan
amsl	Above mean sea level
AOC	Area of concern
BLM	Bureau of Land Management
CLC	City of Las Cruces
CMS	Corrective Measures Study
DoD	Department of Defense
DP	Discharge Plan
DR	Discrepancy Report
EPA	Environmental Protection Agency
ETU	Evaporative Treatment Unit
FMEA	Failure Modes and Effects Analysis
ft	Feet or feet
gal	Gallon(s)
GIS	Geographic Information System
HFTA	Hazardous Fluid Testing Area
HIS	Historical Information Summary
HWDL	Hazardous Waste Drain Line
HWMU	Hazardous Waste Management Unit
HWTLs	Hazardous Waste Transmission Lines
in.	Inch(es)
IWP	Investigation Work Plan
JER	Jornada Experimental Range
JSC	Johnson Space Center
N ₂ O ₄	Nitrogen tetroxide
NASA	National Aeronautics and Space Administration
NMED	New Mexico Environment Department
NMEID	New Mexico Environmental Improvement Division
NMSLO	New Mexico State Land Office
NOI	Notice of Intent
ppb	Parts per billion
ppm	Parts per million
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAM	San Andres Mountains
SWMU	Solid Waste Management Unit
TPS	Test Preparation Sheet
USGS	United States Geological Survey
UST	Underground Storage Tank
WSMR	White Sands Missile Range
WSTF	White Sands Test Facility
yd ³	Cubic yards

1.0 Introduction

1.1 Purpose

The National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) White Sands Test Facility (WSTF) Hazardous Waste Permit (Permit) issued by the New Mexico Environment Department (NMED) requires the preparation and submittal of a historical information summary (HIS) for each solid waste management unit (SWMU) or area of concern (AOC) to be investigated (NMED, 2009, Section VII.H.1.c). This HIS for the hazardous waste transmission lines (HWTLs) SWMU 10 is required by the Permit to be submitted on or before June 30, 2015. The purpose of this HIS is to evaluate past site operations and waste management practices to identify known or potential releases of hazardous waste or hazardous substances to the environment in or around SWMU 10, the 200 Area, and the 600 Area. The information gathered during preparation of this HIS will be used to aid the development of the SWMU 10 Investigation Work Plan (IWP; NASA, 2015), which will be submitted concurrently with this HIS.

1.2 Scope

Information compiled in this summary was obtained from review of historical documentation and information gathered from interviews with current and former WSTF employees. NASA collected and reviewed the information in the HIS between October and December 2014.

The observations and interpretations presented in this document are strictly limited in time and scope to the information obtained during the review process. No subsurface exploratory drilling, sampling, or chemical analyses were performed during the course of this evaluation.

1.3 Limitations and Assumptions

WSTF historical operations and waste management practices were not well documented from the inception of the site in 1963 through the mid-1980s. For this HIS, NASA relied on a limited assortment of documents, correspondence, and the recollections of long-term WSTF employees to provide usage practices for SWMU 10. The information is subject to the limitations of historical documentation, availability and accuracy of pertinent records, and the personal recollection of the individuals interviewed. In many cases, there is insufficient information available to provide independent verification that the information is accurate and correct.

2.0 Site Description

2.1 Location

WSTF is located in Doña Ana County, 18 miles northeast of Las Cruces, New Mexico and 65 miles north of El Paso, Texas. [Figure 2.1](#) provides a WSTF location map. Access to the site is provided via a paved road (NASA Road) that intersects U.S. Highway 70, one mile west of Organ, New Mexico. The installation occupies approximately 60,500 acres.

2.2 Land Ownership

WSTF administrative and testing facilities are located on White Sands Missile Range (WSMR), owned by the U.S. Department of the Defense, Department of the Army (DoD; U.S. Army). NASA is the operator of the facility under an inter-agency agreement with the U.S. Army. NASA also maintains land-use agreements with the Bureau of Land Management (BLM; a right-of-way agreement), the New Mexico

State Land Office (NMSLO; a water exploration/development easement), and the U.S. Department of Agriculture, Agricultural Research Service Jornada Experimental Range (JER; an easement deed) for the use of lands located to the west of the industrial facility. [Figure 2.2](#) provides an ownership overview of lands used by NASA.

2.3 Land Use

All of the WSTF industrial areas are strictly for industrial use. Security and firefighting personnel staff the facility 24-hours per day, seven days per week; however, there are no full-time residents at WSTF. WSTF is a restricted access area closed to the public, and access by visitors is provided only in accordance with NASA JSC policies.

Cattle are grazed on BLM, NMSLO, and JER lands to the north and west of the industrial facilities area; however, fences prohibit the cattle from entering the industrial portions of the facility. The DoD U.S. Army, on behalf of NASA, maintains an inter-agency agreement with the BLM to provide a safety or buffer zone adjacent to WSTF that limits land use to ensure public safety due to the dangers involved with using hydrazine-based propellants and nitrogen tetroxide (N₂O₄), an oxidizer. WSMR occupies the area to the north and east of WSTF.

The land for WSTF occupied by NASA and NASA contractors remains vested with the DoD U.S. Army. All permanent buildings, structures, and other related facilities erected in this land area will become the property of the DoD U.S. Army upon termination of their use by NASA (DoD, 1982).

2.4 General Physical Setting

WSTF is located on soil composed of coalescent alluvial fans that are locally dissected by arroyos. The facility is bordered on the east by the north-south trending San Andres Mountains (SAM) that ascend over 6,000 feet (ft) above mean sea level (amsl). The WSTF site is bordered on the west by a broad uniformly sloping alluvial pediment plain extending into the Jornada del Muerto Basin and to the Doña Ana Mountains. The major alluvial fan systems originate from Bear Canyon to the northeast and Loman Canyon to the southeast of WSTF. Foothills on the western pediment of the SAM at WSTF are typically 4,800 to 5,000 ft amsl, are moderately sloping (15 to 25%), and consist of thin layers of alluvium covering fractured limestone and volcanic bedrock. The numerous dissecting arroyos only flow during periods of heavy rainfall. [Figure 2.3](#) provides a topographic map of WSTF and surrounding areas.

3.0 SWMU 10 Area Background

3.1 Location and Current Use of the SWMU 10 Areas

The HWTLs begin in the 200 Area and terminate in the 600 Area. Current uses of the areas are discussed in this section

3.1.1 200 Area

The 200 Area is located within Section 2 of T.21.S., R.3.E., and access is via Apollo Boulevard, the main access through WSTF. The 200 Area personnel provide support for the Propulsion Test Department at WSTF, including preparing test articles, performing analytical services, and fabrication and cleaning of aerospace program articles. The 200 Area personnel also conduct materials and component testing in hazardous environments, including materials properties determination, materials compatibility and toxicity analyses, detonation studies, flight article outgassing characterization, systems analysis, orbital debris impact simulation testing, and propellant characterization. Five core areas are tested: oxygen

systems, propellant systems, hypervelocity impact testing, composite pressure vessels, and standard materials testing (NASA, 2013c). Buildings, structures, and SWMUs located in the 200 Area are described in [Section 3.3.1](#) and shown in [Figure 3.1](#).

3.1.2 600 Area

The 600 Area is the largest industrial area at WSTF and is located adjacent to and west of the 100 Area, and extends approximately 4 miles to the west of the WSTF 100 Area. The HWTLs extend into the eastern 600 Area to the 600 Area Hazardous Waste Management Unit (HWMU). The eastern 600 Area is located within Section 2 of T.21.S., R.3.E.. Access to the eastern 600 Area is via Apollo Boulevard, the main access road through WSTF. The eastern 600 Area is currently used for support of WSTF water supply and groundwater monitoring and remediation systems. Buildings, structures, and SWMUs located in the eastern 600 Area are described in [Section 3.3.2](#) and shown on [Figure 3.2](#).

3.2 Physical Setting at the Property

The surface and subsurface conditions for SWMU 10, 200 Area HWTLs, are described within the 200 Area HWTLs (SWMU 10) IWP, Section 3.0 (Current Site Conditions; NASA, 2015).

3.3 Description of Structures

3.3.1 200 Area

Buildings, structures, and SWMUs located within the 200 Area are illustrated in [Figure 3.1](#). There are three distinct areas within the 200 Area: the Laboratory and Test Preparation Complex, the 250 Area, and the 270/272 Area.

The Laboratory and Test Preparation Complex consists of Buildings 200 and 201 (including the North and South Highbays), Building 203, and surrounding support buildings and structures. These buildings contain offices, storage space, preparation rooms, clean rooms, shops, test facilities, various laboratories (including photography, fuel, oxidizer, chemistry, metallurgy, molecular desorption analytical, gas and spectroscopy, x-ray, vacuum, and calibration laboratories), and support areas for testing activities. The Laboratory and Test Preparation Complex also contain systems for the storage and handling of many types of propellants, corrosive chemicals, flammable solvents, and compressed gases.

The 250 Area is located west of the Laboratory and Test Preparation Complex across Apollo Boulevard ([Figure 3.1](#)). This area currently contains the Gaseous Oxygen High Temperature and Flow Test Facility (Building 250), the 200 Materials Processing Facility (Building 255), and various support structures. Liquid hydrogen and liquid oxygen are also stored for use in the area.

The 270/272 Area is located southeast of the 200 Laboratory Complex ([Figure 3.1](#)). This area consists of the Detonation Test Facility (Building 270), the Neutron Non-destructive Evaluation Laboratory (Building 270A), the Hypervelocity Impact Facility (Building 272), and various support structures.

Although most of the facilities are located on concrete or asphalt surfaces, some natural soil surfaces are present. There are both paved and unpaved service roads and employee parking lots. Most buildings contain heating/cooling systems and utilities servicing the areas, including electrical, gas, fiber optic, and water.

SWMUs located within the 200 Area include the Clean Room discharge pipe (SWMU 4), the Scape Room discharge pipe (SWMU 5), the Building 203 discharge pipe (SWMU 6), the South Highbay

discharge pipe (SWMU 7), the 200 Area wastewater lagoon (SWMU 8), the 200 Area main burn pit (SWMU 9), the HWTLs (SWMU 10), three septic tanks located adjacent to Building 272 (SWMU 23), and the 200 Area small arms firing range (SWMU 30; NMED, 2009). The 200 Area wastewater lagoon (SWMU 8) and the Building 272 septic tanks (SWMU 23) are managed in accordance with discharge plan (DP)-392.

The 200 Area also contains three closed HWMUs ([Figure 3.1](#)). The closed HWMUs consist of two separate sites that historically contained four hazardous waste underground storage tanks (USTs) and the site of the closed Evaporation Treatment Unit (ETU). The 200 Area West Closure consisted of two steel USTs for storing hazardous wastes derived from the Clean Room. The 200 Area East Closure consisted of two USTs, one steel and one concrete, for storing hazardous wastes derived from the 200 Area Laboratories Complex (other than the Clean Room). All four of these USTs were excavated and removed, and the areas were closed as interim landfills in 1986. NMED approved the closures in 1989 (NMEID, 1989).

The ETU treated aqueous wastes by evaporation and consisted of two circular, flat-bottomed, open-top, carbon steel tanks lined with two 30-mil polyvinyl chloride (PVC) liners in each tank ([Figure 3.1](#)). Closure activities were initiated in July 2012 and consisted of ETU waste phase separation, characterization, and disposal; hazardous waste drain line decontamination and verification; ETU primary and secondary liner inspection; ETU tank structural assessment and deconstruction; soil sampling and verification; and waste management and disposal (NASA, 2012b). The ETU was clean closed with NMED approval of the Certification of Closure Report on September 5, 2014 (NMED, 2014).

A vadose zone investigation of the entire 200 Area has been on-going since September 2012. Previous vadose zone investigations conducted are summarized in Section 2.4 of the 200 Area Closure Investigation Work Plan (NASA, 2012c). Phase I of the 200 Area vadose zone investigation included geophysical surveys and shallow soil vapor sampling, with results provided in the 200 Area Phase I Status Report (NASA, 2013a). Phase II of the 200 Area vadose zone investigation evaluated the vadose zone at specified targets: the two HWMU closures, and the six areas of interest identified in the Phase I investigation. Soil borings and multi-port soil vapor monitoring wells were installed. Results will be provided to NMED in the 200 Area Phase II Investigation Report (NASA, in press).

3.3.2 600 Area

The eastern 600 Area buildings and structures include buildings for transfer of WSTF site water and groundwater assessment support buildings containing generators, gas cylinders, tools, and equipment necessary for performing groundwater assessment activities ([Figure 3.2](#)).

As seen in [Figure 3.2](#), the eastern 600 Area contains four SWMUs, the 100 Area wastewater lagoon (SWMU 2, managed in accordance with DP-392), the terminus of the 200 Area HWTLs (SWMU 10), the 600 Area burn pit (SWMU 15) and the 600 Area overflow wastewater lagoon (SWMU 34, managed in accordance with DP-392), and one HWMU, the former 600 Area surface Impoundments that historically contained dilute hazardous waste resulting from 200 Area laboratory operations. This HWMU was closed in 1989 as an interim landfill. An HWMU investigation was completed in March 2011 (NASA, 2011) with NMED approval of the 600 Area Closure Investigation Report on June 9, 2011 (NMED, 2011).

There are two additional 600 Area SWMUs that are not located in the eastern 600 Area and are therefore not shown on [Figure 3.2](#). These SWMUs are the jet propellant test areas (SWMU 14) and the BLM or 600 Area off-site soil pile (SWMU 16). Both SWMUs are located to the west of the industrial area with access via the WSTF Well Road.

3.4 Current Uses of Adjoining Properties

[Figure 3.3](#) is a map showing the WSTF industrial areas. The locations of adjoining properties are discussed below in relation to the 200 Area and 600 Area.

3.4.1 100 Area

The 100 Area is located to the southeast of the 200 Area and to the east of the eastern 600 Area. This area contains administration and WSTF site support buildings, including emergency services (fire department and dispensary), security offices, a fueling station for government vehicles, a gymnasium, heavy equipment facilities, warehouse facilities, storage buildings, and maintenance facilities. SWMUs within the area include the 100 Area burn pit (SWMU 1), the 100 Area wastewater lagoon (SWMU 2, managed in accordance with DP-392), the 100 Area container storage area (SWMU 3), two 100 Area septic tanks (SWMUs 21 and 22), and two firing ranges (WB-2 [SWMU 31] and the active firing range [AOC 53]).

To the east of the 200 Area are Quartzite Mountain and the SAM. This area is within the boundaries of WSMR, and only activities associated with WSTF and WSMR are conducted. Access to WSMR is restricted.

3.4.2 800 Area

The 800 Area is located adjacent to the 200 Area to the northeast ([Figure 3.2](#)). This area performs tests for ignition and combustion characteristics on a variety of materials in various liquid and gaseous atmospheres for aerospace, aircraft, medical, and industrial applications. Compatibility assessments and post-fire failure analyses are performed to identify potential problems and fire causes to recommend design criteria and avoid future real-world fires. The 800 Area contains a control building, eight reinforced concrete test cells, various test support structures, and test support systems for the pressurization, storage, and handling of cryogenic materials and oxygen.

SWMUs located within the 800 Area include an oxidizer burner (SWMU 20) and a below grade storage tank (SWMU 19) for temporary storage of diluted and residual testing fuels. The 800 Area also contains a septic tank that services Buildings 802 and 803 that is managed in accordance with DP-392.

4.0 Historical Records Review

4.1 Record Sources

Reasonably ascertainable and practically reviewable records relevant to the 200 Area history, operations, and environmental conditions were selected and reviewed dating back to the construction of WSTF in the 1960s. The type and location of these records are as follows:

- NASA Environmental Records - Located on site in the WSTF Environmental Department and available in both paper copy and electronic form. They include:
 - Resource Conservation and Recovery Act (RCRA) Part A and Part B Permit Applications, reports, and correspondence.
 - RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) reports and correspondence (RFI work plan, soil contamination assessments, shallow soil gas and soil boring investigations).
 - Closure records (closure plans, applications, reports, and correspondence).
 - Spill reports.
 - UST records.

- o Environmental activity and WSMR quarterly reports.
 - o SWMU operating records.
 - o Laboratory reports.
 - o Internal WSTF documents (memorandums, reports, discrepancy reports [DRs], and test preparation sheets [TPSs] that describe hazardous waste handling and systems modifications).
- NASA Drafting Records - Located on site in the WSTF Projects Department; paper copy files and some electronic copies containing historical report plates and diagrams relating to the 200 Area were reviewed.
- NASA Photograph Archives - Located on site in the WSTF Photography Laboratory; negative logs were reviewed and pertinent photos were reprinted for review.
- WSMR Geographic Information System (GIS) Laboratory - Located at WSMR, the GIS Lab provided digital images of the WSTF area on file for review.
- New Mexico Bureau of Mines and Mineral Resources - Publications on the geology of the area were reviewed.
- United States Geological Survey (USGS) - Topographic maps and historical aerial photographs were reviewed.

4.2 Interviews and Questionnaires

In addition to the review of historical records, interviews with current long-term and retired WSTF personnel were also conducted. A summary of information obtained from interviews is provided in [Appendix A](#).

5.0 Operational History

The 200 Area HWTLs were a system of 2-inch (in.), 3-in., or 4-in. steel and PVC piping that conveyed aqueous hazardous waste from the 200 Area Laboratories Complex to several different discharge points and ultimately to the 600 Area HWMU. As waste management practices changed in the 200 Area, the HWTLs were modified and altered. Consequently, a discernible area defining the HWTLs have not been established. The nomenclature for the HWTLs were changed throughout the modifications and alterations depending on the final discharge point. The following section details the alterations that were completed on the HWTLs from its initial usage to its final layout and therefore provides a discernible area which defines the SWMU 10 HWTLs.

5.1 Initial Construction

Beginning in 1964, with the construction of the 200 Area Laboratory Complex, the 200 Area HWTLs were constructed for use originally with two USTs: the first Clean Room UST (tank 806) and the concrete Chemistry Laboratory acid tank (NASA, 1985). The Clean Room UST was located on the west side or “front” of the Laboratory Complex and the Chemistry Laboratory acid tank was located on the east side or “back” of the Laboratory Complex ([Figure 5.1](#)).

5.1.1 200 Area Clean Room Tanks (I and II) Lines

Wastes generated from cleaning activities were gravity fed through single wall stainless steel pipes to the original Clean Room tank UST (Tank 806; I) which was located outside Building 200 to the west, in front of the Laboratory Complex. This system was used until late 1978 or early 1979. Due to capacity and integrity issues with the original Clean Room tank, a second tank (Clean Room tank II) was installed to replace the original Clean Room tank. This occurred in 1978 or early 1979. The drain lines were reconfigured and wastes were gravity-drained from 50-gallon (gal) sinks in the precision Cleaning Room

and from the sump of the outdoor Clean Room pad to the tank using 3-in. diameter, schedule 10, grade 304 stainless steel lines, and the tank was connected to the drain lines using 3-in. schedule 40 carbon steel (NASA, 2012d).

5.1.2 200 Area Chemistry Laboratory Tanks Lines

The Chemistry Laboratory acid tank was installed in 1964, had a 1,000-gal capacity, and was constructed of 8-in. thick reinforced concrete with dimensions of 7 ft by 4 ft, 10 in. in width and 8 ft 8 in. in depth. This was the original UST for Chemistry, Metallurgy, Photography, and Etching Room Laboratories wastes. The tank was installed with marble chips or oyster shells in the base in order to assist with neutralizing the acidity of wastes within the tank. According to historical drawings, the Chemistry and Metallurgy Lab lines connected to the Photography and Etching Room lines in a common header and wastes were gravity fed through acid-resistant 4-in. cast iron lines to the Chemistry Laboratory acid tank located outside Building 200 to the east, referred to as the “back” of the Laboratories Complex. The first documented modification to the lines occurred in 1966, when the cathodically-protected steel Chemistry Laboratory UST was added to the system to increase the waste storage capacity. The pipes were reconfigured to allow hazardous waste to flow into and through the concrete Chemistry Laboratory acid tank to the steel Chemistry Laboratory UST. Piping extended from the acid tank to the south and into the Chemistry Laboratory UST (U.S. EPA, 1986; [Figure 5.2](#)). From an independent audit conducted in late 1986, the Chemistry Laboratory tanks were described to be used “...until mid-1986 when these tanks were taken out of service” (NASA, 1986h). Additionally, from information regarding SWMUs and waste management practices submitted to DeLeuw, Cather & Company in August 1985, it was stated, “Prior to 1968, wastes discharged to the tanks would overflow into a nearby ditch. At that time, WSTF began the practice of pumping the waste into a tanker truck and transporting it to the 600 Area surface impoundments” (NASA, 1985). From these two documents, it is suggested that the Chemistry Laboratory acid tank system was used until mid-1986. The acid tank was inspected to determine when it needed to be emptied. The waste was pumped from the tank and transported to the 600 Area HWMU Impoundments when the acid tank reached capacity. A TPS describing the removal of the Chemistry Laboratory Acid Tank indicated that the acid drain line was cut and capped on both the east and west side of the acid tank (NASA, 1986k). A construction drawing (#284-12541-A) indicates the acid drain line may have been abandoned in-place.

5.2 HWTL Construction to 600 Area HWMU Impoundments

In the early to mid-1980s, NASA began generating and maintaining environmental records and continued altering and developing processes and waste management practices to reduce waste and the potential for impact on the environment. In a pollution abatement report to NASA headquarters in June 1984, NASA proposed constructing aboveground evaporation tanks at WSTF to store hazardous waste in order to cease using both the USTs and the 600 Area Impoundments, which were not specifically designed for waste disposal (NASA, 1984a). In the interim, NASA proposed constructing a hazardous waste drain (transmission) line that would transport (by gravity) 200 Area hazardous wastes directly to the 600 Area Impoundments. This would eliminate both the use of all 200 Area USTs and the transportation of waste by truck (NASA, 1984a).

Construction to reroute the hazardous waste transmission lines from the USTs directly to the 600 Area HWMU Impoundments began in April 1986. This line was constructed of stainless steel in the 200 Area and 3-in. (not 2-in., as was originally proposed) PVC to the 600 Area Impoundments (NASA, 1986h). On April 22, 1986, breaches in the Clean room tank (II) were identified, resulting in an immediate alteration in the drain (transmission) line system. The lines were temporarily routed to a 1,000-gal aboveground tank for waste storage until the construction of the hazardous waste transmission lines from the 200 Area to the 600 Area Impoundments could be completed (NASA, 1986a). From a WSTF Environmental

Compliance Program presentation in December 1986, a description of the HWTLs indicated the lines were underground ([Figure 5.3](#)). There are no documents that describe the connection of the Chemistry Laboratories (Chemistry, Metallurgy, Photography, and Etching Room that were connected to the Chemistry Laboratory acid tank) and the 3-in. stainless steel. However, site personnel interviews confirm the HWTL “did extend from the Chemistry and Metallurgy Laboratories around the south highbay and joined the main line there.” In addition, drawings from a 1986 Failure Modes and Effects Analysis (FMEA) show how the 200 Area Clean Room and Chemistry Laboratories were connected to the installed 3-in. stainless steel HWTLs (NASA, 1986j; [Figure 5.5](#)).

5.3 HWTL Operation and Cessation

By May 19, 1986, the HWTLs between the 200 Area and the 600 Area HWMU Impoundments were completed, and use of the lines began immediately; wastes were discharged from the 200 Area Laboratory Complex to the 600 Area Impoundments by gravity flow. There are no documents that record the volume of wastes transmitted through the HWTLs while in operation. However, Section 6.1 describes the types of wastes that were typically transferred to the 600 Area HWMU Impoundments prior to the operation of the HWTLs and after the cessation of the HWTLs.

On June 16, 1986, NASA received a Notice of Noncompliance issued from the Environmental Protection Agency (EPA) stating that NASA had lost interim operating status for the 600 Area Impoundments due to an inadequate groundwater monitoring system. All waste discharges to the 600 Area Impoundments were immediately ceased to comply with the EPA notice. Wastes continued being discharged through the HWTLs, but the HWTLs were reconfigured to connect to a 4,000-gal capacity portable tank truck located adjacent to the 600 Area Impoundments (NASA, 1986i). Wastes within the 4,000-gal tank truck were then shipped off site for disposal at an EPA-permitted incineration facility (NASA, 1986c).

This waste disposal configuration continued until July 30, 1986, when a failure/leak of the hazardous waste transmission lines was discovered at the junction of the stainless steel and PVC lines in the 200 Area. Consequently, use of the PVC portion of the hazardous waste drain line system was immediately terminated, and the laboratory wastes were then collected in a portable 1,000-gal capacity mobile tank, directly from the stainless steel HWTLs. The mobile tank was relocated to the terminus of the stainless steel drain lines on August 1, 1986 (NASA, 1986b). This new configuration is illustrated in [Figure 5.5](#) and a photograph taken in September 1986, also shows this configuration ([Figure 5.6](#)).

An investigation into hazardous waste flows from the 200 Area into the 200 Area waste tank, located south of the South Highbay, was conducted in August 1986 to determine which rooms/laboratories were dispensing liquids into the waste tank. NASA formed an investigation team directed to “... isolate and catalog all sources of flow into the hazardous waste tank” (NASA, 1986h). The investigation team located all flow sources in Buildings 200 and 203 and traced the drainage of each of the sources. Four sources of uncontrolled or unnecessary drainage were located and actions were taken to eliminate or reroute the sources.

The 1,000-gal mobile tank did not contain sufficient capacity to store all 200 Area hazardous waste generated until transportation off site could be arranged. Therefore, beginning in September 1986, wastes were transferred from the 200 Area mobile tank truck to the 19,700-gal capacity historical oxidizer storage tank within the 500 Area (NASA, 1986g). According to long-term WSTF employees, wastes were shipped off site from this 500 Area tank approximately once per month.

In September 1986, the PVC section of the HWTL that ran from the 200 Area to the 600 Area line was triple-rinsed and abandoned in-place (NASA, 1986h). According to site personnel, “a section of the PVC line was excavated and a small portion of the line in the arroyo was cut in order to drain any remaining

water from the lines. There was only about five gallons of fluid left in the lines.” Three samples of the HWTLs rinsates were collected and analyzed for total organic carbon and chromium. The results indicated there was less than 25 ppb of chromium and 24 ppm of total organic carbon.

On February 5, 1987, the upper HWTL system underwent another modification in the 200 Area, when NASA began using two rented 6,000-gal capacity hazardous waste mobile tankers (NASA, 1987a). The HWTLs were modified to extend to the top of the two mobile tankers ([Figure 5.7](#)). This configuration was used until the ETU was completed and available for use in 1988.

On January 4, 1990, NASA submitted a Notice of Intent (NOI) request to the New Mexico Environmental Improvement Division (NMEID) to construct an additional 600 Area overflow wastewater lagoon cell (southeast of the first cell; NASA, 1990a). The new wastewater lagoon would be located to the southeast of the original. “Construction specifications for the proposed lagoon will be similar to the existing lagoon except that the impervious clay liner will be increased from 1 to 2 feet” (NASA, 1990b). This statement refers to the thickness of the clay liner at the bottom and inside slopes of the proposed wastewater lagoon. Another description was provided in the RFI, “In February 1990, a second similar-sized overflow lagoon was put into service beside the first overflow lagoon to increase the surface area available for evaporation and to provide additional storage area” (NASA, 1996). There are no construction records detailing how the HWTLs were removed for the 600 Area overflow wastewater lagoon cell. However, based on personnel site knowledge, when the second 600 Area overflow lagoon was constructed in 1990, the remaining HWTLs in the area from the 200 Area sewage lagoon to the 600 Area Surface Impoundments were removed. The line was then capped off approximately 100 to 150 ft from the 600 Area lagoon, “out into the desert.” Originally, the hazardous waste line was capped “where the hydrant is or where the trailer hole was located below the 200 Area,” in the arroyo, and near the end of the line at the surface impoundments.

5.3.1 200 Area ETU and Hazardous Waste Drain Lines (HWDL)

As mentioned in Section 5.2, NASA constructed the HWTLs from the 200 Area to the 600 Area HWMU Impoundments as an interim solution while the long-term solution (evaporation tanks) were being constructed. The first document at WSTF that proposed the ETU was a pollution abatement memorandum to NASA headquarters in June 1984 (NASA, 1984a). This document states that the project was to, “construct a concrete double lined storage tank in the laboratory area to accept dilute solutions of acids, bases, solvents, and caustics. These wastes are presently trucked to lined evaporation ponds which were not specifically designed for this purpose. The proposed storage tank would be designed and built to meet EPA requirements under CFR 40, Part 264, and would provide increased safety to the environment” (NASA, 1984a). This system was proposed to NMEID in a letter dated November 7, 1984 (NASA, 1984b). The ETU was proposed as a long-term solution to managing hazardous waste “which will provide for compliance with EID and EPA rules governing hazardous waste.” In order to obtain the appropriate funding, design of the facility was planned for 1987, with construction of the ETU scheduled for 1988.

The Clean Room area underground HWTLs were retrofitted with secondary containment and re-routed to a common header on the east side of the building during a Clean Room overhaul (NASA, 1987b). A new building was constructed which overlaid the location of the Clean Room USTs after they were removed. The Chemistry Laboratories underground HWTLs were also retrofitted with secondary containment and replaced with polypropylene piping. New connections from the interior sinks and fume hoods in the Chemistry Laboratories were installed to meet a common header between Building 200 and Building 203 below grade. These new lines became what is referred to as the hazardous waste drain line (HWDL). There are no records that indicate when the 3-in. stainless steel lines from the Clean Room (west side of 200 Area Complex) and Chemistry Laboratories (east side of 200 Area Complex) ceased operation. The

HWDL was connected to the ETU system which allowed liquid waste to gravity-flow from the 200 Area Laboratory Complex and the 800 Area Hazardous Fluid Testing Area (HFTA) to the ETU.

Based on photographic evidence, approximately in May 1990, the mobile tankers (located south of the South Highbay) were removed from service and the remaining HWTLs were rerouted to discharge liquid waste into the ETU until the HWDL system was completely functional ([Figure 5.8](#)). A work document describes cutting and capping the stainless steel portion of the lines and re-routing to the ETU, however there are no records detailing the removal of the remaining 3-in. stainless steel pipe located at the ETU (NASA, 1988).

The ETU system ([Figure 5.9](#)) was in operation from February 1990 to December 9, 2012, when the ETU received the last discharge of hazardous waste. The ETU treated aqueous wastes by evaporation and consisted of two circular, flat-bottomed, open-top, carbon steel tanks lined with two 30-mil PVC liners in each tank. In January 2010, NASA opted to phase out the ETU and closure activities were initiated in July 2012 and consisted of ETU waste phase separation, characterization, and disposal; hazardous waste drain line decontamination, verification, and partial removal; ETU primary and secondary liner inspection; ETU tank structural assessment and deconstruction; soil sampling and verification; and waste management and disposal (NASA, 2012b). The ETU was cleaned closed with NMED approval of the Certification of Closure Report on September 5, 2014 (NMED, 2014).

5.4 SWMU 10 Abbreviated Investigation and Sanitary Sewer Construction

In January 2012, NASA was constructing the City of Las Cruces (CLC) sewer project, where WSTF sanitary sewer lines will be connected to the CLC Municipal Wastewater Treatment Plant, when it was identified that planned sewer line excavations would intersect with certain points along the abandoned HWTLs. The initial sewer line construction drawings indicated that excavations would occur in three locations of the abandoned HWTLs ([Figure 5.10](#) and [Figure 5.11](#)):

- In the 200 Area South Highbay parking lot,
- Near the 200 Area ETU access road, and
- In the 600 Area, between the 600 Area sewage lagoon and the 600 Area HWMU Closure.

The sanitary sewer lines for the CLC sewer project were re-routed to the east of the 200 Area ETU location, which eliminated the potential intersection point at the 200 Area South Highbay parking lot. Thus, only two potential intersection points required investigation.

In March 2012, NASA submitted an Abbreviated Investigation Work Plan for SWMU 10 Soil Removal (SWMU 10 AIWP; NASA, 2012a) to NMED to conduct a soil investigation and removal of the two intersection points with the HWTLs. The objective of the SWMU 10 AIWP was to expeditiously conduct a soil investigation and soil removal to prohibit delays in the CLC sanitary sewer project construction schedule. NMED approved the SWMU 10 AIWP for implementation in April 2012 (NMED, 2012a).

Field work for the SWMU 10 AIWP began on May 23, 2012 in the 200 Area near the ETU access road entrance and was completed in late August 2012 at the 600 Area, between the 600 Area sewage lagoon and the 600 Area HWMU Closure. Due to inconsistent historical records of the exact location of the HWTLs in the 200 Area and 600 Area, potholing within the speculated vicinity of the HWTLs was conducted in an attempt to definitively locate the lines.

The HWTLs in the 200 Area were located in the field and were recorded using global positioning system (GPS) technology. Approximately 125 ft of HWTLs were removed. The removal and disposition of the HWTLs followed disposal procedures referenced in the SWMU 10 AIWP (NASA, 2012a).

Approximately 15 ft³ (~116 gal) of investigative derived waste soil was removed from beneath the HWTLs and was collected in an investigation-derived waste bulk container. Due to the nature of the wastes transmitted through the HWTLs, the soil was managed under the “Contained-In Policy” with the potential to contain listed hazardous wastes as defined in Hazardous Waste for Non-specific Sources (2012). The soil was sampled, analyzed, and verified not to contain any of the potential listed hazardous wastes (NASA, 2012e). An approved no longer contained-in determination for the soil was received August 10, 2012 from NMED and the soil was returned to the trench to use as backfill (NMED, 2012b).

Facility workers were unable to locate the HWTLs in the 600 Area by potholing. This resulted in no soil investigation or HWTL removal in the 600 Area. An Abbreviated Investigation Report (AIR) for SWMU 10 Soil Removal was submitted to NMED on October 9, 2012 (NASA, 2012f). The AIR provided the project background, project summary, waste management procedures, conclusions, and area maps pertinent to the investigation. On January 16, 2013, NMED approved the AIR (NMED, 2013a).

On December 4, 2012, NASA CLC sanitary sewer project construction crews inadvertently intersected a portion of buried 3 ft PVC pipe. Upon further inspection in the field, it was determined that the unknown 3 ft PVC pipe was the remaining HWTLs that had not been located in the 600 Area during the SWMU 10 Investigation. The location of the 600 Area HWTLs were recorded using GPS technology. Approximately 12 linear ft of HWTLs were removed and approximately 8 cubic yards (yd³) of soil was removed from beneath the HWTLs, which were placed adjacent to the trench. Composite soil samples were taken in accordance with the SWMU 10 IWP. The results of the sampling event indicated that there were no detectable concentrations of contaminants in the soil beneath the HWTLs. Subsequent to analytical result verification, the soil was used as backfill for the sanitary sewer construction project. The removed section of HWTL was triple-rinsed and disposed of in a solid waste receptacle. The rinsate was discharged to the 200 Area ETU. A final Abbreviated Investigation Report Addendum for SWMU 10 Soil Removal was submitted to NMED on March 12, 2013 (NASA, 2013b), as an update to the SWMU 10 AIR. On March 20, 2013, NMED approved the Addendum for SWMU 10 Soil Removal (NMED, 2013b).

In addition, exposed sections of the PVC HWTLs located in Gardner Springs Arroyo which were initially cut during the PVC integrity test, were washed out due to naturally occurring run-off in the arroyo. On May 8, 2014, approximately 30 ft of HWTLs were removed from the arroyo and were managed and disposed of in accordance with the SWMU 10 AIWP.

6.0 Findings

6.1 Evidence of Hazardous Substances

In an independent environmental audit conducted by Robert J. Silver in September 1986, it was determined that wastes that were discharged to the 600 Area Impoundments were “dilute waste chemicals” (NASA, 1986h). Also mentioned in the audit were typical chemistry laboratory wastes generated:

- Spent halogenated solvents (carrying F001 and F002 EPA waste codes);
- Heavy metals such as cadmium, chromium, and lead (carrying D006, D007, and D008 EPA waste codes, respectively); and
- Solvents (carrying F005 EPA waste code).

A 200 Area Process Flow Diagram provided in the audit shows the typical waste streams generated in the 200 Area that were discharged to the 600 Area Impoundments (NASA, 1986h; [Figure 6.1](#)).

6.2 Indication of Releases to the Environment

The following describes documented significant and minor releases of hazardous substances to the environment due to spills and/or ineffective historical waste management practices from the HWTLs. There were no official records of hazardous substance releases to the environment at WSTF prior to the mid-1980s, when regulations initiated reporting requirements. NASA began reporting releases in notification letters to the NMEID and internal spill log documents in the mid-1980s. Spill notifications and reports are provided in [Appendix B](#).

The first documented spill from the 200 Area HWTLs occurred July 30, 1986. The spill report which references this spill record (see Section 5.3.1) refers to the lines as the “hazardous waste drain lines,” which are not to be confused with the ETU HWDL. The leak occurred where the stainless steel portion joined the PVC portion and was reported in the Shallow Soil Gas Investigation as approximately 50 ft southeast of the 200 Area (GCL, 1986). Waste to the impoundments had ceased June 16, 1986 (See Section 5.3 for a history of the lines); however, these HWTLs were still in service and discharged into a mobile tank located adjacent to the 600 Area Impoundments. The spill incident reports, “The visible extent of contamination included approximately 20 gallons of free liquid, a patch of wet soil approximately 4 ft in. diameter immediately adjacent to the leak source, and a narrow strip of damp soil approximately 20 ft long in the bottom of the trench in which the PVC pipe is located” (NASA, 1986b).

Directly following the first documented release from the 200 Area HWTLs, there was an overflow of the mobile hazardous waste tank that occurred on August 5, 1986. The tank had already been relocated to the terminus of the stainless steel portion of the 200 Area HWTLs when the leak occurred. There was no spill report filed, and the amount spilled is unknown. This spill was documented in a hazardous waste drain line inspection log (not to be confused with the ETU HWDL; NASA, 1987b). In response to this tank overflow release, all sources of drainage to the 200 Area HWTLs were identified, verified, and unnecessary sources eliminated or rerouted. Also, documentation was written and personnel trained on a system of valve openings and closures for waste transfer to the hazardous waste drain lines, and a liquid level sensor with a warning alarm was installed in the mobile tank (NASA, 1986f). While investigating the cause of the August 5, 1986 overflow, further leaks were discovered. From an interdepartmental communication on August 20, 1986, discussing the investigation of the 200 Area Hazardous waste drain lines, the following statement was made:

“Investigation into all sources of drainage from Building 203 commenced on 18 August. Six rooms have been initially investigated but two unexpected conditions in the drain lines have temporarily halted further investigation in Building 203. These conditions are a leaking flex hose located at the terminus of the drain line and an apparent partial blockage of the drain line downstream from the valve pit, possibly on the southeast corner of the drain line. Discrepancy Reports to correct these conditions prior to continuation of the investigation have been initiated” (NASA, 1986d).

An inspection log of the hazardous waste drain lines confirms an additional leak on August 20, 1986. The amount spilled was not recorded; however, in an internal WSTF document written August 25, 1986, instructions are provided for excavating approximately 1 yd³ of wet contaminated soils from the pit south of the 200 Area where the mobile 1,000-gal tank trailer was located (NASA, 1986e).

An internal WSTF document was written November 16, 1987, for the removal of contaminated soils from the 200 Area near the two rented mobile 6,000-gal capacity hazardous waste tankers (NASA, 1986j). There was no spill report filed; however, removing contaminated soils suggests there was a leak or overflow of the mobile tanks (NASA, 1987c).

6.3 Spill Reports

Waste management practices or spills of hazardous substances from the HWTL, not discussed above, are included here. Also noted, documented spills from the HWDL (from the year 1990 to present) are not included in this section as they were included in the ETU Closure Plan and approved Certification of Closure. [Appendix B](#) contains all the NASA HWTLs (200 Area and 600 Area) spill reports and associated documentation.

6.4 Final HWTLs Layout

As mentioned in Section 5.0, due to the numerous alterations and modifications to the HWTLs, a discernible layout of the lines as they currently lay has not been established to define the SWMU area. Based on a review of the historical operations and records, the modification and transition from the HWTLs to the HWDL, and the activities associated with the 2012 SWMU 10 Abbreviated Investigation, a discernible layout of the SWMU 10 HWTLs has been identified ([Figure 6.2](#)).

7.0 Challenges and Limitations

It was not until NASA began the application process for a Hazardous Waste Operating Permit in the mid-1980s that detailed environmental data was collected, organized and files maintained. Therefore, the most significant data gap identified while conducting this historical research effort is the lack of records, including specific dates in which the 200 Area 3-in. stainless steel HWTLs were placed out of service and either abandoned-in place or removed. In addition, historical drawings do not identify precise or “to-scale” locations of the 200 Area 3-in. stainless steel HWTLs, which limits the ability to obtain precise locations of the HWTLs. Because of the 3-in. PVC, the 600 Area portion of the HWTLs were triple rinsed prior to being abandoned-in place and any additional activities associated with the lines were not recorded, as it was deemed a non-RCRA issue. These issues will be addressed in the SWMU 10 IWP.

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Sands Test Facility Location in Doña Ana County, New Mexico. New Mexico Environment Department, Santa Fe, NM.

NMED. Hazardous Waste Bureau. (2011, June 9). *Approval with Modifications 600 Area Closure Investigation Report and 200/600 Area Soil Gas and Groundwater Data Evaluation Report.* New Mexico Environment Department, Santa Fe, NM.

NMED. Hazardous Waste Bureau. (2012a, April 24). *Approval Abbreviated Investigation Work Plan for Solid Waste Management Unit 10 (SWMU 10), Soil Removal.* New Mexico Environment Department, Santa Fe, NM.

NMED. Hazardous Waste Bureau. (2012b, August 10). *Approval No Longer Contained-In Determination Solid Waste Management Unit 10 (SWMU 10) Soil Removal Investigation-Derived Waste.* New Mexico Environment Department, Santa Fe, NM.

NMED. Hazardous Waste Bureau. (2013a, January 16). *Approval Abbreviated Investigation Report for Solid Waste Management Unit 10 Soil Removal.* New Mexico Environment Department, Santa Fe, NM.

NMED. Hazardous Waste Bureau. (2013b, March 20). *Approval Abbreviated Investigation Report Addendum for Additional Solid Waste Management Unit 10 Soil Removal.* New Mexico Environment Department, Santa Fe, NM.

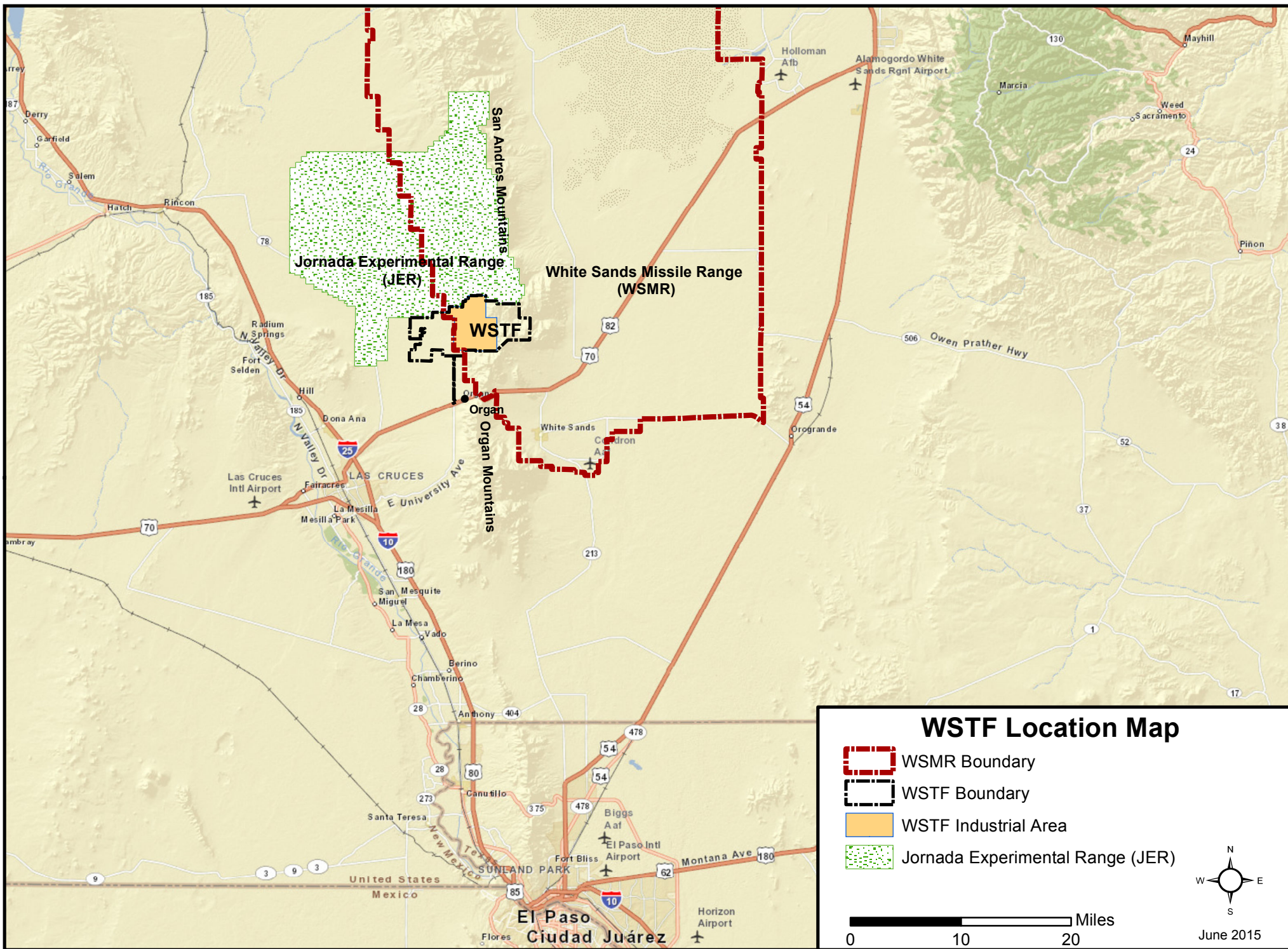
NMED. Hazardous Waste Bureau. (2014, September 5). *Approval Certification of Closure Report for the Evaporation Treatment Unit (ETU).* New Mexico Environment Department, Santa Fe, NM.

NMEID. (1989, November 1). *NM 8800019434 200, 300, 400, 600 Area Closure.* New Mexico Environmental Improvement Division, Santa Fe, NM.

U.S. EPA. (1986, December 11). *Memorandum- Revised RCRA Preliminary Assessment Evaluation.* United States Environmental Protection Agency, Region IV, Dallas, TX.

Figures

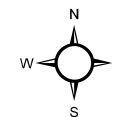
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WSTF Location Map

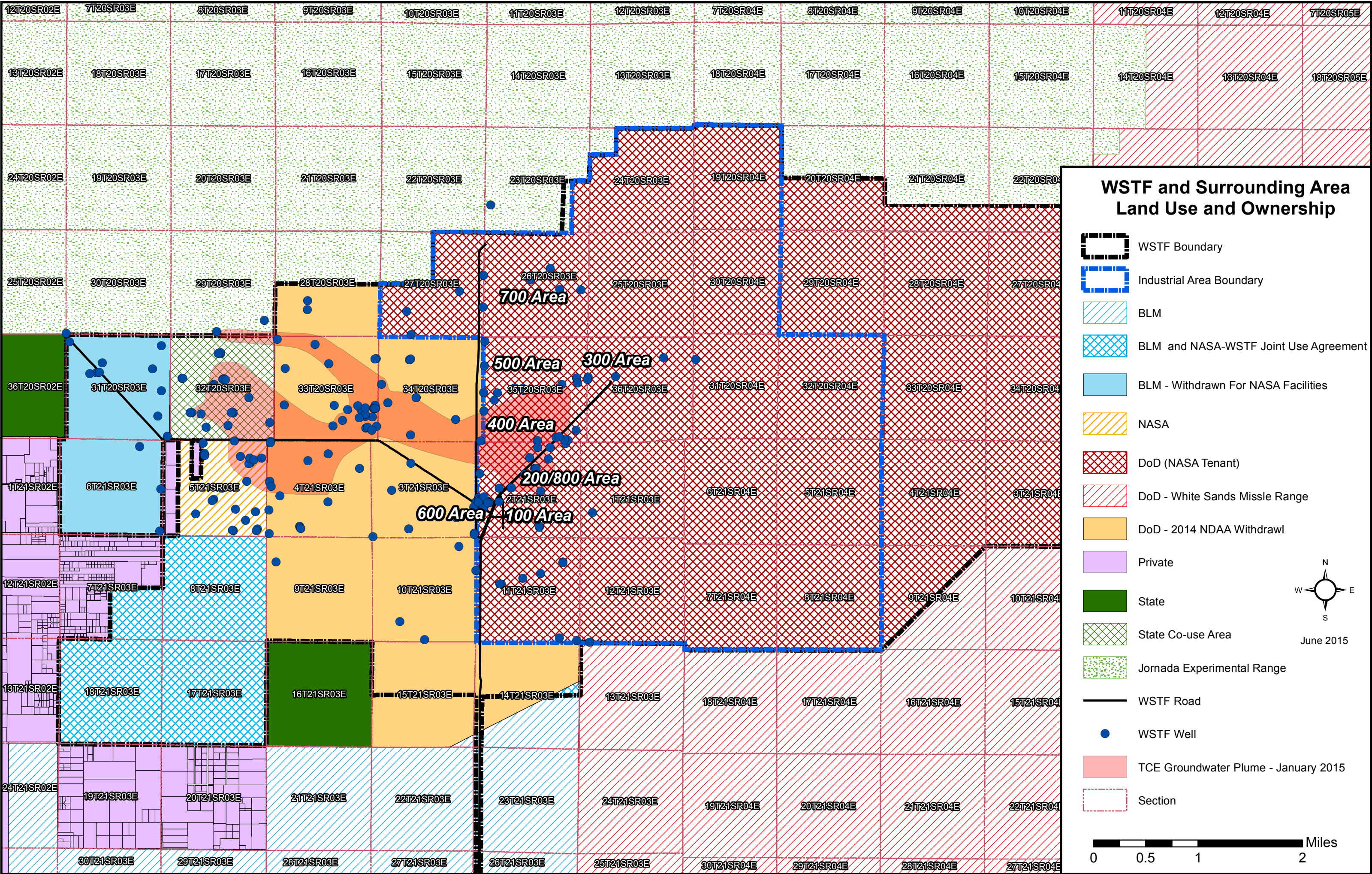
-  WSMR Boundary
-  WSTF Boundary
-  WSTF Industrial Area
-  Jornada Experimental Range (JER)

0 10 20 Miles

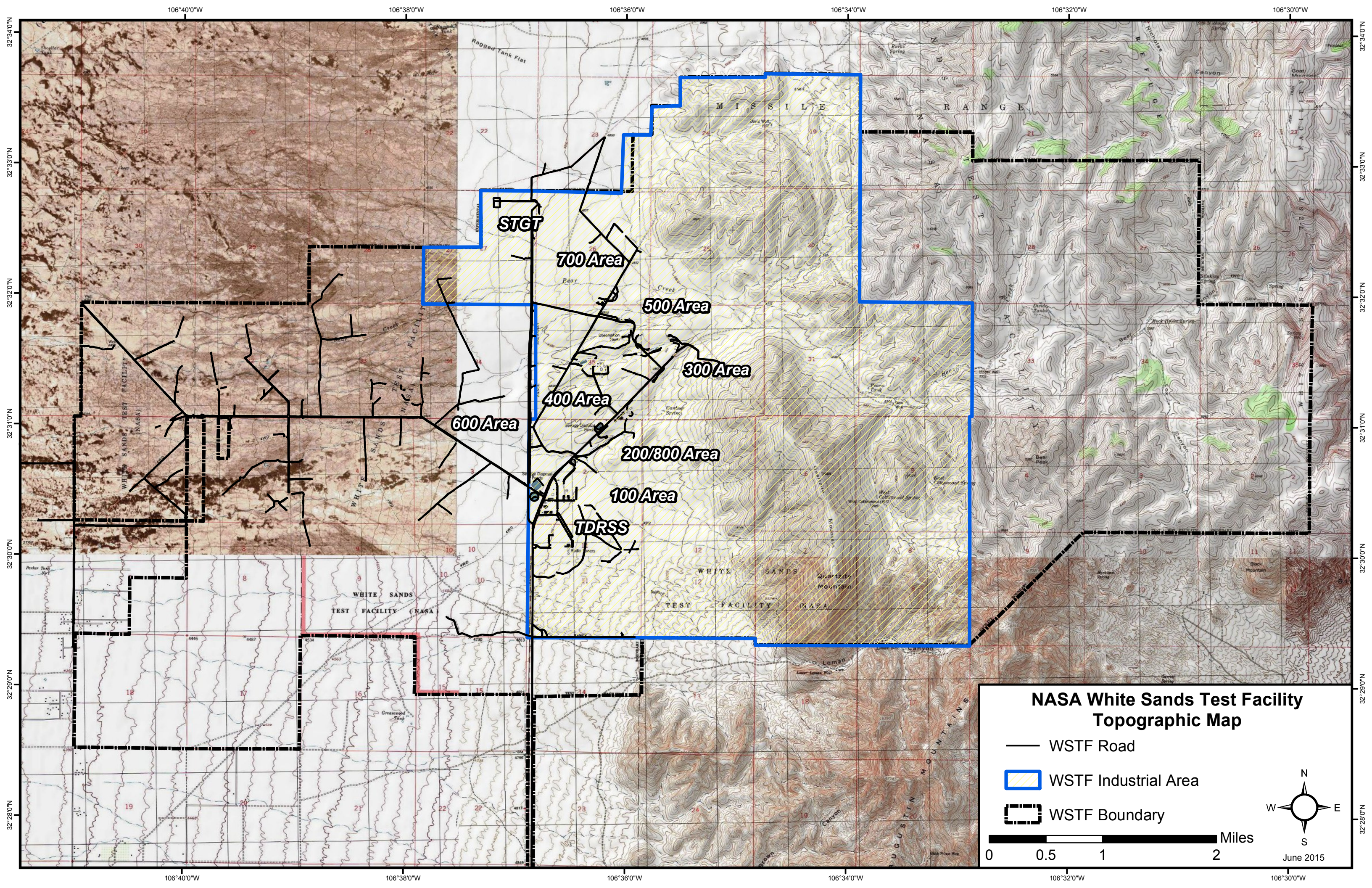


June 2015

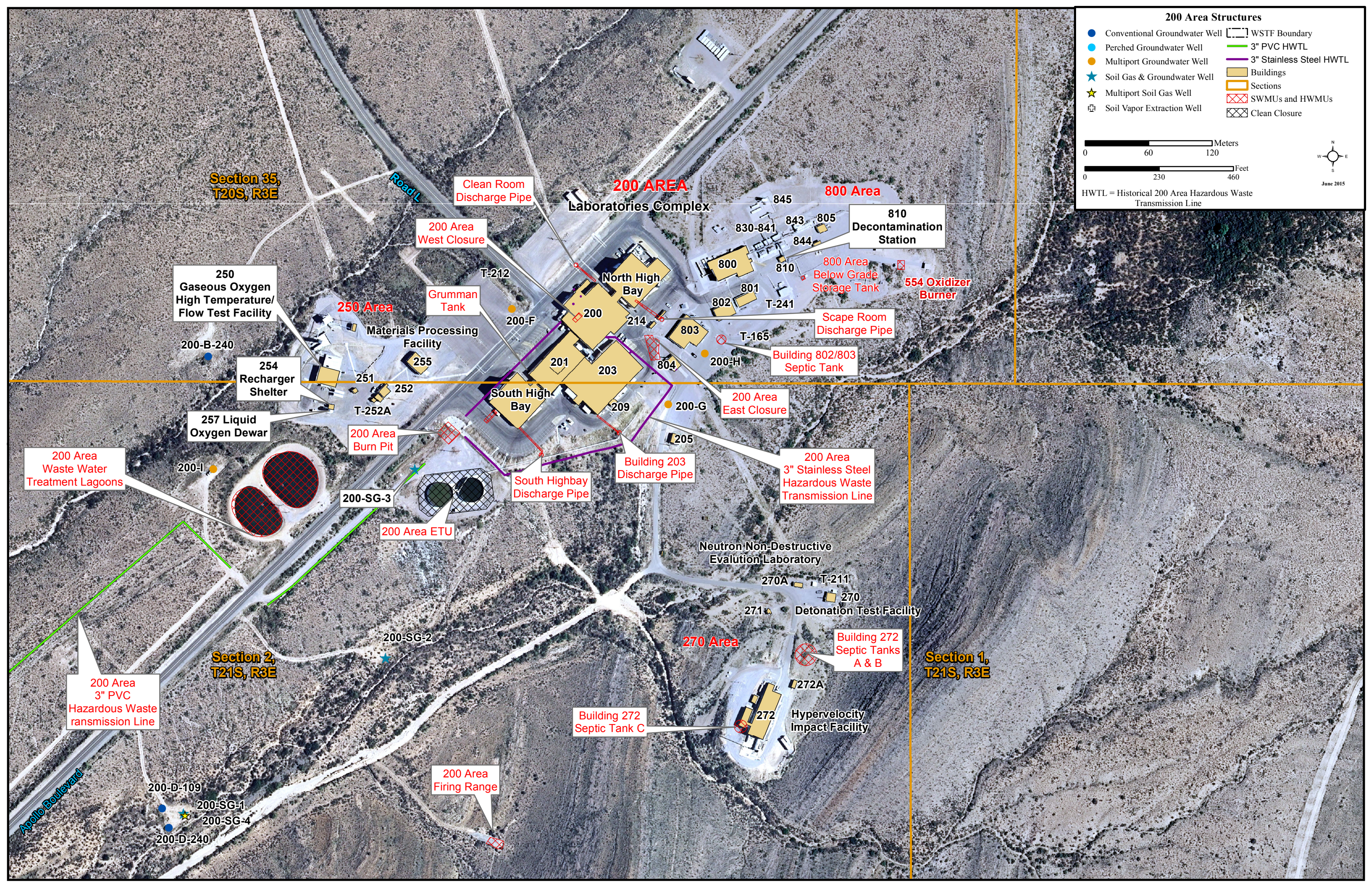
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200 Area Structures

- | | |
|---------------------------------|---------------------------|
| ● Conventional Groundwater Well | ▭ WSTF Boundary |
| ● Perched Groundwater Well | — 3" PVC HWTL |
| ● Multiport Groundwater Well | — 3" Stainless Steel HWTL |
| ★ Soil Gas & Groundwater Well | ▭ Buildings |
| ★ Multiport Soil Gas Well | ▭ Sections |
| ⊞ Soil Vapor Extraction Well | ▭ SWMUs and HWMUs |
| | ▭ Clean Closure |

0 60 120 Meters

0 230 460 Feet

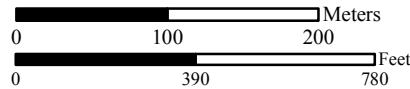
HWTL = Historical 200 Area Hazardous Waste Transmission Line



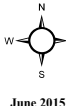
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100 Area Structures

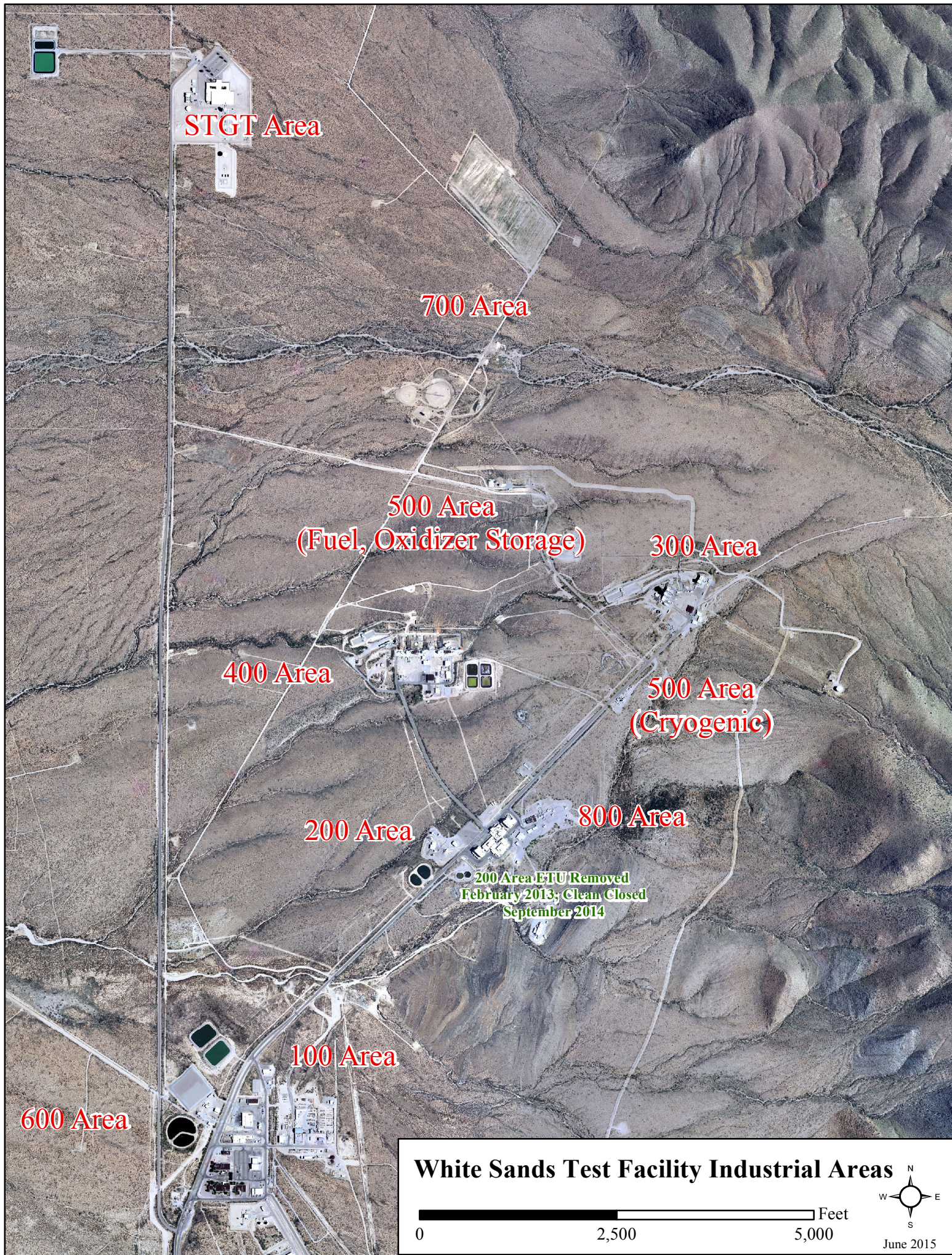
- | | |
|---------------------------------|-------------------|
| ● Conventional Groundwater Well | ▭ WSTF Boundary |
| ● Perched Groundwater Well | — 3" PVC HWTL |
| ● Multiport Groundwater Well | ▭ Buildings |
| ★ Soil Gas & Groundwater Well | ▭ Sections |
| ★ Multiport Soil Gas Well | ▭ SWMUs and HWMUs |
| | ▭ Clean Closure |



HWTL = Historical 200 Area Hazardous Waste Transmission Line



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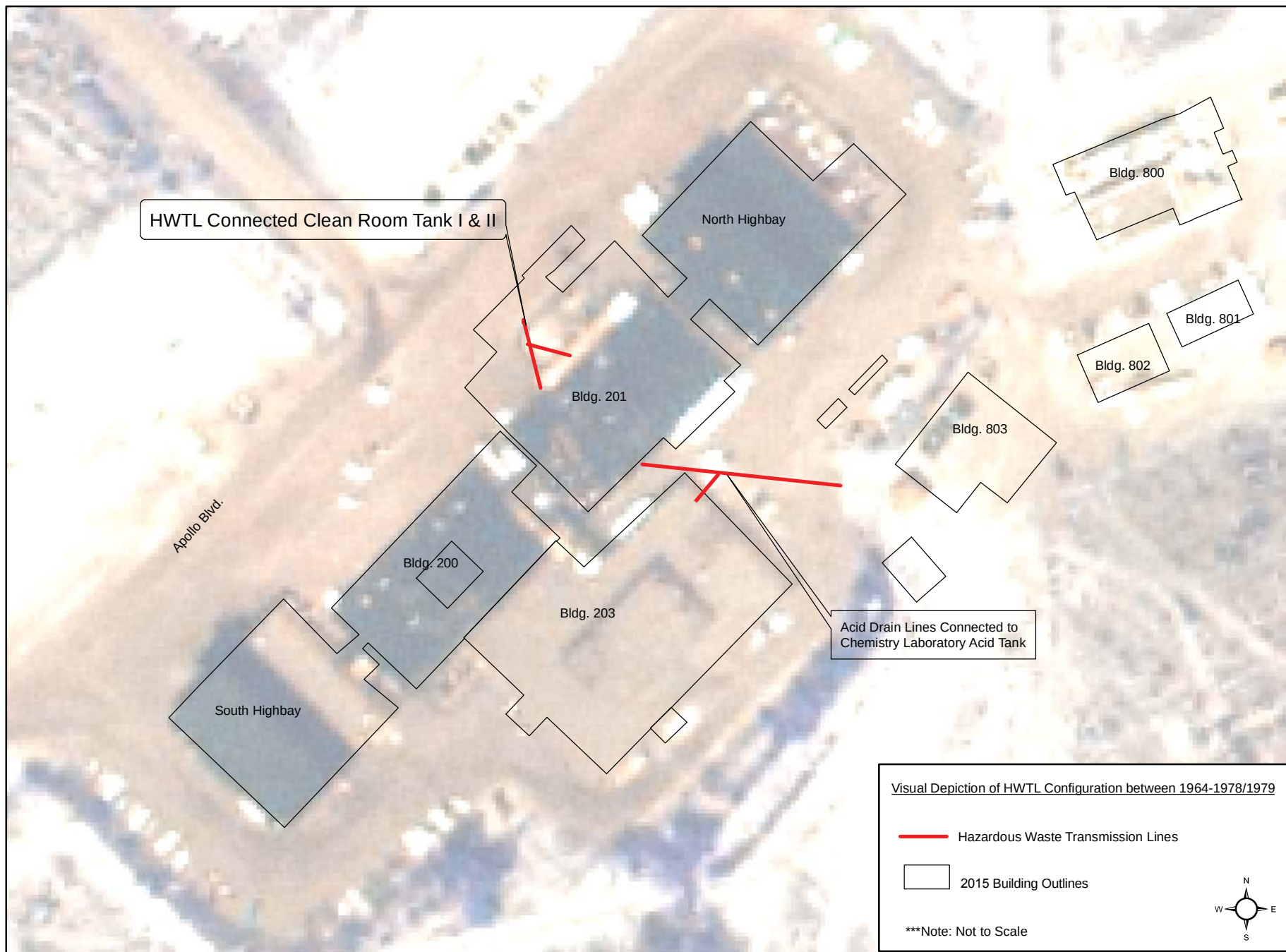


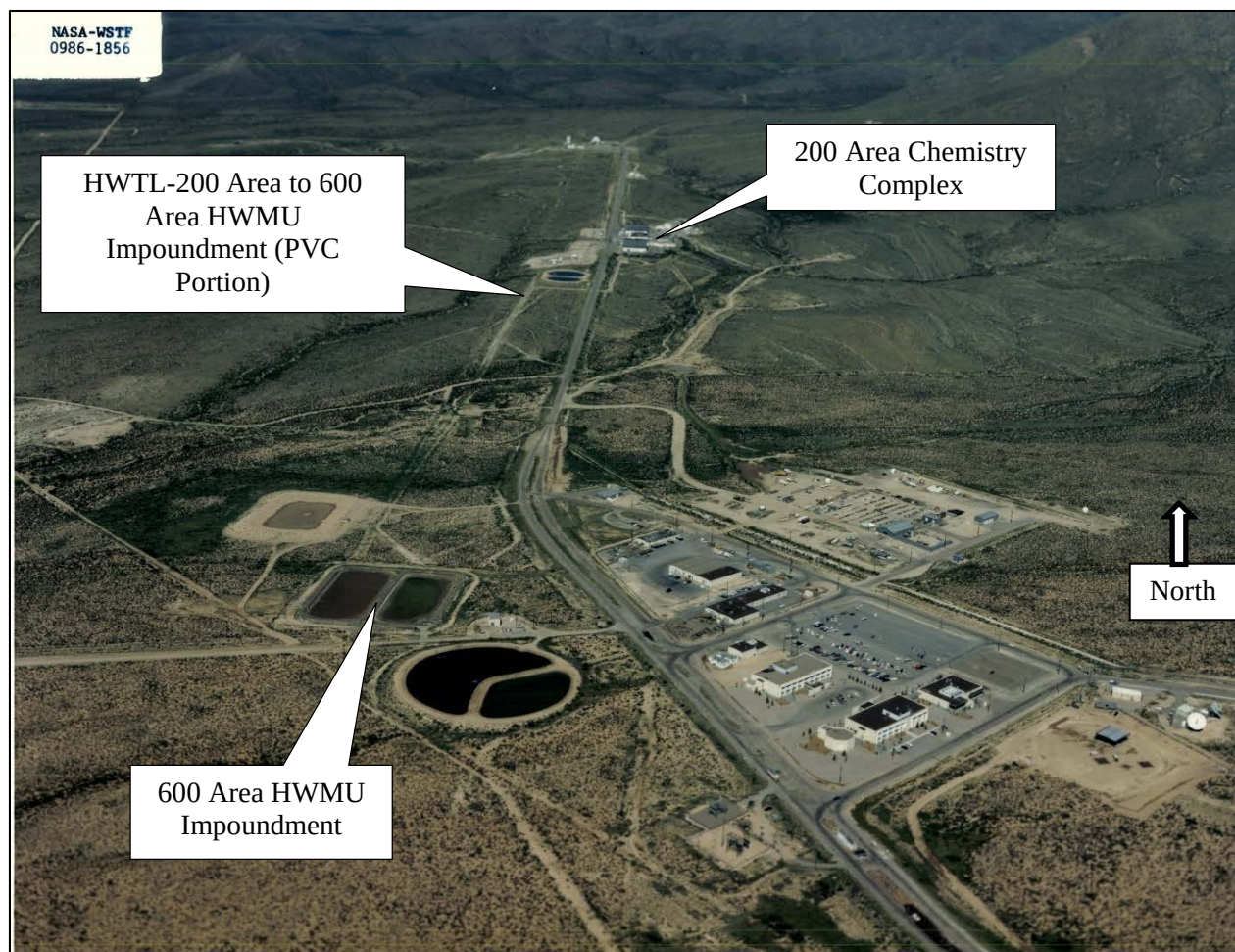
Figure 5.3

200 Area HWTLs Underground Installation (facing south)



This photograph shows the underground installation of the 3-in. stainless steel HWTLs on the west side of the 200 Area Laboratory Complex facing south.

Figure 5.4 View of the HWTLs Path from 200 Area to 600 Area (facing north)



This photograph shows a site view of the HWTLs path from the 200 Area Chemistry Laboratory Complex to the 600 Area HWMU Impoundment (facing north).

(SEE NEXT PAGE)

DRAWING 1

FMEA HWTL Drawing
November 17, 1986

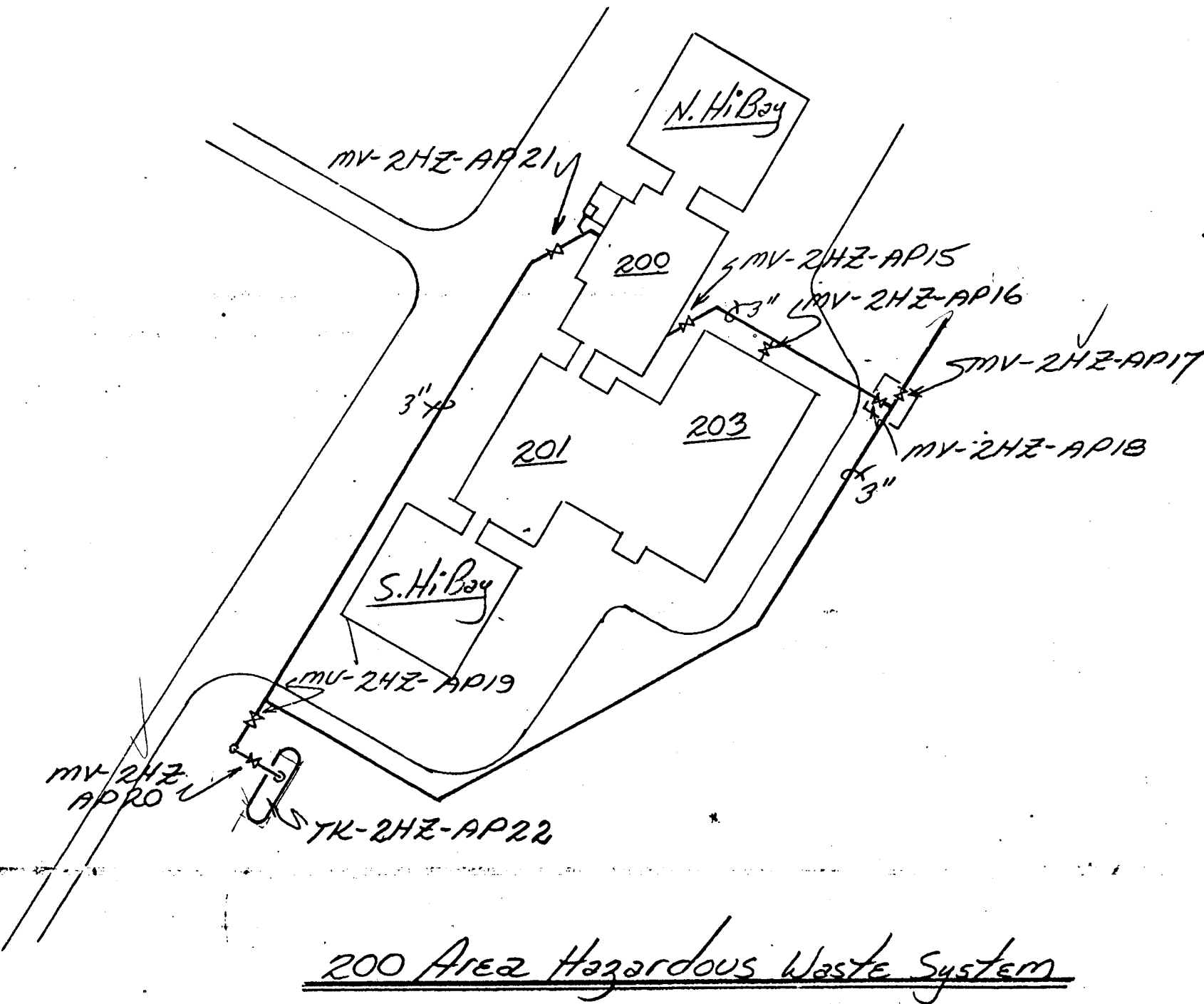


Figure 5.6

HWTLs after Relocation (facing west)



This photograph shows the HWTL configuration after relocating the mobile waste tanker to the terminus of the HWTL (facing west).

(SEE NEXT PAGE)

4

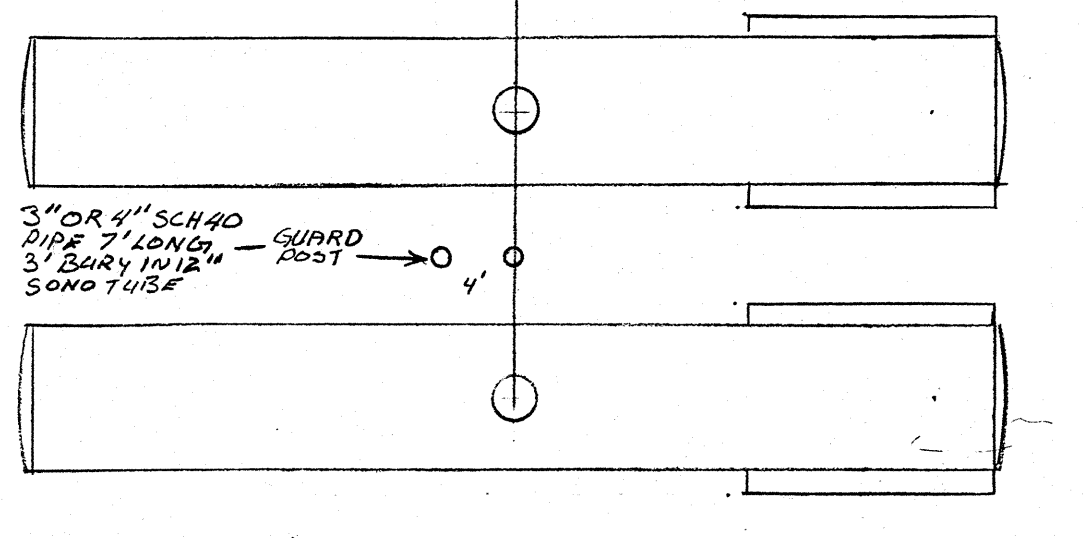
3

2

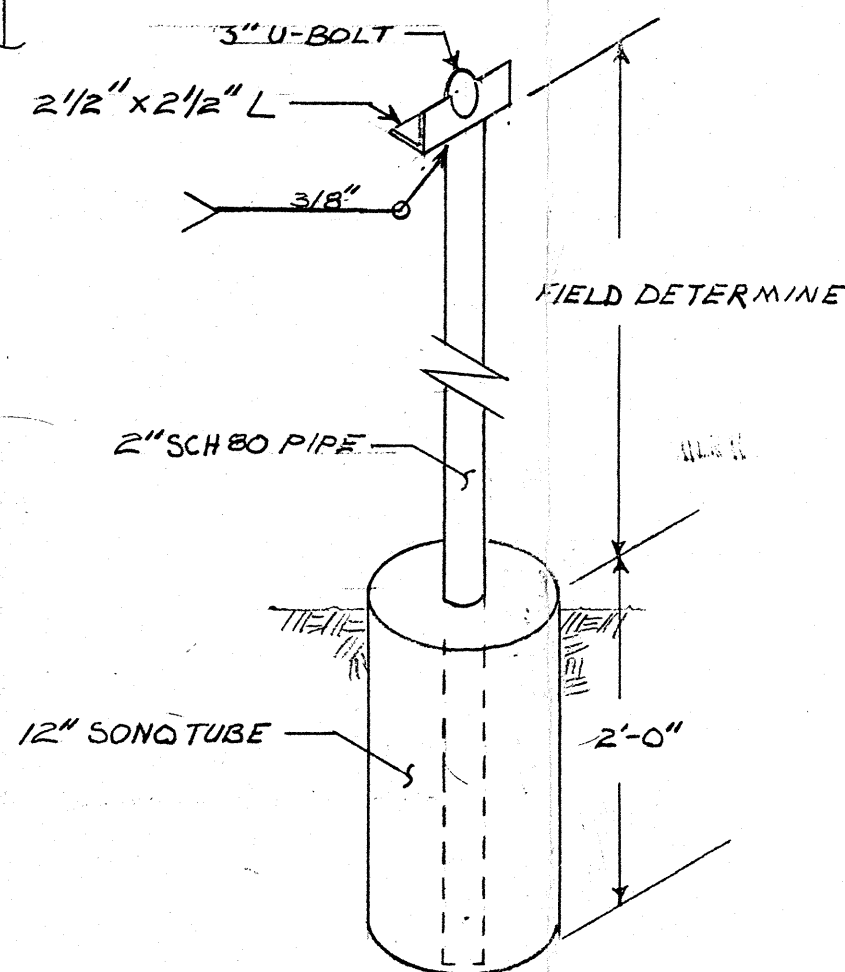
1

D

D

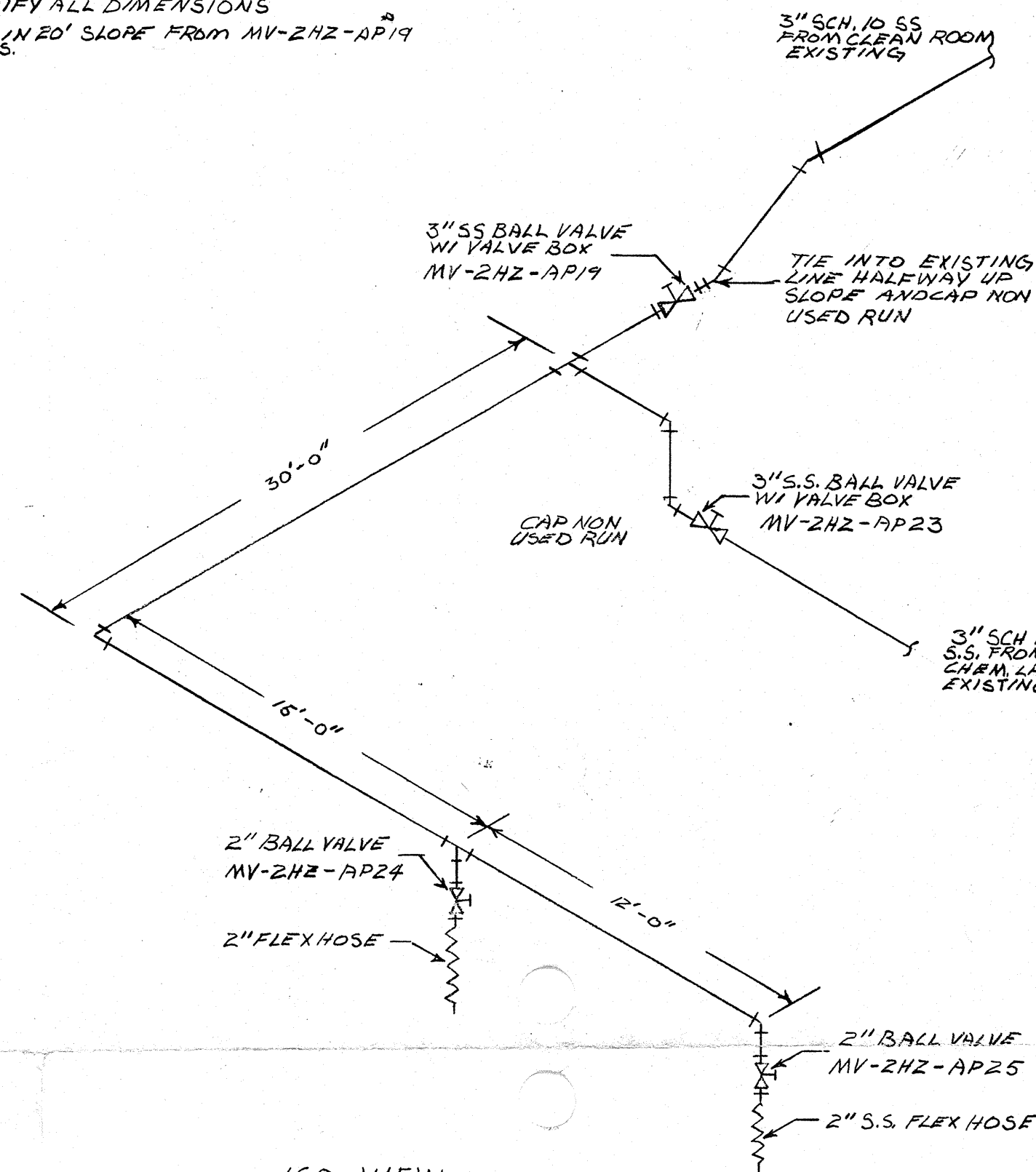


TOP VIEW

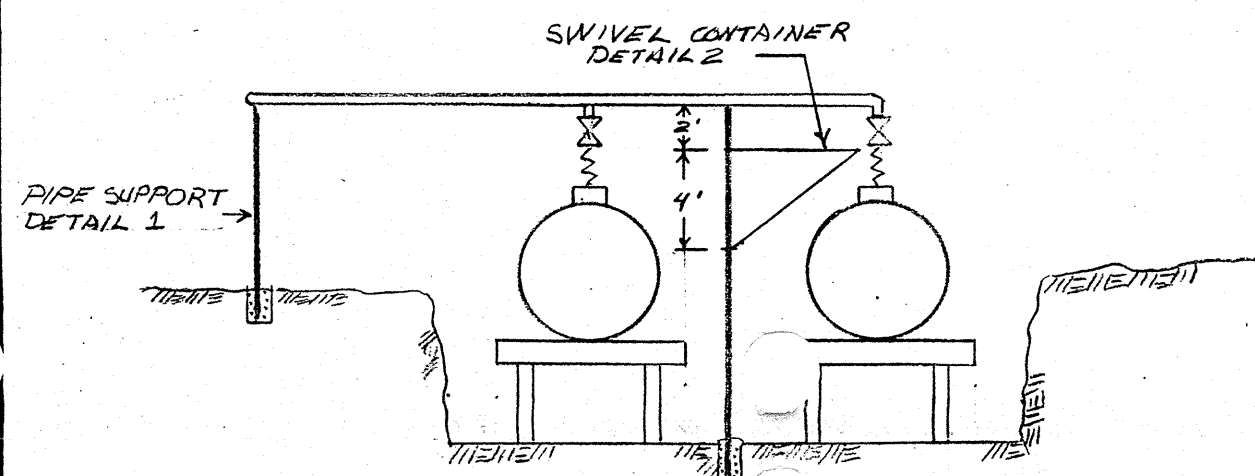


DETAIL 1

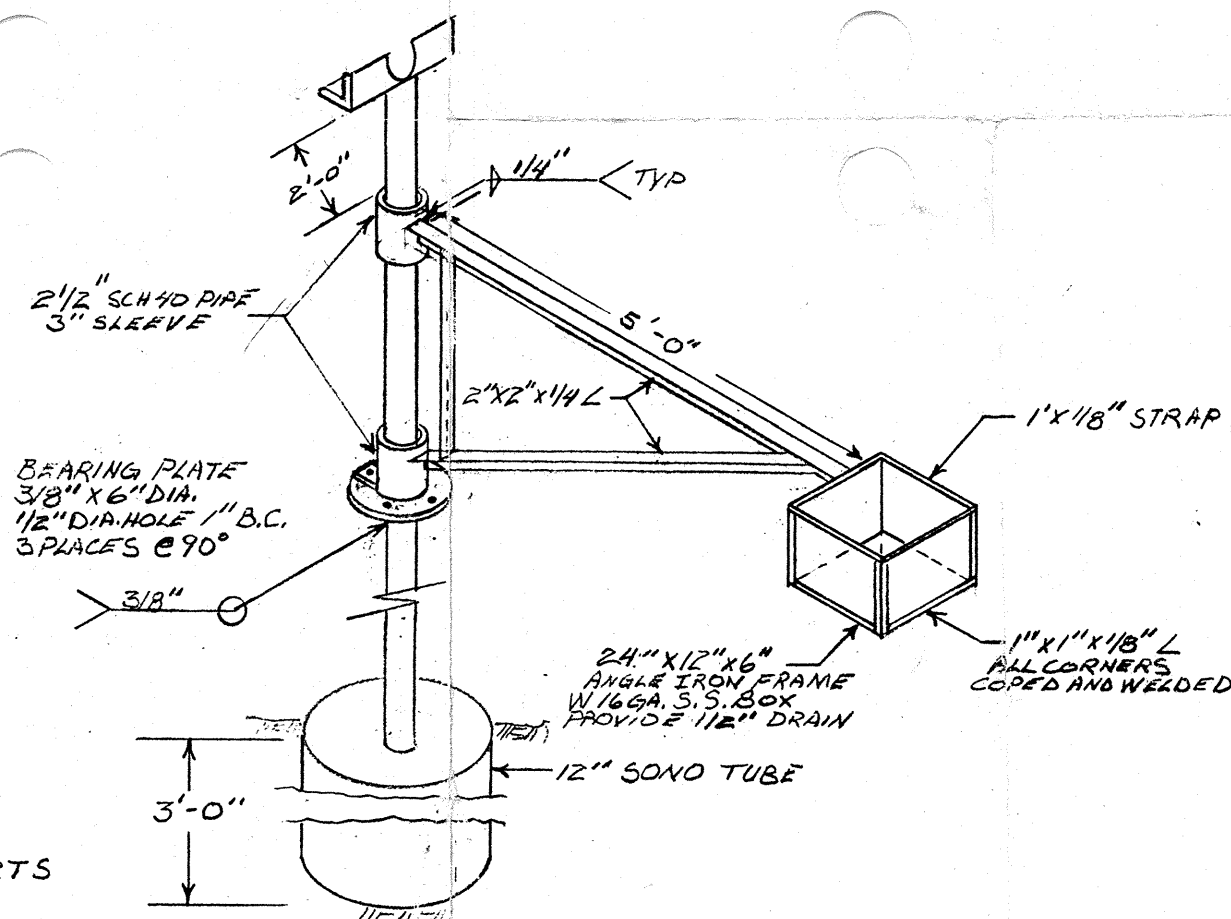
- NOTE**
 1- FIELD VERIFY ALL DIMENSIONS
 2- PROVIDE 1" IN 20' SLOPE FROM MV-2HZ-AP19 TO OUTLETS.



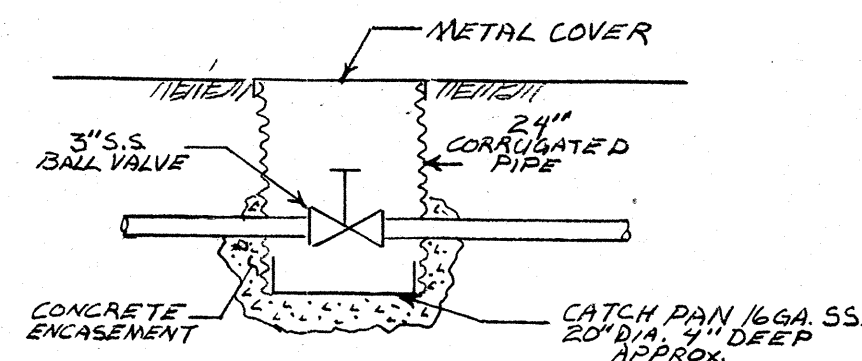
ISO VIEW



FRONT ELEVATION

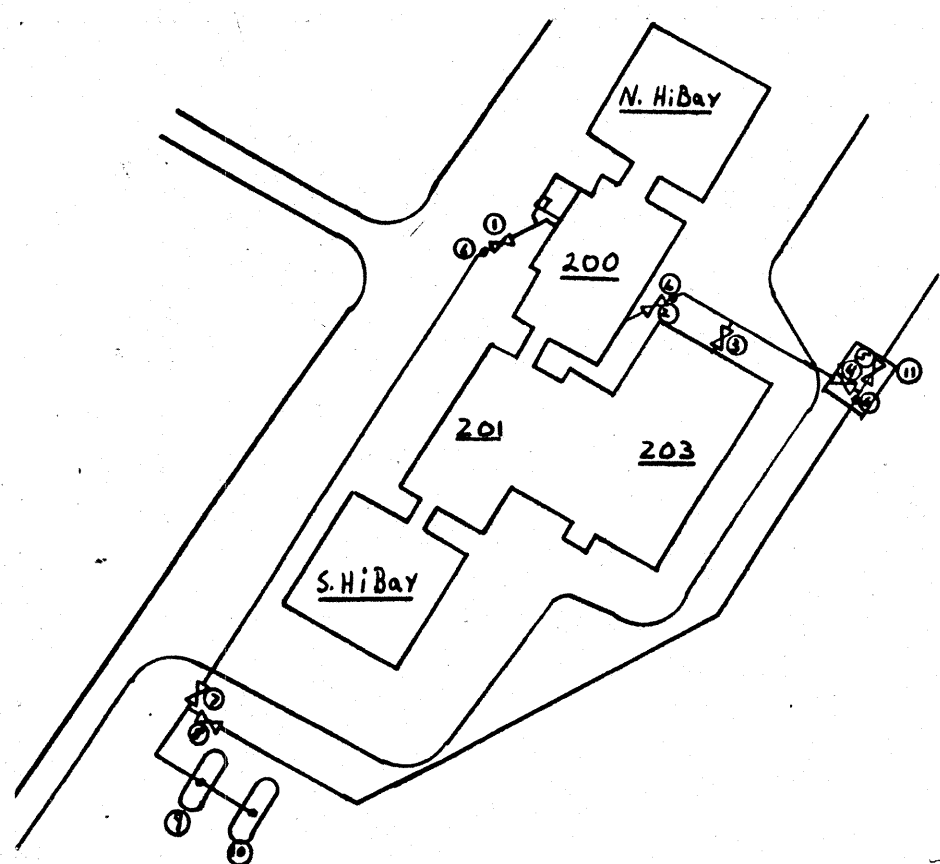


DETAIL 2



VALVE BOX DETAIL

1. MV-2HZ-AP21
2. MV-2HZ-AP15
3. MV-2HZ-AP16
4. MV-2HZ-AP18
5. MV-2HZ-AP17
6. PRESSURE PORTS
7. MV-2HZ-AP19
8. MV-2HZ-AP23
9. TK-2HZ-AP26
10. TK-2HZ-AP27
11. VALVE PIT

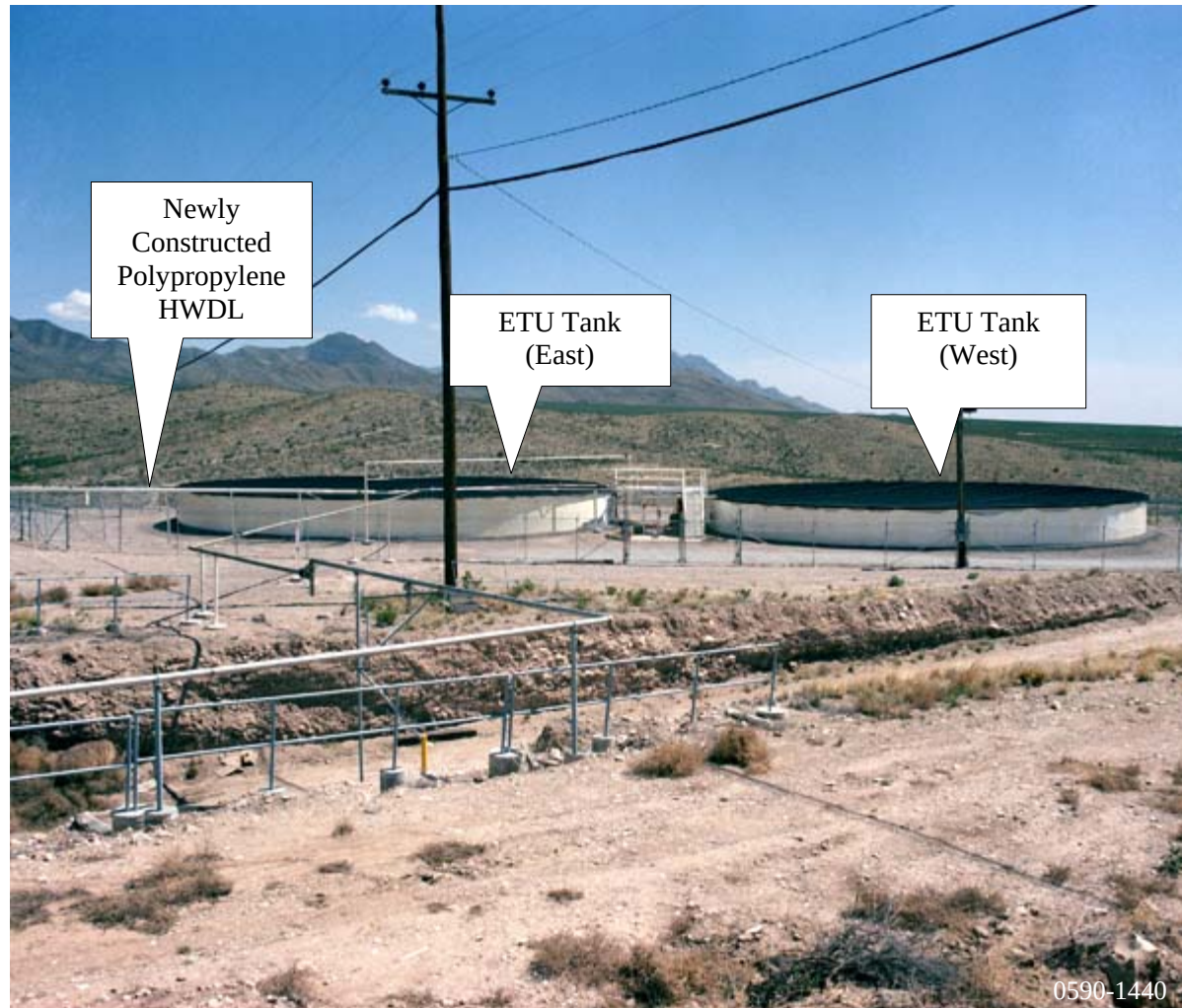


PLOT PLAN

NUMBER C-2		DATE		DRAWING CHANGE NOTICE		SHEET 1 OF 1	
DRAWING NO. 019-13570		REV.		REASON FOR CHANGE		ORIGINATOR E. C. BAGWELL	
TITLE DRAIN MODIFICATION				FULLFILL EPA REQUIREMENTS		DATE 1/23/87	
PROJECT		DRAWING TO BE CHANGED ☐ YES ☒ NO				APPROVED [Signature] 1/23/87	
DISPOSITION OF EXISTING MATL/PARTS		EFFECTIVITY				APPROVED [Signature] 1/23/87	
USE AS IS ☐ RERWORK ☐		MODEL		SERIAL NO.		AUTH [Signature] 1/23/87	
RETURN TO STOCK ☐ CONDEMN ☐							
DESCRIPTION OF CHANGE							

Figure 5.8

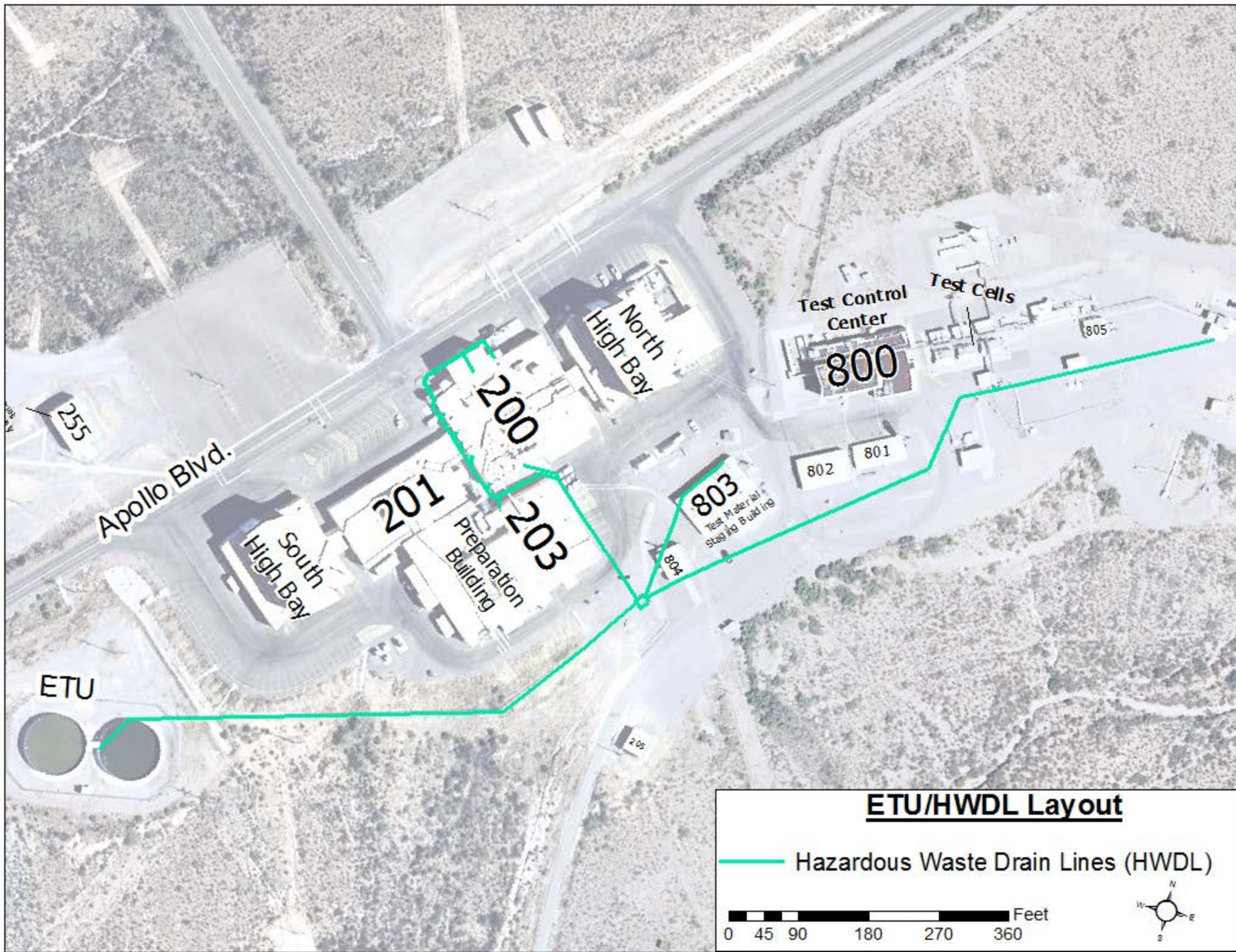
Temporary ETU HWTLs



This photograph shows the remaining 3-in. stainless steel HWTLs routed to discharge wastes to the ETUs until the new HWDL was operational.

Figure 5.9 200 Area Laboratory Complex and 800 Area Hazardous Fluid Testing Area (HFTA)

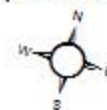
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ETU/HWDL Layout

— Hazardous Waste Drain Lines (HWDL)

0 45 90 180 270 360 Feet



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Figure 6.1

200 Area Process Flow Diagram

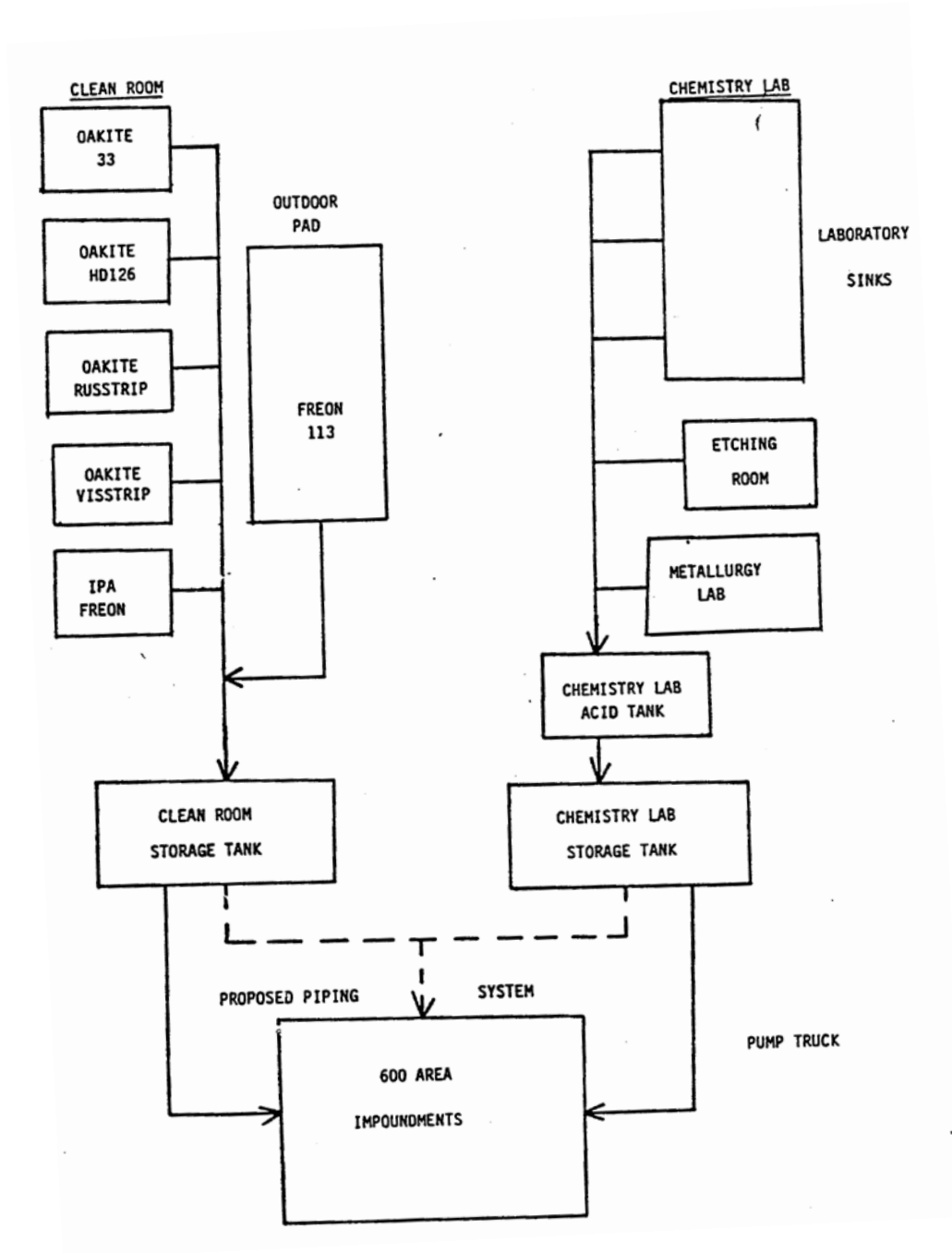


Figure 5-1 from a Memorandum (NASA, 1986j) shows the typical waste streams that were transmitted to the 600 Area Impoundments from the 200 Area Laboratory Complex.

(SEE NEXT PAGE)



Appendix A
SWMU 10 Interview Summary

Appendix A
SWMU 10 Hazardous Waste Transmission Line (HWTL) Summary of Findings from Employee Interviews

Position/ Location	Significant White Sands Test Facility (WSTF) HWTL Information	Other Information or Comments
WSTF plumber from 1985 to 2005	When the second 600 Area overflow lagoon was constructed in 1990, the remaining hazardous waste lines in the area from the sewage lagoons to the 600 Area surface impoundments were removed. The line was then capped off approximately 100 to 150 feet from the 600 Area lagoon, “out into the desert.” Originally, the hazardous waste line was capped “where the hydrant is or where the trailer hole was located below the 200 Area,” in the arroyo, and near the end of the line at the surface impoundments. Any paperwork would have been located in the Environmental Department.	Employee was interviewed in 2012.
WSTF Environmental Department from 1985 to 2005	- Use of the pipeline continued until late July 1986, when the only documented spill of hazardous waste occurred at a coupling connecting the stainless steel portion of the line to the polyvinyl chloride (PVC) portion of the line. Following this release, the PVC portion was rinsed and abandoned in place. - When the PVC line was abandoned, the PVC lines were triple rinsed with water. “A vacuum truck was used to suck out the full line three different times. Following this procedure, WSTF plumbers excavated a small portion of the line in the arroyo in order to drain any remaining water from the lines. There was only about five gallons of fluid left in the lines.” - Only the stick-up at the ponds was removed.	- Employee was interviewed in 2012. - Employee reviewed photos confirming the location of the HWTL from the 200 Area to the 600 Area HWMU Impoundment.
WSTF 200 Area Supervisor from 1965-2008	Confirmed that the lines did extend from the Chemistry and Metallurgy Laboratories around the South Highway and joined the main line there.	- Employee was interviewed in 2012. - Employee not have much personal knowledge of these lines, but that he knew that they were used in the mid-1980s.

Appendix B
Spill Reports

200 Area Environmental Records Review

Document Title: Spill Reports (200 Area Related)

Document Number (if Applicable): various : SPL002 through SPL256

Document Date: Various from 2/28/1986 to 6/16/2011 (Continually Updated)

Location of Document: Records Management ([\\wstf-fs01\records-management\Envr_Records\Spill_File](#))

Electronic or Hard Copy: Electronic

Name/Title of Primary Reviewer: Lela Hunnicutt-Mack

Brief Summary of Structures/Systems/Excavations Discussed in Document:

Historic reported spills from February 1986 through August 1991.

Does this document describe hazardous waste disposal? (If yes, describe below. Attach sheets as necessary): Yes

Spills of note:

- 4/23/1986 and 5/6/1986: underground [Clean Room Tank] catch tank holes: (top) 8" x 10", (sides) 2" x 18", 6" diameter. The holes were discovered while excavating (4/22/1986) to connect a new drain line to the 600 Area impoundments. (Drain line was routed to temporary above ground stainless steel tank). Refer to the waste characterization report 1/30/1986 for analysis of the cleaning facility catch tank). 10 yd³ of soil were excavated and transported to the 600 Area impoundments. Discovering the leaking tank is discussed here: ([\\wstf-fs01\records-management\Envr_Records\Spill_File\1986_04_23nasa.pdf](#)), ([\\wstf-fs01\records-management\Envr_Records\Spill_File\1986_05_06nasa.pdf](#)). The TPS to clean up the soil is here: ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\TPS\TPS-2-2HWM-86-0011.pdf](#))
- 7/30/1986: 200 Area hazardous waste drain lines (where stainless steel met PVC). 20 gallons free liquid, 4' diameter wet soil, 20' long wet soil at bottom of PVC pipe trench. Depth of soil contamination is unknown. (PVC lines "will be abandoned and the waste tanker will be relocated to the 200 Area adjacent to the downstream end of the stainless steel section." "We have also instructed our inspectors to inspect the entire drain system on a daily basis, and check lists have been developed to assist in these inspections.") Free liquids were containerized. Contaminated soils "will be excavated and shipped off site." ([\\wstf-fs01\records-management\Envr_Records\Spill_File\1986_08_01nasa.pdf](#))
- SPL052 - 12/20/1989, 48-60 gallons leaked from joint failure in PVC (scape room in north high bay to 200 Area drain line sump tank, ~30' from sump tank). "A wet spot...20' by 8'...was found directly downstream from the joint failure...drain line had been uncovered as a result of storm drain construction." This entry suggests soil contamination, but the spill report does not mention any clean-up.

All 200 Area Spills:

- ([\\wstf-fs01\records-management\Envr_Records\RCRA\ETU_Operating_Record\Inspections\Tanker\1986_Tanker.pdf](#)) 8/6/1986: From a tanker ("silver") inspection log in the 200 Area: "Evidence of leakage on ground notified T. Boone" Brian O'Dell (also this memorandum discusses the release [\\wstf-fs01\records-management\Envr_Records\RCRA\Correspondence\1986\1986_08_08memo.pdf](#). From J. M. Claffy to J. M. Schentrup. "On August 6, 1986 a previously unidentified source of drainage of cooling water from room 139 in the Chemistry Laboratory to the hazardous waste drain lines was detected and the flow to the drain lines shut off. The flow of cooling water was appreciable and appeared to be a significant contributor to the tank overflow.) The release was 8/5/1986. Many memos discuss the actions taken to prevent further leaks. Four sources of

200 Area Environmental Records Review

unnecessary drainage to the hazardous waste lines were located (plans to eliminate or reroute the sources), and a level sensor with alarm was installed in the mobile tank. For details see review of 1986 Haz Waste Lines_Tank Release lhm.docx

- Same inspection log as above: **8/19 and 20/1986**: DR 1FAC-EPA-014 “leak” listed to the 200 Area hazardous waste tank. I could not find the DR in WSTF documents. However, I believe 2 other documents discuss this: ([\\wstf-fs01\records-management\Envr_Records\RCRA\Correspondence\1986\1986_08_20memo.pdf](#)) While investigating the first mobile tank leak on 8/5/1986, the team found “...a leaking flex hose located at the terminus of the drain line and an apparent partial blockage of the drain line downstream from the valve pit, possibly on the southeast corner of the drain line...Discrepancy Reports to correct these conditions prior to continuation of the investigation have been initiated.”

Also TPS ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\TPS\TPS-2-2HWM-86-0015.pdf](#)) says “to evacuate about 1 cubic yard of contaminated soils from the pit located south of the 200 Area. The pit is where the 1000 gal. tank trailer is presently parked.” The date of the TPS is 8/25/1986, suggesting a response to this leak. The soils were “wet” and placed on plastic sheeting and covered with plastic. The TPS does not state final disposal of the contaminated soil.

- Leak **10/2/1986** from the 200 Area hazardous waste tanker: From the inspection log above: See DR 2-HWM-012, which states “200 Area hazardous waste tank leaking through rear flange (around elec connector)” [assumed to be electrical connector]. “Leak approx less than 1 gal.” The tank was emptied and the leak fixed 10/2/1986. ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\DR\DR-2-2HWM-86-0012.pdf](#))
- Leak **10/21 and 22/1986**: Listed in the above inspection log. Says reference DR-2-HWM-014 and 015. ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\DR\DR-2-2HWM-86-0014.pdf](#)) “The hazardous waste drain line is backing up through the clean room sump. Minimal leakage has occurred from the clean room sump pad to the outside area.” Attempted to remove block from lines using a snake. Attempts failed. Lines were pressurized according to TPS 2-HWM-026 and the block was removed. ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\DR\DR-2-2HWM-86-0015.pdf](#)) “The total quantity of waste which leaked from the clean room pad is estimated at less than 5 gallons. No remedial action is recommended.”
- **3/27/1987**: TPS was written to “remove the soiled materials under the 3” cast iron drain from the Clean Room to the 200 Building foundation wall.” Since this is a modification of TPS 2-HWM-87-0050, which was the “Hazardous Waste Tanks Removal – 200 Area”, I believe this is referring to the piping from the Clean Room to the removed underground tank. Of course there would be contaminated soils, since the connection to the tank was corroded away. This TPS suggests perhaps additional releases?...since it says “from the clean room to the 200 building foundation wall? ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\TPS\TPS-2-2HWM-87-0050-M2.pdf](#)) Soils were contained in plastic lined 55 gallon drums and taken to the “drum storage area”.
- **4/3/1987**: Discrepancy Report ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\DR\DR-2-2HWM-87-0028.pdf](#)) states “A spill occurred at the 200 Area Clean Room Pad, with hazardous constituents on to the pavement and adjoining soil along the fence line to the C/R Pad.” 10 gallons of water contaminated with Freon was spilled. The Clean Room sump was blocked with weeds, dirt and overflowed. All liquids were contained with spill pillows and containerized (55-gallon drum). Soil was contaminated off the pad and along the fence line. Resulted in procedure change to leave valve open and add perforated stainless steel piece to the sump to prevent weeds/trash/dirt from blocking the drain line. Rain (and other) water will go to sump and drain into haz. waste

200 Area Environmental Records Review

tanker. A TPS was written for “removal and accumulation of contaminated soil resulting from a spill of hazardous waste.” No spill report was recorded (that I could find). The detail is: “...Remove as much of the sand and dirt which was contaminated by the spill and place the dirt in lined 55 gallon drum.” (with spill pillows) Disposed of by direction of Environmental personnel. ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\TPS\TPS-2-2HWM-87-0063.pdf](#))

- **11/16/1987:** A TPS was written for the removal of contaminated soils from the 200 Area near hazardous waste tankers. The assumption is that the tankers overflowed. Also “drum pile of soil behind T253...and move to Drum Storage facility” TPS asks no more soil be piled in the areas. ([\\wstf-fs01\Archive\WSTF-All\QualityDocumentArchive\200\2HWM\TPS\TPS-2-2HWM-87-0094.pdf](#))
- **SPL050 - 11/30/1989,** 50 gallons of water was leaked from a flange connecting the new hazardous waste drain line with the existing line. The water drained onto the ground beside the east tank. This portion of the hazardous waste line had been leak-checked, but never used for hazardous waste. The fluid was determined to be water. The cracked pipe was repaired and an investigation to prevent future incidents was initiated.
- **SPL070 - 8/30/1991,** 40 gallons of spent rust stripper was inadvertently placed in an abandoned hazardous waste drain line between Buildings 200 and 203. The rust stripper solution backed up into sinks in Room 110, Building 203, and a few pints spilled onto the ground between Buildings 200 and 303. The rust stripper was contained in the abandoned line and flushed to the ETUs. Causes of the incident included lack of procedure documentation updates when modifications of the hazardous waste drain line were performed. Preventative actions included writing or modifying documentation for appropriate waste disposal and placing “do not operate” signs on the abandoned line.

Oakite (Cleaner) Spills:

- **SPL046 - 7/14/1989,** an unknown amount of Oakite 126 was spilled in the 200 Area (“contamination control”) from a cut (for modifications) drain line to the cleaning solution tanks in the clean room. The end of the plugged line leaked a high pH (Oakite from one tank inside) fluid onto the soil. Contaminated soil was removed. (The report does not say where the soil was taken). The pipe was capped.

Are there any structures described whose use is unknown that could have, in your judgment, been used to dispose hazardous waste (e.g., pits, unknown pipes, depressions with distressed vegetation, etc)? If yes, describe.

No.

If the answer was “yes” to either of the above questions, are quantities disposed indicated or possible to estimate? How much?

See above.

Second Reviewer: John Roland, Antonette Sanchez

No additional comment.

APR 23 1986

RA

New Mexico Environmental Improvement Division
Attn: Mr. Boyd Hamilton
Hazardous Waste Section
P. O. Box 968
Santa Fe, New Mexico 87504-0968

Subject: Incident Report

Pursuant to the New Mexico Hazardous Waste Management Regulations (Part IV, 402), please be advised that there was a release of hazardous waste from a hazardous waste tank used to collect cleaning facility waste in the 200 Area. The stainless steel line that drains the waste from the cleaning facility to the catch tank was excavated to connect a new drain line to carry the waste directly to the 600 Area surface impoundments and bypass the catch tank. The 8-inch-long vertical carbon steel nozzle on the catch tank had been corroded away and there was an elliptical hole approximately 8 inches by 10 inches in the top of the tank. All discharges of hazardous waste into the tank were stopped and the line was rerouted to a temporary above-ground stainless steel tank. The underground tank will be emptied, rinsed, and the excavation covered to prevent water from collecting. The contaminated soil that has been excavated will be disposed of in the 600 Area surface impoundments. No further action is planned until a closure plan is prepared to close this tank and the chemistry laboratory catch tanks.

It is difficult to estimate the quantity of waste that has been released; however, we feel that the extent of contamination is limited since the damaged pipe was in a vertical riser. The closure plan will outline the necessary steps to determine the extent and the composition of the contamination.

An additional letter will be submitted within 15 days which will detail any additional information and any further actions that will be taken to minimize any damage to the environment. If you have any questions, please contact Bill Schroeder at (505) 524-5771 or Terry Boone at (505) 524-5235.

ORIGINAL SIGNED BY R. R. TILLET

Rob R. Tillett
Manager

RA/WSchroeder:ci:4/23/86:5771

bcc:
AC
AG
AL4/J. Kemp
JJ/J. Herrmann
RC/E. Sievers, D. Amidei
RF/D. Pippen
LEMSCO/J. Schentrup
LEMSCO/T. Boone
✓ RA/Official File
RA/Reading File

MAY 06 1986

RA

New Mexico Environmental Improvement Division
Attn: Mr. Boyd Hamilton
Hazardous Waste Section
P. O. Box 968
Santa Fe, NM 87504-0968

Subject: Incident Report 15-Day Notification

As previously indicated in our letter dated April 23, 1986, there was a release of hazardous waste from the 200 Area cleaning facility catch tank on April 22, 1986. Pursuant to New Mexico HWR-II, this letter constitutes the written report required by Section 206.B.10.

- a. Name, address, and telephone number of the owner or operator:

Rob R. Tillett
NASA JSC White Sands Test Facility
P. O. Drawer MM
Las Cruces, NM 88004
(505) 524-5771

- b. Name, address, and telephone number of the facility:

NASA JSC White Sands Test Facility (NM8800019434)
P. O. Drawer MM
Las Cruces, NM 88004
(505) 524-5771

- c. Date, time, and type of incident:

At approximately 9:00 a.m. on April 22, 1986, the drain line from the cleaning facility to the under-ground catch tank was excavated in preparation for the connection of a new stainless steel drain line to the 600 Area surface impoundment. An 8-inch-long vertical nozzle on the catch tank had been corroded away and there was an elliptical hole approximately 8 inches by 10 inches in the top of the tank. The cleaning facility waste was then rerouted to an above-ground

stainless steel tank and the underground tank was drained and rinsed. Approximately 1 inch of liquid and some sand remained in the tank. The tank was inspected and two additional holes were found in its side. One was approximately 2 inches wide by 18 inches long and the other was approximately 6 inches in diameter. Both holes were about midway up the tank wall.

d. Name and quantity of materials:

It is difficult to estimate the quantity of waste that has been released. A revised closure plan is being prepared that will detail the actions that we propose to take to determine the extent of the contamination. Please refer to the Waste Characterization Report submitted January 30, 1986, for a detailed analysis of the cleaning facility catch tank.

e. The extent of injuries, if any:

None

f. An assessment of the actual or potential hazards to human health or the environment, where this is applicable:

Substantial quantities of spent cleaning solvents including Freon 113, TCA, and methylene chloride have been dumped in this tank since it was installed in 1978. Three distinct layers of waste were found in this tank which makes it difficult at this time to assess the composition of the waste that has leaked into the ground. The area around the cleaning facility is paved with asphalt so the contaminated soil around the tank presents no actual hazards to human health. Excavations near the tank are covered with plastic sheeting to prevent rainwater from collecting and driving any contaminants further into the ground. The cleaning facility, located in the 200 Area, is situated close to the San Andres Mountains. A 36-inch-diameter excavation 35 feet deep was recently completed in the 200 Area and bedrock was encountered at approximately 32 feet.

There are no ground-water monitoring wells located in the 200 Area; however, the depth to ground water varies from 110 feet to 180 feet at the other facility ground-water monitoring wells. The closest drinking water wells are located approximately 4 miles to the west of the facility. Hence, after evaluating the

above data we believe it is unlikely that any contaminants have reached ground water and there is virtually no possibility that any contaminants could have entered the site drinking water supply. At this time we have no indication that there is any significant threat to human health or the environment from this incident.

- g. Estimated quantity and disposition of recovered material that resulted from the incident:

Approximately 10 cubic yards of soil from the spill area were excavated and placed in the 600 Area hazardous waste surface impoundments.

I have instructed my environmental staff to proceed as rapidly as possible to develop a comprehensive closure plan for all the underground tanks in the 200 Area so that the extent of the contamination may be determined and the appropriate corrective action initiated. Budget options are being evaluated to augment the current site environmental budget for this fiscal year and for FY87. This budget will provide the funding necessary to perform this closure and all the other tasks that we plan to do to keep WSTF in full compliance with all the USEPA and NMEID regulations. This comprehensive EPA Compliance Program will minimize the possibility of any future incidents of this nature.

Should you have any questions or require any additional information regarding this incident, please call me or Bill Schroeder at (505) 524-5771 or Terry Boone at (505) 524-5235.

ORIGINAL SIGNED BY R. R. TILLET

Rob R. Tillett
Manager

bcc:

AC

AG

AL4/J. Kemp

JJ/J. Herrmann

RC/E. Sievers

RC2/D. Amidei

RD/I. D. Smith

RF/D. Pippen

RF/H. Johnson

LEMSCO/T. Boone

WSMR, STEWS-IS-N/R. Mitchell

RA/Official File

RA/Reading File

RA/WMSchroeder:c1:05/06/86:5771



APR 24 '86



NASA JSC WSTF TEST PREPARATION SHEET

TPS NO. 2-24W-011 9-27-86
~~1-EPAGPAC048~~
TYPE: A - Configuration Change
B - No Configuration Change

SYSTEM ENVIRONMENTAL
DRAWING(S), DOCUMENTS, OCP(S), PART NO(S) & DCN(S)
MOD SHEET NO.
PAGE 1 of 6 PREPARATION DATE 4/23/86

TPS SHORT TITLE
REMEDIATION ACTION FOR THE CLEAN ROOM TANK
REASON FOR WORK
REGULATORY COMPLIANCE

TASK ORDER NO. 040 TAB 00 NEED DATE 4/24/86 CONSTRAINTS
SPECIAL SAFETY REQUIREMENTS ☒ YES ☐ NO MATERIALS REQUIRED ☒ YES ☐ NO

ITEM NO.	DESCRIPTION (TYPE OR PRINT)	WORKED	INSPECTED
		SHOP	NASA
	SCOPE: To provide for the rinsing of the clean room catch tank and disposal of contaminated soils associated with excavation around the clean room tank.		
	MANPOWER: 10 manhours		
	MATERIALS: 1 roll of 12' x 100' 6 mil poly sheathing (from the warehouse)		
	metal coating (from bone yard)		
	Adhesive as necessary		

PREPARED BY: T Boone ORGANIZATION: LEMSCO COMPLETION DATE: 11/5/86 SHOP 12-23-86
CONTRACTOR AUTHORIZED SIGNATURES NASA AUTHORIZED SIGNATURES
T Boone D. Amidei 4/23/86



NASA JSC WSTF
TEST PREPARATION SHEET
CONTINUATION SHEET



APR 24 '86

PAGE 2 OF 6

TPS NO. ~~143W-143W-011~~ 2-HWM-011
MOD. NO.



7-29-86

ITEM NO.	DESCRIPTION CONTINUED	WORKED	INSPECTED
		SHOP	NASA
①	The TPS hardcopy will be secured from Bldg. 101 and all work signed off as it is completed.	M/11	
②	Technical direction will be provided by the LEMSCO engineer. He shall be notified prior to commencing work. (ext 235)	M/11	
③	Water from a garden hose shall be directed into the various ports on the clean room tank to disperse the sludge which is present. Simultaneously, the sump pump shall be utilized to pump liquids from the tank into the hazardous waste transport truck. The level of liquid in the tank shall not exceed 1/2 of its capacity, and it is preferable to	Dxm 5-6-86	
CONTRACTOR AUTHORIZED SIGNATURES		NASA AUTHORIZED SIGNATURES	
E. J. JONES		D. J. JONES 4/13/86	



NASA JSC WSTF
TEST PREPARATION SHEET
CONTINUATION SHEET



APR 24 '86

PAGE 3 OF 6

TPS NO.
MOD. NO.

~~1-ENR-040-040~~

2-HWM-011



9-29-86

ITEM NO.	DESCRIPTION CONTINUED	WORKED	INSPECTED
		SHOP	NASA
	Keep the level at less than $\frac{1}{3}$ of the tanks capacity. The length of time the rinse/pump operation continues is a function of the appearance of the contents of the tank as determined by the CEMSO engineer. The transport truck shall be monitored to ensure its capacity is not exceeded.		
4	The rinse operation shall cease on direction of the engineer and the remaining liquid in the tank pumped out.		
5	All liquids pumped from the tank shall be transported to the 600 Area Salt pond for disposal.		
6	The manhole cover shall be placed over the manhole and a small piece of		
CONTRACTOR AUTHORIZED SIGNATURES		NASA AUTHORIZED SIGNATURES	
See		Amador 4/23/86	

JSC Form 1395A (Rev Feb 76)

Q.C. LOG BOX



NASA JSC WSTF
TEST PREPARATION SHEET
CONTINUATION SHEET



SEP 24 '86

PAGE 4 OF 6

TPS NO.

MOD. NO.

~~1-87H-7AC-848~~ 22-HWM-01



9-29-86

ITEM NO.	DESCRIPTION CONTINUED	WORKED	INSPECTED
		SHOP	NASA
	Poly shall be glued over the hole in the tank. This step will require cleaning the area around the hole with a brush (but no liquids).		
⑦	The contaminated soils as designated by the engineer shall be transported in the dump truck to the salt Pond and placed in a location specified by the engineer. There is a drum of contaminated absorbant material which will also be disposed of at the salt Ponds under the engineers direction. (Note that the absorbant will be placed in a depression then covered with contaminated soils)	DM 5-6-86	
CONTRACTOR AUTHORIZED SIGNATURES		NASA AUTHORIZED SIGNATURES	
Boor		D. Chiles 9/23/86	

JSC Form 1395A (Rev Feb 76)

Q.C. LOG BOX



NASA JSC WSTF
TEST PREPARATION SHEET
CONTINUATION SHEET



SEP 4 '86

PAGE 5 OF 6

TPS NO.

MOD NO.

~~TPS NO. 010~~

2-2-HWM-011

7-27-86

ITEM NO.	DESCRIPTION CONTINUED	WORKED	INSPECTED
		SHOP	NASA
8	The dumped soils shall be spread out to be consistent with the existing dike surface.		
9	The excavated areas over the clean room tank shall have grating material placed over them. (available from 150 yd scrap)		
10	The entire excavated areas over the clean room shall be covered with the poly to keep rainwater out. The entire perimeter of the poly shall be covered with adequate dirt to keep the wind from blowing it away.		
11	Barricades will be placed around the area to keep people away from the holes.		
CONTRACTOR AUTHORIZED SIGNATURES		NASA AUTHORIZED SIGNATURES	
Seon		Amidon 9/23/86	

JSC Form 1395A (Rev Feb 76)

Q.C. LOG BOX



APR 24 '86

DR-TPS NO.

2-2 HWM-011



9-29-86

PAGE

OF

DATE

4/25/86

DR-TPS SAFETY REQUIREMENTS

(Circled Items Will Apply to This Operation)

NOTE: Safety requirements noted are minimum. If other operations are running concurrently, the more stringent safety requirement shall apply. Verify other operations with stand leadman or respective area test coordinator (800 Area).

- * 1. Protective clothing required (circle applicable items):
 - a. SCAPE
 - b. Splash
 - c. Goggles
 - d. Hard Hat
 - e. Face Shield
 - f. Gloves
 - g. Ear Protection
 - h. Breathing Protection
 - i. Other _____
- * 2. Flex-lines will be restrained in accordance with WSTFI 5.4, Attachment 13: (Check for current proof-pressure and service use prior to installation.)
- * 3. System shall be vented prior to breaking pressurized lines.
 - a. Announcement: (required prior to venting hazardous gases)
Venting fuel/oxidizer to ponds/burner.
- * 4. Only personnel involved in the test or procedure will be permitted in the area.
- * 5. Equipment will have the power disconnected and the switch locked off. (A "DO NOT OPERATE" tag may be used as an alternate.)
- * 6. Hazardous Operation Permit required.
- * 7. Approved lifting equipment will be used (verify valid proof load).
- * 8. Direct communications required (radios, test net, etc.).
- * 9. This is a two-man operation (using "buddy" system).

OTHER REQUIREMENTS NOT COVERED ABOVE

- 10. Eye protection
- 11. Wear Disposable coveralls.
- 12. _____

* CONTRACTOR AUTHORIZED SIGNATURES

NASA AUTHORIZED SIGNATURES

[Signature][Signature] 4/25/86

WSTF-69 (Revised 2-79)

* Denotes change.

RA

AUG 01 1986

New Mexico Environmental Improvement Division
Attn: Mr. Peter Pache, Program Manager
Hazardous Waste Section
P. O. Box 968
Santa Fe, New Mexico 87504-0968

Subject: Incident Report - July 30, 1986

Pursuant to New Mexico Hazardous Waste Management Regulations (Part IV., 402), please be advised that there was a release of hazardous waste from the hazardous waste drain lines located in the 200 Area at NASA JSC White Sands Test Facility. The release occurred at the point where the stainless steel drain line is coupled to the PVC drain line. Upon detecting the release at approximately 9:00 a.m., all waste flow through the line was immediately discontinued by closing upstream valves.

The visible extent of contamination included approximately 20 gallons of free liquid, a patch of wet soil approximately 4 feet in diameter immediately adjacent to the leak source, and a narrow strip of damp soil approximately 20 feet long in the bottom of the trench in which the PVC pipe is located. The depth of the soil contamination is unknown.

Remedial action is in progress. The free liquids were immediately removed and containerized. The contaminated soils will be excavated and shipped off site. WSTF has implemented temporary repairs, superior to the original construction, to allow normal operations to resume. As a more permanent fix, the PVC section of the waste drain system will be abandoned and the waste tanker will be relocated to the 200 Area adjacent to the downstream end of the stainless steel section. Thus all waste piping will be 300 Series stainless steel. Design of this fix is complete, the installation paperwork has been issued, and installation is scheduled to complete on August 1. Another review of the drain system design will be made and any deficiencies corrected as soon as possible. We have also instructed our inspectors to inspect the entire drain system on a daily basis, and check lists have been developed to assist in these inspections.

Should you have any questions concerning this matter, please feel free to contact Bill Schroeder at (505) 524-5771 or Terry Boone at (505) 524-5464.

ORIGINAL SIGNED BY R. R. TILLET

Rob R. Tillett
Manager

bcc:

AC

AG

AL4/J. Kemp

JJ/J. Herrmann

RC2/D. Amidei

LEMSCO/T. Boone

WSMR, STEWS-IS-N/L. Buescher

RA/Official File

RA/Reading File

RA/WMSchroeder:lg:07/31/86:5771

IV: D. Greenly

DCAS

AREA: 600

UNIT: RED TRUCK

MONTH/YEAR: June

[illegible]

T. BOONE.
D. GREENIFY

5235

INSPECTOR:

AREAS

UNIT:

MONTH/YEAR:

DAILY

WASTE LEVEL

RED TRUCK
(PRIMARY)

SILVER STIR-TACK
(SECONDARY)

RATE OF
FLOW

LEAKS

DIPERATICA

COMMENTS

SIGNATURE

CLEAN ROOM PEOPLE THERE 0845

Red truck removed - Pumping into silver

Notified to call FRANK Geisel
on a daily basis 5235
* Silver Tank moved to be emptied

NASA/WSIF HAZARDOUS WASTE FACILITY
INSPECTION LOG

DAILY

WASTE LEVEL																
RED TRUCK (PRIMARY)	SILVER STR. TANK (SECONDARY)	RATE OF FLOW	LEAKS	OPERATIONAL												
DATE	TIME	IN"	IN"													
8-1	0730	✓	18"	med	none	yes										
8-4	0932		—	med	none	yes										
8-5	0830		—	slow	no	yes										
8-6	0807		8.5"	slow	no	yes										
8-7	0800		10"	slow	no	yes										
8-8	0816		13.3"	slow	no	yes										
8-11	0730		19"	light	none	yes										
8-12	0745		21"	light	none	yes										
8-13	0820		28"	med	none	yes										
8-14	0840		5"	light	none	yes										
8-15	0830		12"	light	none	yes										
8-18	0918		13"	light	none	yes										
8-19	0835		18"	light	none	yes										
8-20	0821		25"	light	yes	yes										
8-21	0805		27"	light	no	yes										
8-22	0955		2"	none	no	no										
8-25	0800		12"	light	no	yes										
8-26	0735		15"	none	none	no										
8-27	0845		X	none	no	yes										
8-28	0925		20"	none	none	no										
8-29	0800		30"	none	none	yes										

INSPECTOR: DCAS
 AREA: 600 200 AREA
 UNIT: TRUCK
 MONTH/YEAR: August

X5235
clay

COMMENTS	SIGNATURE
(P.O.U.) 10mi. + (10 mi. 7:31) (20 miles total)	B. O. Dell
Dip stick not available - notified CLAY Boone	P. Boone
Dip stick not available	P. Boone
Evidence of leakage on ground notified T. Boone	P. Boone
	P. Boone
	P. Boone
	B. O. Dell
	B. O. Dell
	B. O. Dell
	P. Boone
DR 1 FAC - EPA - 014 - leak	P. Boone
"	P. Boone
	P. Boone
Line is plugged notified Lockheed	P. Boone
(Morrell)	B. O. Dell
Sys. shut down (Mod) 1-EPA-FAC-073	B. O. Dell
Removed Red TKG. 0940 - NO STICK TO MEAS.	B. O. Dell
REF. DR. 1-EPA-FAC-070, 021, 022	B. O. Dell
TANK EMPTIED. 0930 COMPLETE. 1/2"	B. O. Dell

INSPECTION LOG

DCAS

200 AREA.

RED TRUCK

SEP.

86 -

NASA/WSTF HAZARDOUS WASTE FACILITY INSPECTION LOG

INSPECTOR: DCAS
 AREA: 200 AREA
 UNIT: RED TRUCK
 MONTH/YEAR: OCT 86

DAILY						
WASTE LEVEL						
RED TRUCK (PRIMARY)	SILVER STRIP TANK (SECONDARY)	RATE OF FLOW	LEAKS	OPERATIONAL		
IN.	IN.					
10-1	0805	26"	heavy	none	yes	
10-2	0730	28"±0	light	YES	YES	
10-3	0725	14"	heavy	none	yes	
10-6	0800	16"	light	none	yes	
10-7	0855	19"	light	none	yes	
10-8	0800	22"	light	none	yes	
10-9	0720	26"	light	none	yes	
10-10	0810	28"	light	none	yes	
10-14	0715	28 1/2"±0	light	none	yes	
10-15	0905	14"	med	none	yes	
10-16	0835	18"	light	none	yes	
10-17	0930	30"±0	heavy	none	yes	
10-20	0830	18"	heavy	none	yes	
10-21	0835	18 1/2"	light	none	yes	
10-22	0730	19"	light	none	yes	
10-23	0745	28"±0	med	none	NO	
10-24	0715	32"±0	med	none	NO	
10-27	0825	24"	med	none	yes	
10-28	0715	32"±0	med	none	yes	
10-29	0810	9"	light	none	yes	
10-30	0735	11 1/2"	light	none	yes	
10-31	0710	18"	med	none	yes	

COMMENTS	SIGNATURE
REF. DR # 2-HWM-012	30 Dell
TANK EMPTIED - THIS DATE.	30 Dell
	30 Dell
	30 Dell
	30 Dell
	30 Dell
	30 Dell
TANK EMPTIED - 0730 - REF TPS	30 Dell
	30 Dell
TANK EMPTIED - 0730 REF TPS	30 Dell
	30 Dell
Ref DR - 2-HWM-014 - 015	30 Dell
Ref DR - 2-HWM-014 OK	30 Dell
TANK EMPTIED. 0745-	30 Dell
TANK EMPTIED 0730 - Fixed 1000.	30 Dell
TANK	30 Dell
TANK EMPTIED 0730 = 0" Ref TPS 2-HWM-016	30 Dell
	30 Dell
	30 Dell

NASA/WSTF HAZARDOUS WASTE FACILITY

TANK

INSPECTION LOG

DAILY

WASTE LEVEL

RED TRUCK
(PRIMARY)SILVER STR. TANK
(SECONDARY)RATE OF
FLOW

LEAKS

OPERATIONAL

Q6.

DATE	TIME	IN.	IN.															COMMENTS	SIGNATURE
11-3-86	0745		28"±0	heavy	none	yes												Notified F. Mathis. 2-HUM-DIGR TRANSFER TO 500	Bodell
11-4	0845		12"	med	none	yes													Bodell
11-5	0800		16"	light	none	yes													Bodell
11-6	0755		20"	light	none	yes													Bodell
11-7	0730		29"±0	med	none	yes												TRANSFERRED - TFS 2-HUM-DIGR	Bodell
11-10	0800		16"	med	none	yes													Bodell
11-12	0915		20"	light	none	yes													Bodell
11-13	1235		25"	light	none	yes													Bodell
11-14	0615		26"±0	light	none	yes												TRANSFERRED - TFS 2-HUM-DIGR	Bodell
11-17	0720		8"	med	none	yes													Bodell
11-18	0735		13"	light	none	yes													Bodell
11-19	1215		26"	heavy	none	yes													Bodell
11-20	0730		28"±0	light	none	yes												TRANSFERRED TO 500 - TFS 2-HUM-DIGR	Bodell
11-21	1135		12"	med	none	yes													Bodell
11-24	0945		14"	light	none	yes													Bodell
11-25	1000		14"	none	none	yes													Bodell
11-26	1015		22"	heavy	none	yes													Bodell
11-28	0845		26"	med	none	yes													Bodell

INSPECTOR:

DCAS

AREA:

200 AREA

UNIT:

RED TRUCK

MONTH/YEAR:

NOV 86

NASA/WSTF HAZARDOUS WASTE FACILITY

TANK

INSPECTION LOG

INSPECTOR:

DCAS

AREA:

200 AREA

UNIT:

RED TRUCK - TANK

MONTH/YEAR:

DEC. 1986

DAILY

WASTE LEVEL

RED TRUCK
(PRIMARY)SILVER STRIP TANK
(SECONDARY)RATE OF
FLOW

LEAKS

OPERATIONAL

DATE	TIME	IN.	IN.													COMMENTS	SIGNATURE
12-1	0800		26"	light	none	yes											Bo Del
12-2	0730		28"=0	light	none	yes										TRANSFERED TPS-2-HUM-016R	Bo Del
12-3	0805		20"	heavy	none	yes											Bo Del
12-4	0725		24"	light	none	yes											Bo Del
12-5	0715		28"=0	light	none	yes										TRANSFERED TPS-2-HUM-016R	Bo Del
12-8	1130		25"	heavy	none	yes										IPA dumped. & Geoscience	Bo Del
12-9	0730		25"	light	none	yes											Bo Del
12-10	0730		30 1/2"	med	none	yes										TRANSFERED TPS-2-HUM-016R	Bo Del
12-11	0810		4 1/2"	light	none	yes											Bo Del
12-12	0800		14"	med	none	yes											Bo Del
12-15	0810		17"=0	light	none	yes										Chem Lab tank drained. Transfer 2-HUM-016	Bo Del
12-16	1335		8"	light	none	yes											Bo Del
12-17	0935		10 1/2"	light	none	yes											Bo Del
12-18	1215		18"	med	none	yes										Geoscience rinsc water dumped.	Bo Del
12-19	0800		20"	light	none	yes											Bo Del
12-22	0825		24"	med	none	yes											Bo Del
12-23	0755		29"=0	med	none	yes										TRANSFER 2-HUM-016R	Bo Del
12-24	0805		14"=0	heavy	none	yes										TRANSFER 2-HUM-016R	Bo Del
12-29	1400		16"	med	none	yes											Bo Del
12-30	0900		20"	med	none	yes											Bo Del
12-31	0845		25"=0	light	none	yes										TRANSFER 2-HUM-016R	Bo Del

INTERDEPARTMENTAL COMMUNICATION

ES86-005

DATE August 8, 1986

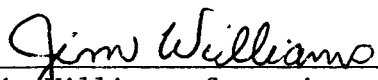
TO	J. M. Schentrup	DEPT./ ORGN.	40-01	BLDG./ ZONE	100	PLANT/ FAC.	WSTF	
FROM	J. M. Claffy	DEPT./ ORGN.	40-01	BLDG./ ZONE	100	PLANT/ FAC.	WSTF	EXT. 5464

SUBJECT: Investigation of 200 Area Hazardous Waste Drain Lines

The following actions have been completed as of 7 August 1986 in the investigation and isolation of the 200 Area hazardous waste flow into the tank located just south of the 200 Area south high bay.

On 6 August 1986 a previously unidentified source of drainage of cooling water from room 139 in the Chemistry Laboratory to the hazardous waste drain lines was detected and the flow to the drain lines shut off. The flow of cooling water was appreciable and appeared to be a significant contributor to the tank overflow. A system of positive control of valve openings and closures and measurements of liquid levels in the tank was also implemented. A liquid level warning alarm was installed in the tank and the drainage of all potential sources of liquid from the Photography Laboratory was verified by members of the "Tiger Team" on 7 August 1986.

Additional updates will follow as significant findings or progress occurs.



Jim Williams, Supervisor
Contamination Control and Metallurgical
Engineering Laboratory



John Claffy
Field Engineer
Lockheed EMSCO Environmental Section



Floyd Lane
Facility Engineer
Technical Support Division

cc: William M. Schroeder ✓
David L. Pippen
Harry Johnson
Craig Bishop
File

Rob R. Tillett
Frank Geisel
Terry Boone

INTERDEPARTMENTAL COMMUNICATION

ES86-012

DATE August 20, 1986

TO	J. M. Schentrup	DEPT./ ORGN.	4001	BLDG./ ZONE	100	PLANT/ FAC.	WSTF	
FROM	J. M. Claffy	DEPT./ ORGN.	4001	BLDG./ ZONE	100	PLANT/ FAC.	WSTF	EXT. 5464

SUBJECT: Investigation of the 200 Area Hazardous Waste Drain Lines

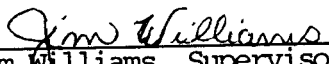
Investigation and isolation of all sources of drainage from Building 200 into the hazardous waste drain lines is complete at this time with the exception of the color coding of lines according to drainage. This action has been delayed until this time due to non receipt of marking tape. Tape was however received on 20 August and the color coding of pipes will proceed as soon as possible.

Two sources in Building 200, one in Room 139 and one in Room 140, are capped off at this time and awaiting a TPS for corrective action to preclude unnecessary drainage of industrial water into the hazardous waste lines.

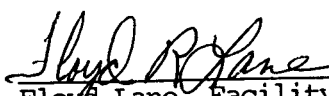
Investigation into all sources of drainage from Building 203 commenced on 18 August. Six rooms have been initially investigated but two unexpected conditions in the drain lines have temporarily halted further investigation in Building 203.

These conditions are a leaking flex hose located at the terminus of the drain line and an apparent partial blockage of the drain line downstream from the valve pit, possibly on the southeast corner of the drain line.

Discrepancy Reports to correct these conditions prior to continuation of the investigation have been initiated.


Jim Williams, Supervisor
Contamination Control and Metallurgical
Engineering and Laboratory
Lockheed/WSTF Operations


John Claffy, Field Engineer
Environmental Section
Lockheed/WSTF Operations


Floyd Lane, Facility Engineer
Technical Support Department
Lockheed/WSTF Operations

aef

cc: C. Bishop/LEMSCO
T. Boone/LEMSCO
F. Geisel/LEMSCO

R. Tillett/NASA
H. Johnson/NASA
D. Pippen/NASA

✓ W. Schroeder/NASA
File



NASA JSC WSTF TEST PREPARATION SHEET

TPS NO. 2-2 HWM-015TYPE: A - Configuration Change
B - No Configuration Change

SYSTEM

ENVIRONMENTAL

MOD SHEET NO.

DRAWING(S), DOCUMENTS, OCP(S), PART NO(S) & DCN(S)

PAGE 1 of 4 PREPARATION DATE 8/25/86

TPS SHORT TITLE

SOILS CLEAN-UP IN THE ZOO AREA

REASON FOR WORK

ENVIRONMENTAL IMPROVEMENT

TASK ORDER NO.

NEED DATE

CONSTRAINTS

040 JAB 00ASAPCOORDINATE WITH THE CLEAN RMSPECIAL SAFETY
REQUIREMENTS ☒ YES
☐ NOMATERIALS
REQUIRED ☒ YES
☐ NOITEM
NO.

DESCRIPTION (TYPE OR PRINT)

WORKED

INSPECTED

SHOP

NASA

SCOPE: To excavate about
1 cubic yard of contaminated
soils from the pit located
south of the Zoo Area. The
pit is where the 1000 gal
tank trailer is presently parked.

Manpower 8 1/2 manhour

Materials: 1 backhoe
Equipment 10'x20' poly sheet

① Operating under engineering direction
and with the assistance of Clean
Room personnel disconnect the

PREPARED BY:

ORGANIZATION:

COMPLETION DATE:

SHOP

NASA

1

CONTRACTOR AUTHORIZED SIGNATURES

NASA AUTHORIZED SIGNATURES

T. Boone
T. Boone

T. Condon 8-25-86
T. Condon



NASA JSC WSTF 8-25-86
TEST PREPARATION SHEET
CONTINUATION SHEET



PAGE 2 OF 4



TPS NO.
MOD. NO.

TPS NO. ~~TPS NO. 0700~~ 142W-015

ITEM NO.	DESCRIPTION CONTINUED	WORKED	INSPECTED
		SHOP	NASA
	necessary hoses and electrical connectors from the 1000 gallon HW tank and pull it out of the pit.		
2	With the bucket of the backhoe, excavate the moistened soils as directed by the engineer and place them on the existing poly sheeting located near the pit	✓	
3	Return the 1000 gal tank and reconnect the hoses & fittings.	✓	
4	Cover the contaminated soil with the new sheet of poly and secure its perimeter so that rain water runs off	✓	
CONTRACTOR AUTHORIZED SIGNATURES		NASA AUTHORIZED SIGNATURES	

JSC Form 1395A (Rev Feb 76)

Q.C. LOG BOX

8-2-86



2-24WM-015



DR-TPS NO. 1-24WM-015

PAGE 3 OF 4

DATE 8/27/86

DR-TPS SAFETY REQUIREMENTS

(Circled Items Will Apply to This Operation)

NOTE: Safety requirements noted are minimum. If other operations are running concurrently, the more stringent safety requirement shall apply. Verify other operations with stand leadman or respective area test coordinator (800 Area).

- * 1. Protective clothing required (circle applicable items):
 - a. SCAPE
 - b. Splash
 - c. Goggles
 - d. Hard Hat
 - e. Face Shield
 - f. Gloves
 - g. Ear Protection
 - h. Breathing Protection
 - i. Other _____
- * 2. Flex-lines will be restrained in accordance with WSTFI 5.4, Attachment 13: (Check for current proof-pressure and service use prior to installation.)
- * 3. System shall be vented prior to breaking pressurized lines.
 - a. Announcement: (required prior to venting hazardous gases)
Venting fuel/oxidizer to ponds/burner.
- * 4. Only personnel involved in the test or procedure will be permitted in the area.
- * 5. Equipment will have the power disconnected and the switch locked off. (A "DO NOT OPERATE" tag may be used as an alternate.)
- * 6. Hazardous Operation Permit required.
- * 7. Approved lifting equipment will be used (verify valid proof load).
- * 8. Direct communications required (radios, test net, etc.).
- * 9. This is a two-man operation (using "buddy" system).

OTHER REQUIREMENTS NOT COVERED ABOVE

- 10. Avoid skin contact
- 11. _____
- 12. _____

* CONTRACTOR AUTHORIZED SIGNATURES

[Signature]

NASA AUTHORIZED SIGNATURES

[Signature] 825-86

WSTF-69 (Revised 2-79)

* Denotes change.

8-25-86

Page 4 of 4

~~REF 86 076~~

2-2 HWM-015



PERMIT TO EXCAVATE/DRAW

Date: 8/25/86

Project: ENVIRONMENTAL

W. T. No.: TPS/DR No.:

I have reviewed the drawings applicable to this project and authorize excavation/dragging to be performed on this project subject to the following restrictions:

To be performed under engineering direction

Drawings Reviewed:

200-7-01

200 Area Utilities

Lockheed-EMSCO Technical Support Engineer

NASA Technical Support Engineer

Reference: NSI 203

WSTF-289 (1/82)

NASA JSC WSTF DISCREPANCY RECORD



OCT 2 1986

PAGE 1 of 2

(SEE INSTRUCTION ON REVERSE OF LAST COPY)

1. DR NO.

22HWM-012

2. END ITEM SN

3. PART NAME

TANK
STAINLESS STEEL

4. CONTRACTOR PART NO.

NIA

5. SERIAL NO.

NIA

6. REF. DWG. NO.

7. SUPPLIER

NIA

8. SUPPLIER PART NO.

NIA

9. REF. DOC. NO.

TPS-2-HWM-016 R

10. TIME/CYCLES

11. PRIORITY

040-JBL-00

12. NEED DATE

ASAP

13. SYSTEM

HAZARDOUS WASTE MGMT

14. LOCATION

200 AREA

ITEM NO.

15.

200 AREA HAZARDOUS WASTE TANK
LEAKING THROUGH REAR FLANGE,
(AROUND ELEC CONNECTOR)
AS MARKED.

NOTE: LEAK APPROX LESS THAN 1 GAL.
TANK BEING EMPTIED THIS DATE.

16. INITIATOR'S SIGNATURE

[Signature]

17. STAMP NO.

142

18. ORGANIZATION

DCAS QA

19. DATE

2 OCT 86

20. NEW TECH: ☐ YES ☐ NO

21. MAT REQ'd: ☐ YES ☐ NO

22. CRAFT

120

122

124

126

135

140

152

175

177

182

OTHER

23. MR REQUIRED:

☐ YES ☐ NO

24. DISPOSITION TAG NO.

25. REPLACEMENT PART NO.

26. SERIAL NO.

27. RETEST REQUIRED

☐ YES ☐ NO

28. FAILURE ANALYSIS

☐ YES ☐ NO

29. CONSTRAINT

SPECIAL SAFETY INSTRUCTION
YES ☒ NO ☐

30. RETEST ACCEPTED: CONTR. NASA

DATE

ITEM NO.

31.

ENGINEERING DISPOSITION

32. WORKED

SHOP

33. INSPECTED

NASA

1. EMPTY TANK PER TPS 2 HWM-016 R
2. TRANSPORT TO MACHINE SHOP
3. REMOVE SMALL ROUND CENTER PLATE
4. WELD UP PENETRATION ON INSIDE OF PLATE AS REQUIRED OR REPLACE PLATE IF REQUIRED.
5. REINSTALL PLATE & RETURN TANK TO 200 LOCATION. LEAK OK good

B/10-2-86
B/10-2-86
B/10-2-86
B/10-2-86
B/10-2-86

10-2-86
10-2-86
10-2-86
10-2-86
10-2-86

FINAL ACCEPTANCE

34. DATE

10-2-86

SHOP

NASA

10-4-86

DR-TPS NO. 2-HWM-012PAGE 2 OF 2

DATE _____

DR-TPS SAFETY REQUIREMENTS

(Circled Items Will Apply to This Operation)

NOTE: Safety requirements noted are minimum. If other operations are running concurrently, the more stringent safety requirement shall apply. Verify other operations with stand leadman or respective area test coordinator (800 Area).

- * 1. Protective clothing required (circle applicable items):
 - a. SCAPE
 - b. Splash
 - c. Goggles
 - d. Hard Hat
 - e. Face Shield
 - f. Gloves
 - g. Ear Protection
 - h. Breathing Protection
 - i. Other _____
- * 2. Flex-lines will be restrained in accordance with WSTFI 5.4, Attachment 13: (Check for current proof-pressure and service use prior to installation.)
- * 3. System shall be vented prior to breaking pressurized lines.
 - a. Announcement: (required prior to venting hazardous gases)
Venting fuel/oxidizer to ponds/burner.
- 4. Only personnel involved in the test or procedure will be permitted in the area.
- 5. Equipment will have the power disconnected and the switch locked off. (A "DO NOT OPERATE" tag may be used as an alternate.)
- 6. Hazardous Operation Permit required.
- * 7. Approved lifting equipment will be used (verify valid proof load).
- * 8. Direct communications required (radios, test net, etc.).
- 9. This is a two-man operation (using "buddy" system).

OTHER REQUIREMENTS NOT COVERED ABOVE

- 10. _____
- 11. _____
- 12. _____

CONTRACTOR AUTHORIZED SIGNATURES

P. Sturp 10/2/86
P. Sturp

NASA AUTHORIZED SIGNATURES

T. Condon 10-2-86
T. Condon

NASA JSC WSTF DISCREPANCY RECORD

(SEE INSTRUCTION ON REVERSE OF LAST COPY)



10-21-86

PAGE 1 of 4

1. DR NO.

2-2HWM-014

2. END ITEM SN

3. PART NAME

HW DRAIN LINE

4. CONTRACTOR PART NO.

N/A

5. SERIAL NO.

N/A

6. REF. DWG. NO.

N/A

7. SUPPLIER

N/A

8. SUPPLIER PART NO.

N/A

9. REF. DOC. NO.

none

10. TIME/CYCLES

11. PRIORITY

12. NEED DATE

ASAP

13. SYSTEM

HAZARDOUS WASTE DRAIN

14. LOCATION

200 AREA

ITEM NO.

15.

1. THE HAZARDOUS WASTE DRAIN LINE IS BACKING UP THROUGH THE CLEAN ROOM SUMP.

2. MINIMUM LEAKAGE HAS OCCURRED FROM THE CLEAN ROOM SUMP PAD. TO THE OUTSIDE AREA.

note: EPA coordinator, T. Boone, notified

16. INITIATOR'S SIGNATURE

B. O. Dell

17. STAMP NO.

142

18. ORGANIZATION

DCAS QA

19. DATE

21 OCT 86

20. NEW TECH: ☐ YES ☐ NO

21. MAT REQ'd: ☐ YES ☐ NO

22. CRAFT

120

122

124

126

135

140

152

175

177

182

OTHER

23. MR REQUIRED:

☐ YES ☐ NO

24. DISPOSITION TAG NO.

25. REPLACEMENT PART NO.

26. SERIAL NO.

27. RETEST REQUIRED

☐ YES ☐ NO

28. FAILURE ANALYSIS

☐ YES ☐ NO

29. CONSTRAINT

SPECIAL SAFETY INSTRUCTIONS
YES ☒ NO ☐

30. RETEST ACCEPTED: CONTR

NASA

DATE

ITEM NO.

31.

ENGINEERING DISPOSITION

32. WORKED

SHOP

33. INSPECTED

NASA

1. Troubleshoot per engineering direction & list steps taken on this DR.

2. Reference DR 2-HWM-015

(Task Order # 040 JAB 00)

LEMSCO

NASA

F. Mathis

Vernon J. Harris

John M. Claffy 10-21-86

Darryl G. White 10-21-86

FINAL ACCEPTANCE

34. DATE

10-21-86

SHOP

gmc



NASA JSC WSTF
DISCREPANCY RECORD-CONTINUATION SHEET

DR NO.

22HWM-014

PAGE 2 of 4

ITEM NO.	31. ENGINEERING DISPOSITION (Cont'd)	WORKED	INSPECTED
		SHOP	NASA
1.	Announce the closing of the drain lines	JMC	 OCT 24 '86
2.	Insure technician has on gloves and face shield	JMC	 OCT 24 '86
3.	Remove flange from drain pipe for freon extraction unit on clean room pad and observe for liquid = No liquid observed 3 flange was replaced	JMC	 OCT 24 '86
4.	Remove flange from the pressure test port located in the clean room drain lines and observe for liquid = liquid was standing in drain line 3 flange was replaced quickly	JMC	 OCT 24 '86
5.	Remove flange from the pressure test port located by the clean lab value box and observe for liquid = Minimal amount of standing water observed and flange replaced	JMC	 OCT 24 '86
6.	Remove flange from pressure test port located in valve pit and observe for liquid = Negligible amount of water observed and flange replaced	JMC	 OCT 24 '86
7.	Close valve in valve box located at the	JMC	 OCT 24 '86
FINAL ACCEPTANCE		34. DATE 10-21-86	SHOP JMC

NASA JSC WSTF
DISCREPANCY RECORD-CONTINUATION SHEET

PAGE 3 of 4

DR NO.

2-2-HWM-014

ITEM NO.	ENGINEERING DISPOSITION (Cont'd)	WORKED	INSPECTED
		SHOP	NASA
	hazardous waste tank	JMC	 OCT 24 '86
8	Close Jamesberry valve located just above the hazardous waste tank	JMC	 OCT 24 '86
9	Disassemble flex hose from the hazardous waste tank (QA coverage necessary) Flex hose assembly verified as clear	JMC	 OCT 24 '86
10	Reassemble flex hose to hazardous waste tank and drain lines	JMC	 OCT 24 '86
11	Open both valves located near the hazardous waste tank	JMC	 OCT 24 '86
12	Remove the flange from the clean room pressure test port and check the liquid level = 8" drop from AM	JMC	 OCT 24 '86
13	Place snake in line and attempt to locate plug or any other problem	JMC	 OCT 24 '86
14	Plug located approximately 40 ft down stream from pressure test port (minor blockage not main plug)	JMC	 OCT 24 '86
FINAL ACCEPTANCE		DATE 10-21-86	SHOP JMC  OCT 24 '86

DR NO

2-2 HWM 014

34. DATE _____

10-27-86

SHOP

NASA
NASA
142W

OCT 24 '88

NASA JSC WSTF DISCREPANCY RECORD										PAGE <u>1</u> of <u>1</u>		
(SEE INSTRUCTION ON REVERSE OF LAST COPY)										1. DR NO. <u>22HWM-015</u>		
2. END ITEM SN												
3. PART NAME <u>HW DRAIN LINE</u>			4. CONTRACTOR PART NO. <u>N/A</u>			5. SERIAL NO. <u>N/A</u>		6. REF. DWG. NO. <u>N/A</u>				
7. SUPPLIER <u>N/A</u>			8. SUPPLIER PART NO. <u>N/A</u>			9. REF. DOC. NO. <u>DR-2-HWM-014</u>		10. TIME/CYCLES <u>—</u>				
11. PRIORITY			12. NEED DATE <u>ASAP</u>			13. SYSTEM <u>HAZARDOUS WASTE DRAIN LINES</u>		14. LOCATION <u>200</u>				
ITEM NO.	15.											
1.	REF. DR. 2-HWM-014. Item 2 LEAKAGE OCCURRED FROM 200 AREA DRAIN LINE SUMP. FROM CLEAN ROOM PAD. TO OUTSIDE AREA. T. BOONE NOTIFIED.											
16. INITIATOR SIGNATURE <u>B. ODUM</u>			17. STAMP NO. <u>142</u>			18. ORGANIZATION <u>DCAT DA</u>			19. DATE <u>21 OCT 86</u>			
20. NEW TECH: ☐ YES ☐ NO			21. MAT REQ'd: ☐ YES ☐ NO									
22. CRAFT		120	122	124	126	135	140	152	175	177	182	OTHER
23. MR REQUIRED: ☐ YES ☐ NO			24. DISPOSITION TAG NO.			25. REPLACEMENT PART NO.			26. SERIAL NO.			27. RETEST REQUIRED ☐ YES ☐ NO
28. FAILURE ANALYSIS ☐ YES ☐ NO			29. CONSTRAINT			SPECIAL SAFETY INSTRUCTION YES ☐ NO ☒			30. RETEST ACCEPTED: CONTR. NASA			
ITEM NO.	31. ENGINEERING DISPOSITION								32. WORKED SHOP		33. INSPECTED NASA	
	The total quantity of waste which leaked from the clean room pad is estimated at less than 5 gallons. No remedial action is recommended in view of the quantity released and the proximity of it to the leaky CR tank which is currently being addressed. <u>C. Boone</u> <u>A. Schroeder</u> 10/23/86											
FINAL ACCEPTANCE						34. DATE <u>10/23/86</u>			SHOP		OCT 24 '86 	



NASA JSC WSTF TEST PREPARATION SHEET

TPS NO.

2-2-HMM-050

TYPE: A - Configuration Change
B - No Configuration Change

SYSTEM

HAZARDOUS WASTE TANKS REMOVAL - 200 AREA

MOD SHEET NO.

2

DRAWING(S), DOCUMENTS, OCP(S), PART NO(S) & DCN(S)
284-13927/DCN 284-13927

PAGE

1 of 3

PREPARATION DATE

3/27/87

TPS SHORT TITLE

SITE PREPARATION, EXCAVATION, FILLING AND CAPPING

REASON FOR WORK

REMOVE HAZARDOUS WASTE FROM 3" DRAIN LINE FOR DISPOSAL

TASK ORDER NO.

031 J02 00

NEED DATE

3/31/87

CONSTRAINTS

NONE

SPECIAL SAFETY
REQUIREMENTS☒ YES
☐ NOMATERIALS
REQUIRED☒ YES
☐ NOITEM
NO.

DESCRIPTION (TYPE OR PRINT)

WORKED
SHOPINSPECTED
NASAWORK SCOPE:

This modification provides the instructions to remove
the soiled materials under the 3" cast iron drain from
the Clean Room to the 200 building foundation wall.

SAFETY REQUIREMENTS:

Chemical resistant gloves
Dust masks with replaceable filters are to be worn
Neoprene rubber work boots
SEE ATTACHED SAFETY REQUIREMENTS SHEET

LABOR REQUIREMENTS:

M&C: 8.0 mh

H/E: 2.0 mh

PREPARED BY:
E. C. MerrittORGANIZATION:
Lockheed-EMSCO/WSTFCOMPLETION DATE:
6/7/88

CONTRACTOR AUTHORIZED SIGNATURES

NASA AUTHORIZED SIGNATURES

J. Hassley
E. C. Merritt
Joseph B. Hindsley 3/27/87

T. Condon
T. Condon 3/27/87

JSC FORM 1393 (REV May 76)



NASA JSC WSTF TEST PREPARATION SHEET CONTINUATION SHEET



PAGE 2 OF 3

TPS N.O.

2-2-NM-050

MOD. NO.

ITEM NO.	DESCRIPTION CONTINUED	WORKED	INSPECTED
		SHOP	NASA
	NOTE:		
	Lined with plastic 55 gallon drums are available from		
	the 150 warehouse. They are stored under the name		
	of John Claffy, who has released them for this		
	requirement.		
1.	Pick up drums as required from 150 warehouse.	JH	NASA 158W 6-7
2.	Dig out materials under and adjacent to 3" line to the foundation.	JH	NASA 158W 6-7
3.	Any sections of 3" cast iron pipe can be removed to facilitate clean-up.	JH	NASA 158W 6-7
4.	Place materials in drums and relocate to drum storage area as directed by environmental coordinator, J. Hossey, X5464.	JH	NASA 158W 6-7
5.	All other coordination is with E. C. Merrill, X5235.	JH	NASA 158W 6-7
CONTRACTOR AUTHORIZED SIGNATURES		NASA AUTHORIZED SIGNATURES	
[Signature]		[Signature]	

JSC Form 1395A (Rev Feb 76)

Q.C. LOG BOX



MAR 31 '87

DATE 3-27-87DR-TPS SAFETY REQUIREMENTS

(Circled Items Will Apply to This Operation)

NOTE: Safety requirements noted are minimum. If other operations are running concurrently, the more stringent safety requirement shall apply. Verify other operations with stand leadman or respective area test coordinator (800 Area).

- * 1. Protective clothing required (circle applicable items):
 - a. SCAPE
 - b. Splash
 - c. Goggles
 - d. Hard Hat
 - e. Face Shield
 - f. Gloves
 - g. Ear Protection
 - h. Breathing Protection
 - i. Other _____
- * 2. Flex-lines will be restrained in accordance with WSTFI 5.4, Attachment 13: (Check for current proof-pressure and service use prior to installation.)
- * 3. System shall be vented prior to breaking pressurized lines.
 - a. Announcement: (required prior to venting hazardous gases)
Venting fuel/oxidizer to ponds/burner.
- * 4. Only personnel involved in the test or procedure will be permitted in the area.
- * 5. Equipment will have the power disconnected and the switch locked off. (A "DO NOT OPERATE" tag may be used as an alternate.)
- * 6. Hazardous Operation Permit required.
- * 7. Approved lifting equipment will be used (verify valid proof load).
- * 8. Direct communications required (radios, test net, etc.).
- * 9. This is a two-man operation (using "buddy" system).

OTHER REQUIREMENTS NOT COVERED ABOVE

10. NEOPRENE WORK BOOTS

11. _____

12. _____

CONTRACTOR AUTHORIZED SIGNATURES

E. B. [Signature] 3/27/87Joseph B. [Signature] 3/27/87

NASA AUTHORIZED SIGNATURES

[Signature] 3/27/87

WSTF-69 (Revised 2-79)

* Denotes change.

NASA JSC WSTF DISCREPANCY RECORD

APR 9 '87

PAGE 1 of 4

(SEE INSTRUCTION ON REVERSE OF LAST COPY)

1. DR NO. 2-2-HWM-028

2. END ITEM SN

3. PART NAME NONE

4. CONTRACTOR PART NO. N/A

5. SERIAL NO. N/A

6. REF. DWG. NO. N/A

7. SUPPLIER N/A

8. SUPPLIER PART NO. N/A

9. REF. DOC. NO. HAZARDOUS WASTE INSP.

10. TIME/CYCLES

11. PRIORITY 031-1AB-00

12. NEED DATE ASAP

13. SYSTEM HAZARDOUS WASTE DRAIN

14. LOCATION 200

ITEM NO.

15.

1. A SPILL OCCURRED AT THE 200 AREA CLEAN ROOM PAD, WITH HAZARDOUS CONSTITUENTS ON TO THE PAVEMENT AND ADJOINING SOIL ALONG THE FENCE LINE TO THE CIR PAD.

2. CORRECTIVE ACTION NECESSARY.

16. INITIATOR'S SIGNATURE B. O. D.

17. NTMP NO. 142W

18. ORGANIZATION DPK DA

19. DATE 4-3-87

20. NEW TECH: ☐ YES ☒ NO

21. MAT REQ'd: ☐ YES ☒ NO

22. CRAFT

120

122

124

126

135

140

152

175

177

182

OTHER

23. MR REQUIRED:

☐ YES ☒ NO

24. DISPOSITION TAG NO. N/A

25. REPLACEMENT PART NO. N/A

26. SERIAL NO. N/A

27. RETEST REQUIRED

☐ YES ☒ NO

28. FAILURE ANALYSIS

☐ YES ☒ NO

29. CONSTRAINT

mm

30. RETEST ACCEPTED:

DATE

CONTR

NASA

ITEM NO.

31.

ENGINEERING DISPOSITION

32. WORKED

SHOP

33. INSPECTED

NASA

1 TPS 2-HWM-063 ADDRESSES
SPILL CLEAN-UP.

BACKGROUND:

SPILL 4/3/87, 10:30 AM

10 GAL. WATER CONTAMINATED
W/ FREON.

THE FREON EXTRACTION UNIT
WAS BEING USED TO RECLAIM

FINAL ACCEPTANCE

34. DATE 4-9-87

SHOP

4987

NASA 142W

TPS & LII

DISCREPANCY RECORD-CONTINUATION SHEET

DR NO.

2-2-HWM-028

ITEM NO.	ENGINEERING DISPOSITION (Cont'd)	WORKED	INSPECTED
		SHOP	NASA
31.	SPENT FREON. THE DISCHARGE FROM THE UNIT WAS ACROSS THE PAD AND INTO THE HAZARDOUS WASTE SUMP. MATERIAL ACCUMULATING IN THE SUMP (DIRT, WEEDS) PLUGGED THE EXIT FILTER IN THE SUMP. THE SUMP OVERFLOWED ONTO THE PARKING LOT AND RAN TOWARDS THE ROAD. ALL FREE LIQUIDS WERE CONTAINED WITH SPILL PILLOWS AND ACCUMULATED IN A 55 GAL DRUM. SOIL CONTAMINATION WAS REMOVED UNDER TPS- 2-HWM-063. SCOPE: THIS DISPOSITION WILL PROVIDE FOR PROCEDURAL AND DESIGN CHANGES TO PREVENT SPILLS FROM THE CLEAN ROOM PAD. 2 CHANGE PROCEDURES IN ORDER TO MAINTAIN THE DRAIN VALVE FROM THE SUMP IN AN OPEN POSITION. THIS WAS NOT A FACTOR FOR THE SPILL OF 4/3/87, BUT IS A NECESSARY STEP FOR THE		
FINAL ACCEPTANCE		34. DATE 4-9-87	4-9-87

NASA JSC WSTF APR 9 '87		PAGE <u>3</u> of <u>4</u>	
DISCREPANCY RECORD-CONTINUATION SHEET		DR NO. <u>221WM-028</u>	
ITEM NO.	ENGINEERING DISPOSITION (Cont'd)	WORKED	INSPECTED
		SHOP	NASA
	PREVENTION OF FUTURE RELEASES. (RE: AVO ATTACHED)		
3.	REDESIGN AND INSTALL A NEW FILTER IN THE SUMP FOR BETTER DRAINAGE AND RESISTANCE TO PLUGGING		
	PREPARED BY James H. Harrison LEMSCO 4/6/87		
	Harold D. Johnson 1/8/87		
	The Hazardous waste valve MV-2HZ-AP21 will be left open except in case of emergency. A piece of perforated stainless was cut to fit over the inlet to the sump to prevent weeds and trash from plugging the line. LJI 320-33-23 Hazardous Waste Management LJI was changed to reflect these operational modifications.		
	KO Lambert 4-9-87		
FINAL ACCEPTANCE		34. DATE	
		4-9-87	

K. Lambert

B. Plante.

WRITE IT — ACCEPT NO VERBAL ORDERS

SAVE PAPER - REPLY ON THIS SHEET WHEN POSSIBLE

TO	DIVISION	DEPT./ORGN.	BLDG./ZONE	PLANT/FAC.	DATE
Jim Williams		LEMSCO		WSTF	04-03-87
FROM		NASA			EXT.
Barry Plante					5722
SUBJECT	Rain Water Drainage				

Modify the standard procedures for control of the drainage valves to ensure that rain water accumulation on the pad drains into the tanks. The normal position of the valve should be open. Investigate building drainage water overflow.

cc: Harry Johnson

Bob Mitchell

Peter Pache

WSTF-232 (7/76)

2-24um
pg 4 of 4
028



NASA JSC WSTF TEST PREPARATION SHEET

TPS NO. **2-2 HWM 063**TYPE: ☒ A - Configuration Change
☐ B - No Configuration ChangeSYSTEM
ENVIRONMENTAL

MOD SHEET NO.

DRAWING(S), DOCUMENTS, OCP(S), PART NO(S) & DCN(S)
NONEPAGE **1** of **2** PREPARATION DATE **4/3/87**TPS SHORT TITLE
DISPOSE OF SPILL CONTAMINATED SOILREASON FOR WORK
ENVIRONMENTAL COMPLIANCETASK ORDER NO. **UST JAB 00** NEED DATE **4/3/87** CONSTRAINTS **NONE**SPECIAL SAFETY REQUIREMENTS ☒ YES ☐ NOMATERIALS REQUIRED ☒ YES ☐ NO

ITEM NO.	DESCRIPTION (TYPE OR PRINT)	WORKED	INSPECTED
		SHOP	NASA
	SCOPE: This IPS is for the removal and accumulation of contaminated soil resulting from a spill of hazardous waste.		
	MATERIALS: 2 Shovels as needed		
	MANPOWER: 2 manhours		
	Move the 55 gallon drum which contains the spill pillows from the 4/3/87 cleanup out to the area on the parking lot where the spill occurred.	JHW 4-6-87	4-6-87
	Using shovels ^{whatever device is available} remove as much of the sand and dirt which was contaminated by the spill and place the dirt in the 55 gallon drum.	JHW 4-6-87	4-6-87
	Environmental Section will provide a stop point on soil removal.		
	Close drum and return the drum. Dispose of contaminated dirt with other dirt as directed by ^{Environmental Section personnel.}	KG 4-7-87	4-8-87
PREPARED BY: Henderson	ORGANIZATION: LEMSCU	COMPLETION DATE: 4-7-87	SHOP JHW
CONTRACTOR AUTHORIZED SIGNATURES J. Henderson		NASA AUTHORIZED SIGNATURES H. Johnson.	

DR-TPS SAFETY REQUIREMENTS

(Circled Items Will Apply to This Operation)

NOTE: Safety requirements noted are minimum. If other operations are running concurrently, the more stringent safety requirement shall apply. Verify other operations with stand leadman or respective area test coordinator (800 Area).

- * 1. Protective clothing required (circle applicable items):
 - a. SCAPE
 - b. Splash
 - c. Goggles
 - d. Hard Hat
 - e. Face Shield
 - f. Gloves
 - g. Ear Protection
 - h. Breathing Protection
 - i. Other
- * 2. Flex-lines will be restrained in accordance with WSTFI 5.4, Attachment 13: (Check for current proof-pressure and service use prior to installation.)
- * 3. System shall be vented prior to breaking pressurized lines.
 - a. Announcement: (required prior to venting hazardous gases)
Venting fuel/oxidizer to ponds/burner.
- 4. Only personnel involved in the test or procedure will be permitted in the area.
- * 5. Equipment will have the power disconnected and the switch locked off. (A "DO NOT OPERATE" tag may be used as an alternate.)
- 6. Hazardous Operation Permit required.
- * 7. Approved lifting equipment will be used (verify valid proof load).
- * 8. Direct communications required (radios, test net, etc.).
- 9. This is a two-man operation (using "buddy" system).

OTHER REQUIREMENTS NOT COVERED ABOVE

- 10. SOIL IS CONTAMINATED W/HAZARDOUS
- 11. CONSTITUENTS NO DIRECT HAZARDS. BUT
- 12. AVOID SKIN CONTACT

* CONTRACTOR AUTHORIZED SIGNATURES

NASA AUTHORIZED SIGNATURES

[Signature]

Nancy J. John 4/13/77



DEC 1 1987

NASA

NASA JSC WSTF
TEST PREPARATION SHEET

TPS NO.

2-2-HWM-094

TYPE: A - Configuration Change
B - No Configuration Change

X

SYSTEM

ENVIRONMENTAL

MOD SHEET NO.

1

DRAWING(S), DOCUMENTS, OCP(S), PART NO(S) & DCN(S)

NONE

PAGE

of

2

PREPARATION DATE

16 NOV 87

TPS SHORT TITLE

CONTAMINATED SOILS REMOVAL

REASON FOR WORK

REGULATORY COMPLIANCE

TASK ORDER NO.

JAB and JB6

NEED DATE

18 DEC 87

CONSTRAINTS

NONE

SPECIAL SAFETY
REQUIREMENTS☒ YES
☐ NOMATERIALS
REQUIRED☒ YES
☐ NOITEM
NO.

DESCRIPTION (TYPE OR PRINT)

WORKED

SHOP

INSPECTED

NASA

SCOPE: This TPS authorizes the removal of
contaminated soils from the 2010 Area
for shipment to an off site disposal
facility

SAFETY: Skin contact with contaminated
soils will be avoided

MATERIALS: 6 Ea Open top 55 gallon, carbon
steel drums with liner
shovels

Hazardous Waste labels as needed
Shipping labels as needed
Front end loader

12/24/87

PREPARED BY:

J. Claffy

ORGANIZATION:

LEMSEO

COMPLETION DATE

24 DEC 87

SHOP

Jm

NASA

142W

CONTRACTOR AUTHORIZED SIGNATURES

J. Claffy

NASA AUTHORIZED SIGNATURES

R. Mitchell

John M Claffy 16 NOV 87

Robert Mitchell 24 Nov 87



NASA JSC WSTF
TEST PREPARATION SHEET
CONTINUATION SHEET



DEC 1 1987

PAGE 2 OF 2

TPS NO. 8-2 HWM-094
MOD. NO.

ITEM NO.	DESCRIPTION CONTINUED	WORKED	INSPECTED
		SHOP	NASA
	PERSONNEL: 1Ea Environmental Representative at 4 manhours 2E, m3C Technicians at 4Ea manhours 1Ea 11E Technician at 2Ea manhours		
1	Heavy equipment technician will P/u P pile of dirt and debris located next to NW tankers in the 200 Area per engineering direction Change to JAB	JMC 23 DEC 87	 12/23/87
2	M3C Technicians drum pile of soil behind T253 per engineering direction and move to Drum Storage facility	JMC 23 DEC 87	 12/23/87
3	Environmental Representative will label drums and send out IDC directing no more soils be piled, dumped, placed or otherwise deposited in the areas.	JMC 23 DEC 87	
CONTRACTOR AUTHORIZED SIGNATURES		NASA AUTHORIZED SIGNATURES	
John M. Claffy 23 NOV 87		Robert E. H. H. H. 24 NOV 87	

JSC Form 1395A (Rev Feb 76)

Q. C. LOG BOOK

NASA White Sands Test Facility

NMED Comment No.	NMED Comment	Redlined Sections in Revised IWP
1. Section 2.3, Contaminants of Potential Concern, Page 5	Permittee's Statement: "Contaminants of potential concern (COPCs) for SWMU 10 comprise the substances that would be potentially present in environmental media affected by a release, and include waste derived from the WSTF Clean Room and Chemistry Laboratory underground storage tanks. The known operational history for the 200 Area documented in the 200 Area HIS (NASA, 2012a), 200 Area SWMU 10 (HWTLs) HIS (NASA, 2015), results of previous 200 Area Investigations, and results from ongoing groundwater monitoring evaluations were used to develop a list of contaminants of concern (COCs; Table 2.1)." NMED Comment: Based on the Historical Information Summary (HIS) the Hazardous Waste Transmission Lines (HWTLs) continued to receive the same waste stream that was previously directed to the Clean Room and Chemistry Laboratory underground storage tanks. A review of the 200 Area Phase II RCRA Facility Investigation (RFI) investigation work plan dated November 2013 presented a comprehensive COPC list for the 200 Area to be utilized for soil samples collected in the vadose zone. Based on this information, in addition to proposed soils analysis for volatile organic compounds (VOCs), hydrazine, N- nitrosodimethylamine (NDMA), semi-volatile organic compounds (SVOCs), and total target analyte list (TAL) metals, all collected soil samples must be analyzed for bromacil, dioxin/furans, nitrate/nitrite, cyanide, perchlorate, chloride, and pH. Also, analytical methods proposed to test all environmental media must be clearly stated in the text or appropriate tables in any investigation work plan or investigation report submitted to NMED. To ensure current and consistent analytical methods are used in conformance with the most recent investigation at the 200 Area (Phase II RFI), samples must be analyzed by the following EPA test methods, VOCs by EPA Method 8260C; Hydrazine by EPA Method 8315; NDMA by EPA Method 607M; SVOCs by EPA Method 8270C including low level polycyclic aromatic hydrocarbons (PAH); bromacil by EPA Method 8321B; dioxins/furans by EPA Method 8280/8290; Total TAL metals by most	See Section 2.3, COPC, Page 5, and the revised Table 4.1 where the additional analytes and EPA test methods were added.

NASA White Sands Test Facility

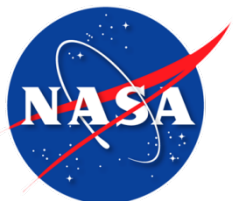
NMED Comment No.	NMED Comment	Redlined Sections in Revised IWP
	appropriate method; nitrate/nitrite by EPA Method 300.0; pH by EPA Method 9045D; and hexavalent chromium by EPA Method 7199.	
2. Section 2.4.3 , Exposure Pathways, Page 6.	Permittee's Statement: "Construction workers will be excavating the HWTLs and supporting collection of soil samples during this investigation, therefore a potential exposure pathway exists for that population to ingest, inhale, or come into dermal contact with potentially contaminated soil (Pathways 2, 3 and 4)." NMED Comment: Ensure that appropriate dust suppression and personal protective equipment measures are implemented during any field activities (e.g., backhoe excavation work) that could expose site workers to potentially contaminated soils.	See Section 2.4.3 , Exposure Pathways, Page 6 and the project-specific Safety and Health Plan Addendum.
3. Section 4.1.5 , Abandonment or Removal of Steel Section of HWTL, Page 12.	Permittee's Statement: "The industrialized 200 Area hosts a complex network of existing underground utility lines, paved parking lots, roadways, and existing structures, which are located proximally to the HWTLs and significantly limit accessibility. As a result, the HWTLs in this area will be abandoned in place if excavation and removal are not possible. Actual field conditions encountered during the investigation will determine if the pipeline can be removed or if abandonment is the only option." NMED Comment: The Permittee must remove the HWTLs from the ground to the extent practicable and adequately assess the condition of the pipeline along the entire pipe run. Additional samples must be collected at any observed sections where the integrity of the pipeline has degraded or been compromised. The Permittee must provide adequate documentation of all pipe run inspection activities during excavation and provide an adequate rationale for abandoning the stainless steel portion of the HWTLs in place.	See Section 4.1.5.1 , Abandonment or Removal of Steel Section of HWTL, Page 12, Section 4.2.1 , Industrialized 200 Area, Page 13, and Section 7.0 , Field Documentation Procedures, Page 19.

NASA White Sands Test Facility

NMED Comment No.	NMED Comment	Redlined Sections in Revised IWP
4. Section 4.2.1 , Industrialized 200 Area, Page 13.	NMED Comment: If the stainless steel HWTLs are to be abandoned in place, the Permittee must collect six (6) additional soil samples along the pipe run. Two additional samples must be collected at evenly spaced intervals along the pipeline run between proposed sample locations 200-HWTL-04 and 200-HWTL-05; one additional sample must be collected at the midpoint of the pipe run between proposed sample locations 200-HWTL-08 and 200-HWTL-03; two additional samples must be collected at evenly spaced intervals along the pipe segment between proposed sample locations 200-HWTL-02 and 200-HWTL-03; and one additional sample must be collected along the pipe run at the midpoint between proposed sample locations 200-HWTL-01 and 200-HWTL-02. The additional sample points are required to provide shallow subsurface site characterization information along the stainless steel portion of the HWTL.	See Section 4.2.1 , Industrialized 200 Area, Page 13, and updated Figure 4.1 , Proposed Sampling Locations.
5. Section 5.3.2 , Field Quality Control Samples, Page 15.	NMED Comment: Permit Attachment 17, Section 17.2.2.e, Soil, Rock and Sediment Sample Types, requires equipment blanks from all sampling apparatus at a frequency of ten percent or at a frequency of one per day if disposable sampling equipment is used. The Permittee must collect field blanks at a frequency of one per day for each medium at each SWMU, AOC, or other site. The blanks and duplicates shall be submitted for laboratory analysis associated with the project-specific contaminants, data quality concerns, and media being sampled. All quality control and sampling procedures during any investigation must be in accordance with the requirements of Attachment 17 of the facility's hazardous waste permit.	See Section 5.3.2 , Field Quality Control Samples, Page 15.
6. Figure 5.7, HIS, HWTLs Reconfiguration Connecting Two Waste	NMED Comment: Figure 5.7 of the HIS depicts the two tanks previously used for interim waste storage near the South High Bay to be in a pit below surface grade. The Permittee must determine the depth below grade that the tanks were originally located prior to sampling. Historical information also indicates that at least three releases of waste effluent from the 200 Area occurred between July and August of 1986	See Section 4.2.1 , Industrialized 200 Area, Page 13, and updated Figure 4.1 , Proposed Sampling Locations.

NASA White Sands Test Facility

NMED Comment No.	NMED Comment	Redlined Sections in Revised IWP
Tankers, Pages 30.	along with subsequent spill clean-up including excavation activities which may have disturbed shallow subsurface soils at the location of the former waste storage tank staging area and stainless steel to polyvinyl chloride pipe couple. Based on the current understanding of this information, proposed sampling locations 200-HWTL-06, 200-HWTL-07, 200-HWTL-08 and 200-HWTL-09 must be extended to a depth which accounts for the disturbance of any shallow subsurface soils during cleanup activities and the bottom of the storage tank staging area. Any additional information regarding spill cleanup activities, additional storage tank information, and any resulting variances in the proposed sampling plan must be adequately documented in the investigation report.	



National Aeronautics and
Space Administration

200 Area Hazardous Waste Transmission Lines (SWMU 10) Investigation Work Plan

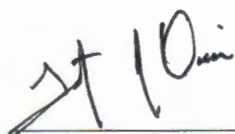
June 2015

NM8800019434
NASA Johnson Space Center White Sands Test Facility
12600 NASA Road Las Cruces, New Mexico 88012

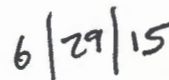
NASA Johnson Space Center White Sands Test Facility
200 Area Hazardous Waste Transmission Lines (SWMU 10)
Investigation Work Plan

June 2015

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Timothy J. Davis
Chief, NASA Environmental Office



Date

Executive Summary

The National Aeronautics and Space Administration (NASA) is required by the White Sands Test Facility (WSTF) Hazardous Waste Permit (Permit; NMED, 2009) issued by the New Mexico Environment Department (NMED) to develop investigation work plans (IWPs) for identified closed hazardous waste management units (HWMUs) and solid waste management units (SWMUs) at WSTF. SWMU 10, the 200 Area Hazardous Waste Transmission Lines (HWTLS), are identified in the Permit and addressed in this IWP. A Historical Information Summary (HIS) was developed for SWMU 10 and is being submitted concurrently with this IWP.

The 200 Area HWTLS were constructed to transfer waste from the industrialized 200 Area Chemistry Laboratory complex to the 600 Area HWMU impoundments (Closure) by gravity flow over a total distance of approximately 3,750 feet (ft). Typical wastes transferred using the HWTLS were diluted hazardous constituents and possibly contained spent halogenated solvents, heavy metals, and solvents. The HWTLS operated as designed from May 19, 1986 until June 16, 1986, when NASA received a Notice of Noncompliance issued from the EPA. At least a portion of the HWTLS continued use until 1988, when the 200 Area Evaporation Tank Unit (ETU) was completed and began use. Evidence located during HIS research indicated that there were several waste spills associated with use of the HWTLS.

This IWP describes the activities required to investigate SWMU 10 to confirm that no hazardous constituents exist above background and regulatory levels in the soil within and adjacent to the SWMU. Pre-investigation activities including the performance of a site survey using ground-penetrating radar (GPR), potholing, and GIS to map the investigation area will be conducted to provide site characterization data. These activities will provide information for preliminary planning activities and help refine removal and excavation (if applicable), site investigation, and site restoration requirements.

NASA intends to investigate and collect supporting data to confirm that hazardous constituents do not exist in the soil within and adjacent to SWMU 10 above established cleanup levels. Site restoration that includes surface grading and pipeline removal will be conducted after the investigation. All PVC transmission line sections, where feasible, will be removed. Stainless steel sections may be inaccessible, reducing the potential for removal. Sections that cannot be removed will be abandoned or plugged and abandoned until the 200 Area is ultimately decommissioned. The land surface will be returned to its approximate original elevation.

Following NMED approval of this IWP, NASA anticipates to start the investigation following the closure of the 200 and 600 Area wastewater lagoon and sewer line.

The use of trademarks or names of manufacturers is for accurate reporting and does not constitute an official endorsement either expressed or implied of such products or manufacturers by the National Aeronautics and Space Administration.
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List of Acronyms

AOC	Area(s) of concern
ASTM	American Society for Testing and Materials
bgs	below ground surface
CAP	RCRA Corrective Action Program
CFR	Code of Federal Regulations
CME	Corrective measures evaluation
COC	Contaminant of Concern
CoC	Chain-of-custody
COPC	Contaminant(s) of potential concern
DMN	N-nitrodimethylamine
DQOs	Data Quality Objectives
EDD	Electronic data deliverable
EPA	Environmental Protection Agency
ETU	Evaporation Tank Unit
ft	Feet/foot
gal	Gallon(s)
GIS	Geographic Information System
GMP	Groundwater Monitoring Plan
GPR	Ground Penetrating Radar
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations and Emergency Response Standard
HFTA	Hazardous Fluid Testing Area
HHF	Hardscrabble Hill Fault
HIS	Historical Information Summary
HSM	Health and Safety Manager
HWB	Hazardous Waste Bureau
HWDLs	Hazardous Waste Drain Line(s)
HWMU	Hazardous Waste Management Unit
HWTLs	Hazardous Waste Transmission Lines
IDW	Investigation-derived waste
in.	inch(es)
IWP	Investigation Work Plan
JDMB	Jornada del Muerto Basin
JSC	Johnson Space Center
MS	Matrix spike
MSD	Matrix spike duplicate
NASA	National Aeronautics and Space Administration
ND	Not Detected
NDMA	N-nitrosodimethylamine
NMED	New Mexico Environment Department
OSHA	Occupational Safety and Health Administration
PAH	Polynuclear Aromatic Hydrocarbons
PCE	Tetrachloroethene
PDF	Portable document format
PID	Photoionization Detector

PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance and Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
SAM	San Andres Mountains
SCEM	Site conceptual exposure model
SHP	Safety and Health Plan
SSL	Soil Screening Level
SVOA	Semivolatile Organics Analyzed
SVOC	Semivolatile Organic Carbons
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
USCS	Unified Soil Classification System
UST	Underground storage tank
VOC	Volatile Organic Compounds
WSTF	White Sands Test Facility

1.0 Introduction

The National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) White Sands Test Facility (WSTF) is located at 12600 NASA Road in central Doña Ana County, New Mexico. The site is approximately 12 miles northeast of Las Cruces, New Mexico and 65 miles north of El Paso, Texas ([Figure 1.1](#)). WSTF has supported testing of space flight equipment and materials since 1964 and continues to operate as a field installation of JSC in Houston, Texas. The WSTF U.S. Environmental Protection Agency (EPA) Facility Identification Number is NM8800019434.

WSTF occupies over 60,000 acres of Chihuahuan Desert environment in the western foothills of the San Andres Mountains (SAM) that border the eastern edge of the southern Jornada del Muerto Basin (JDMB). A 6-mile paved road provides access to WSTF from U.S. Highway 70. WSTF is a U.S. government restricted access site that was established in 1962 to support the NASA Apollo Space Program. Although the primary purpose of the facility is to provide test services and support to NASA for the U.S. Space Program, services are also provided for the Department of Defense, Department of Energy, private industry, and foreign government agencies.

The WSTF Hazardous Waste Permit (Permit; NMED, 2009) requires the preparation of several investigation work plans (IWPs) to assess the potential impact of historical releases of hazardous waste or hazardous constituents. The Permit requires NASA to determine whether these releases may have the potential to serve as continuing sources of groundwater contamination. Permit Attachment 16 lists the Solid Waste Management Units (SWMUs) and areas of concern (AOCs) that require the submittal of an IWP to the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) for closure and/or investigation. SWMU 10, the 200 Area Hazardous Waste Transmission Lines (HWTLs) is identified in Permit Attachment 16 with a required IWP submittal date of June 30, 2015. Section VII.H.1.c of the Permit requires the submittal of a Historical Information Summary (HIS) to the NMED HWB in conjunction with this IWP.

1.1 Objectives and Scope

This IWP describes the activities that are required for the investigation of SWMU 10. The objective of this investigation is to verify that no hazardous constituents exist in the vadose zone soils located adjacent to the 200 Area HWTLs (SWMU 10) at concentrations above applicable regulatory limits. If contaminants of potential concern (COPCs) are detected at concentrations above regulatory limits, the data may be used to guide remedial action, if necessary. The IWP is limited in scope to soils beneath and adjacent to SWMU 10. Follow-on investigatory actions required to confirm the investigation meets the project objectives are also described in this work plan.

1.2 Approach and Implementation

The investigation process will consist of the following activities:

- Preparation of the site to ensure access to soils for investigation activities.
- Preliminary mapping of the investigation area using Geographic Information System (GIS).
- Excavation activities to expose the majority of HWTLs piping between the 200 Area and the 600 Area closure and potholing or trenching to expose accessible portions of the stainless steel HWTLs in the 200 Industrial Area.
- Investigation soil sampling activities including the installation of soil borings and soil sample collection and analysis.

- Sample and data management followed by data verification, validation, and assessment.
- Development and submittal of a WSTF 200 to 600 Area HWTLs Investigation Report to NMED.
- Removal and management of wastes generated during the site cleanup activities. Likely project waste includes potentially contaminated soil and other contact waste.
- Removal of adjacent pipeline coincident with removal of the 200/600 Area wastewater lagoon sewer line. The removal of accessible sections of the pipeline in the 200 Area will also be considered based on field conditions encountered.
- Site restoration and grading.

1.3 Regulatory Requirements

Removal and investigation activities are regulated by the NMED HWB. The investigation of SWMUs are regulated by the HWB through Releases from Solid Waste Management Units (2012) and the Permit (NMED, 2009). The Permit requires that NASA investigate and address historical releases of hazardous waste and hazardous constituents that may have occurred at sites throughout WSTF as part of the Resource Conservation and Recovery Act (RCRA) Corrective Action Program (CAP). This includes the investigation, characterization, and, if necessary, cleanup of the SWMUs identified in the Permit. The principal components of the CAP are:

- RCRA Facility Assessment.
- RCRA Facility Investigation.
- Interim Corrective Measures (if necessary).
- Corrective Measures Study (if necessary).
- Corrective Measures Implementation (if necessary).

2.0 Background

The 200 Area HWTLs were a system of 2-inch (in.), 3-in., or 4-in. steel and PVC piping that conveyed aqueous hazardous waste from the 200 Area Laboratories complex to several different discharge points and ultimately to the 600 Area HWMU. As waste management practices changed in the 200 Area, the HWTLs were modified and altered. A description of the HWTLs, a summary of historical information, a description of the preliminary site conceptual model, and a summary of previous investigations conducted are provided below.

2.1 Description

The 200 Area HWTLs comprise a network of mostly 3-in. stainless steel and polyvinyl chloride (PVC) underground pipelines. [Figure 2.1](#) shows the stainless steel and PVC sections of the HWTLs as well as sections that have been cut or removed as required by site project activities (NASA, 2015). A preliminary field survey to confirm the location of all sections of the HWTLs was conducted in March 2015 using ground-penetrating radar (GPR) and potholing. The findings are discussed below.

2.1.1 Industrialized 200 Area – Stainless Steel HWTL

The portion of the HWTLs located within the industrialized 200 Area Chemistry Laboratory Complex west of Buildings 200, 201, and the South Highbay comprised 3-in. stainless steel pipe installed at a depth

of 3 feet (ft) over a distance of approximately 420 ft. This section of pipeline is currently located under an asphalt parking lot. Its location was confirmed using the GPR ([Figure 2.1](#)). The portion of HWTLs that extended approximately 1,000 ft from the east side of the 200 Area Chemistry Laboratory Complex (Building 203 and the South Highbay) was also constructed of 3-in. stainless steel pipe installed at a depth of 3 ft. The field survey located the upgradient section of the pipeline east of Buildings 200 and 203, but the section that ran east and south of the South Highbay was not located during the preliminary field survey ([Figure 2.1](#)). Refer to [Section 2.1.3](#) for additional information regarding this portion of the HWTLs. Significant corrosion of the stainless steel pipeline remaining in place is not anticipated due to its location in the shallow vadose zone below asphalt and concrete paving materials.

2.1.2 200 Area to 600 Area Wastewater Lagoon – PVC HWTLs

The portion of the HWTL that extends from the north side of the former 200 Area ETU and southwest past the 200 Area wastewater lagoon to the 600 Area Closure is constructed from 3-in. diameter polyvinyl chloride (PVC) pipe installed at a depth of 3 ft. The PVC HWTLs comprise four sections of remaining pipeline as follows ([Figure 2.1](#)):

- 660 ft of PVC pipeline on the southeast side of Apollo Boulevard, between the former ETU and the location where the line passes below and crosses Apollo Boulevard.
- 1,830 ft of PVC pipeline on the northwest side of Apollo Boulevard from the southwest side of the 200 Area Wastewater Lagoon to a major east-west trending arroyo.
- 840 ft of PVC pipeline on the northwest side of Apollo Boulevard between the arroyo and the 600 Area overflow lagoon.
- A small section of PVC pipeline between the 600 Area Overflow Lagoon and the 600 Area Closure.

The field survey confirmed the location of PVC pipeline in some areas but not in others. It is believed that the line in this area is intact, however variations in soil density masked ground penetrating radar (GPR) results. In addition, vegetation cover impeded access with the GPR, thus the HWTLs could not be completely located during the survey. The sanitary sewer pipeline constructed at WSTF transected the PVC HWTLs in 2012, immediately south of the 200 Area wastewater lagoon and between the 600 Area overflow lagoon and the 600 Area Closure. As a result, the HWTLs were cut and capped in these areas ([Figure 2.1](#)).

2.1.3 Additional Information

In June 2015, a retired long-term 800 Area employee toured the WSTF site with WSTF Environmental Department personnel. The employee was able to locate a valve box for the HWTLs to the east of the 200 Area building complex. The employee stated that the valve box had been filled with soil, capped with cement, and installed with a metal plate stamped with information regarding the valve box and HWTLs. The metal plate identified the HWTLs as 3-in. stainless steel piping located 3 ft below ground surface (bgs) at that location. The employee stated that the remainder of the HWTLs could possibly be located by potholing or trenching near this valve box, where the HWTLs location are known, and following the line south and west around the 200 Area building complex to the terminus that was located adjacent to the South Highbay. A general indication of the depth of the HWTLs could be estimated by measuring the grade of the HWTLs in the known areas, since the line was gravity fed to the 600 Area impoundments originally, and then to the mobile tankers adjacent to the South Highbay.

2.2 Historical Information

Historical research results for operational history and potential wastes transmitted by the 200 Area HWTLs (SWMU 10) are provided in the 200 Area HWTLs HIS (NASA, 2015). Summaries of the information presented in the HIS are provided below.

2.2.1 Operational History

Beginning in 1964 with the construction of the 200 Area Laboratories complex, the 200 Area HWTLs were originally constructed to gravity drain 200 Area hazardous wastes to two USTs: the first Clean Room UST (tank 806) located on the west side or “front” of the laboratory complex and the concrete Chemistry Laboratory acid tank located on the east side or “back” of the laboratory complex (NASA, 1985). In 1966, a third UST was installed to increase storage capacity, requiring modifications to the HWTLs. From 1968, wastes were transported by truck from the 200 Area USTs to the 600 Area Hazardous Waste Management Unit (HWMU) Impoundments as needed. This HWTL configuration continued until 1986 (NASA, 2015).

In order to close the 200 Area USTs in 1986, the HWTLs were modified within the 200 Area and extended from the 200 Area to the 600 Area for direct discharge of 200 Area wastes by gravity flow to the 600 Area HWMU Impoundments. This HWTL extension was designed to be an interim solution for the 200 Area Laboratory Complex waste management until the construction of the 200 Area Evaporation Treatment Unit (ETU). The HWTL extension was constructed in April and May 1986 and was placed in the same trench as the wastewater lagoon overflow pipeline from the 200 Area to the 600 Area. NASA began discharging wastes from the 200 Area Laboratory Complex through the HWTLs to the 600 Area HWMU impoundments on May 19, 1986, immediately after construction (NASA, 2015).

On June 16, 1986, NASA received a Notice of Noncompliance issued from the EPA, stating that NASA had lost interim operating status for the 600 Area impoundments due to an inadequate groundwater monitoring system. All waste discharges to the 600 Area Impoundments were immediately ceased to comply with the EPA notice. Wastes continued being discharged through the HWTLs to a 4,000-gallon (gal) capacity portable tank truck located adjacent to the 600 Area Impoundments (NASA, 2015).

Wastes within the 4,000-gal tank truck were then shipped off-site for disposal at an EPA-permitted incineration facility. After a leak occurred (July 30, 1986) in the HWTLs at the stainless steel/PVC connection joint near the South Highbay, NASA ceased using the 3-in. PVC portion of the HWTLs that extended from south of the South Highbay to the 600 Area HWMU Impoundment. In September 1986, the PVC portion of the HWTLs was triple-rinsed and abandoned in place (NASA, 2015).

NASA continued using the upper 3-in. stainless steel portion of the lines in the 200 Area to discharge wastes into a series of mobile tanks located adjacent to the South Highbay: a 1,000 gal mobile tank and then two 6,000 gal mobile tanks. In 1988, NASA completed the construction of the ETU and reconfigured and replaced the HWTLs with polypropylene drain pipe known as the hazardous waste drain line (HWDL) in the 200 Area Laboratory Complex and connected the 800 Area Hazardous Fluid Testing Area (HFTA) to discharge into the ETU. There are no records that indicate if the 3-in. stainless steel lines were removed or abandoned in place. Common practice at the time suggests the lines were abandoned in-place (NASA, 2015).

2.2.2 Discharge History of Hazardous Constituents at SWMU 10

The following discharge information has been extracted and summarized from the HIS submitted with this IWP. Refer to the HIS for more detail (NASA, 2015). All known spills were limited to the 200 Area,

in and around the area where the mobile stainless steel tanker trailers were located (adjacent to the South Highbay), and spill cleanup involved the removal of the affected soil and shipment off site for disposal (NASA, 2015).

The first documented leak from the 200 Area HWTL occurred July 30, 1986. Approximately 500 gallons of laboratory wastes were released to ground surface at the junction of the stainless steel and PVC sections of the line (NASA, 2015).

On August 5, 1986, there was an overflow of the mobile hazardous waste tank located at the terminus of the stainless steel portion of the HWTL. The amount discharged is unknown. Improvements were made to the HWDL system to better manage waste flow to the tank and avoid future spills. In response to this tank overflow release, all sources of drainage to the HWTL were identified, verified, and unnecessary sources were eliminated or rerouted. Procedural documentation was created, personnel were trained, and a liquid level sensor with a warning alarm was installed in the mobile tank (NASA, 2015).

Additional discharges identified from HIS research included a leak detected during an August 20, 1986 inspection (volume not recorded; but approximately one cubic yard of wet contaminated soils were excavated from the pit south of the 200 Area where the mobile 1,000-gallon tank trailer was located) and a written request on November 16, 1987 for the removal of contaminated soils from the 200 Area near the two rented mobile 6,000-gallon capacity hazardous waste tankers, suggesting there was a leak or overflow of the mobile tanks at that time (NASA, 2015).

2.3 Contaminants of Potential Concern

Contaminants of potential concern for SWMU 10 comprise the substances that would be potentially present in environmental media affected by a release, and include wastes derived from the WSTF Clean Room and Chemistry Laboratory underground storage tanks. The known operational history for the 200 Area documented in the 200 Area HIS (NASA, 2012a), 200 Area SWMU 10 (HWTLs) HIS (NASA, 2015), results of previous 200 Area investigations, and results from ongoing groundwater monitoring evaluations were used to develop a list of contaminants of concern (COCs; [Table 2.1](#)). The purpose of this list is to help select appropriate analytical methods and sampling techniques. [In accordance with NMED IWP Approval with Modifications Comment #1, Table 2.1 includes additional analytes and the required chemical analytical methods for each analyte.](#)

2.4 Preliminary Site Conceptual Exposure Model

A preliminary site conceptual exposure model (SCEM) was developed ([Figure 2.2](#)) to provide an understanding of the potential for exposure to hazardous contaminants at the sites based on the source of contamination, the release mechanism, the exposure pathway, and residential, industrial and construction worker potential receptor(s).

2.4.1 Contamination Sources

The potential contamination sources under investigation in the IWP are soils that may have been affected by hazardous aqueous laboratory waste leaked from the HWTLs and mobile tanker trailers. Leaks were known to have occurred at the PVC/stainless steel juncture and the area in and around the mobile tankers. Contaminated soil was removed following each leak or spill. During this investigation, the entire length of the HWTLs and area where the tankers were parked will be investigated in order to determine if there are any continuing sources of contamination.

2.4.2 Release Mechanisms

Contamination was released from the HWTLs at a pipeline juncture and overflow from mobile waste tankers into the shallow subsurface, however cleanup was conducted at the time of each release. If any residual contaminated soil remained after clean up, or there were undetected leaks along the HWTLs, then potential transport deeper into the vadose zone, and possibly groundwater, by hydrodynamic processes resulting from gravity and precipitation may have occurred.

2.4.3 Exposure Pathways

Four potential exposure pathways are identified: 1) ingestion of groundwater; 2) incidental ingestion of soil; 3) inhalation of volatile contaminants or particulate emissions (dust); and 4) dermal contact with soil.

There are no current or future residential land use scenarios anticipated in the vicinity of the HWTLs. WSTF is a controlled test site located on the U.S. Army White Sands Missile Range. There are no encroaching residential areas. Therefore, there are no complete exposure pathways identified for residential land use scenarios in this SCEM.

The groundwater underlying much of WSTF is known to be contaminated and its future use and potential risk to receptors are part of an ongoing site-wide evaluation and corrective actions. The only water supply wells for the site are located several miles to the west of the investigation areas and are monitored regularly for the presence of any site-source contaminants. A risk assessment of the groundwater itself will not be conducted as part of this investigation. Ingestion of groundwater (Pathway 1) is not considered a completed exposure pathway for industrial, construction, or residential potential receptors for the HWTLs.

The HIS states that a few small portions of the HWTLs (SWMU 10) have been removed, however, most of it remains intact in the shallow subsurface in the 200 Area and between the 200 and 600 Areas. Since what is left of the HWTLs exists underground, the exposure pathways of potentially contaminated soil (ingestion, inhalation, dermal) to industrial receptors is not considered complete (Pathways 2, 3, and 4). The HIS identified two areas of known leaks at the surface, however those were remediated promptly and all contaminated soil removed from the site.

Construction workers will be excavating the HWTLs and supporting collection of soil samples during this investigation, therefore a potential exposure pathway exists for that population to ingest, inhale, or come into dermal contact with potentially contaminated soil (Pathways 2, 3, and 4). This potential exposure will be mitigated by the use of personal protective equipment (PPE) during excavation and sampling activities. In accordance with NMED IWP Approval with Modifications Comment #2, “appropriate dust suppression and personal protective equipment measures” will be “implemented during any field activities (e.g., backhoe excavation work) that could expose site workers to potential contaminated soils.” (NMED, 2015a)

[Figure 2.2](#) summarizes and presents the SCEM discussed above in diagram form. Incomplete exposure pathways are denoted by dashed lines to potential receptors. Complete exposure pathways were not identified for the HWTLs.

2.4.4 Potential Receptors

There are no completed exposure pathways at SWMU 10, therefore there are no identified potential receptors.

2.5 Previous Investigations

Several previous investigations have been performed in the 200 Area. Investigations that were performed in the vicinity of the 200 Area HWTLs (SWMU 10) were reviewed in more detail to support development and design of this IWP. The location of previous investigation activities that are pertinent to this IWP relative to the location of the HWTLs are provided in [Figure 2.3](#).

2.5.1 200 Area Investigations (1986 – 2011)

A number of investigations were performed to target historical contaminant release locations and their impact on the vadose zone and the underlying aquifer. These included a seismic reflection survey (performed 1986), shallow soil vapor investigation (1986), shallow soil boring investigations to target known HWMUs and SWMUs (Phase I: 1986 – 1987 and Phase II: 1994-1995), and the installation of soil vapor wells 200-SG-1, 200-SG-2, 200-SG-3, and 200-SG-4 (1997). A brief summary of these investigations with references to the original reports is provided in the 200 Area Phase II Investigation Report (NASA, in press).

Conventional groundwater monitoring wells 200-B-240, 200-D-109, and 200-D-240 and Westbay^{®1} multi-port groundwater monitoring wells 200-F, 200-G, 200-H, and 200-I were also installed in the 200 Area during the 1987 to 1997 timeframe as part of the WSTF groundwater and post-closure care monitoring programs. Multi-port soil vapor and groundwater monitoring well 200-JG-110 was installed in 2011 to assist with investigation between the WSTF 200 and 600 Areas. The location of soil vapor points, soil borings, and monitoring wells installed as part of previous investigations and a summary of each of the individual investigations along with data summary tables are provided in the revised 200 Area investigation work plan (NASA, 2012a).

2.5.2 200 Area Investigations (2012 – 2014)

2.5.2.1 200 Area ETU and HWDL Soils Investigation (2012)

A shallow soils investigation was completed as part of the ETU Closure Certification (NASA, 2013a) in order to confirm that no hazardous releases to the environment occurred during the ETU's operational history. During this investigation, a total of 44 soil borings were sampled as follows:

- 10 borings along the HWDL in the 800 Area at a depth of 0-6 inches and 1-2 ft.
- 19 borings along the HWDL in the 200 Area at a depth of 0-6 inches and 1-2 ft.
- 2 borings in the HWDL sump vault at a depth of 2 ft.
- 10 borings within the ETU footprint at a depth of 2 ft bgs.
- 3 borings within the ETU footprint at a depth of 10 ft bgs.

Analyte concentrations did not exceed soil screening levels (SSLs) except for arsenic. The Soil Background Study (NASA, 2014b) confirmed that arsenic occurs naturally at levels above SSLs at WSTF.

¹ Westbay[®] is a registered trademark of Nova Metrix, LLC.

2.5.2.2 200 Area Phase I Vadose Zone Investigation (2013)

Phase I of the latest comprehensive 200 Area investigation was conducted between September 2012 and January 2013 and included a geophysical survey to add detailed resolution of the bedrock surface and delineation of structural features in bedrock of the 200 Area and shallow soil vapor survey to provide current data relative to any shallow soil vapor anomalies (NASA, 2013b). The shallow soil gas survey overlapped a significant portion of the 200 Area HWTLs and provides a useful reference relative to the determination of sampling locations for the SWMU 10 investigation.

The shallow soil vapor survey was performed to evaluate volatile organic compounds (VOCs) in the shallow subsurface using a grid with sampling points coincident with the depth of the HWTLs. The survey was conducted in two phases across the entire 200 Area and portions of the adjacent 100, 600, and 800 Areas ([Figure 2.3](#)). The initial grid had dimensions of approximately 1,800 ft by 4,500 ft with 144 individual shallow soil vapor survey points generally located on 250-ft centers. An additional 26 survey points were selected within the grid to target specific features such as the underground storage tanks (USTs), SWMUs as identified in the Permit (NMED, 2009), and other areas identified in the 200 Area IWP and HIS (NASA, 2012a). A small diameter shallow boring was drilled at each sample point. Shallow soil vapor survey samples were collected using GORE^{®2} Modules and provided a semi-quantitative evaluation of VOCs in the vadose zone.

The results for trichloroethene (TCE) in soil vapor are included on [Figure 2.3](#), as this represents the primary contaminant of concern for the VOC survey. TCE concentrations varied between <0.02 and 39.45 µg with a mean value of 2.02 µg. The mean concentration for TCE in all soil vapor samples collected was the second highest after Freon^{®3} 113. The iso-concentration data for TCE identified three areas of elevated TCE concentrations relative to the rest of the grid. None of these elevated concentration areas for TCE in soil vapor correlates directly to the transect of the HWTL, although the termination of the HWTLs at the Clean Room tank HWMU is located adjacent to Area IV and is a known location for elevated concentrations for TCE in soil vapor and groundwater.

2.5.2.3 200 Area Phase II Vadose Zone Investigation (2014)

Phase II of the investigation was conducted between June 2014 and November 2014, and comprised the installation of 18 soil borings with associated soil sampling to the top of limestone bedrock at locations identified based on the results of the Phase I investigation. Nine of the Phase II soil borings installed are of particular interest relative to the 200 Area HWTLs ([Figure 2.3](#)):

- Soil borings 200-SB-05 and 200-SB-06 were drilled to bedrock at a depth of 18 ft bgs adjacent to the location of the steel HWTLs in the vicinity of the Clean Room tank HWMU. Soil chemical samples were collected at 8 – 10 ft bgs in both soil borings. Multi-port soil vapor wells were installed within the borings with ports at 9 ft bgs in 200-SV-05 (boring 200-SB-05) and 34 ft, 64 ft, and 84 ft bgs in 200-LV-150 (200-SB-06).
- Soil borings 200-SB-07 and 200-SB-08 were drilled to bedrock at a depth of 53 and 56 ft bgs, respectively, adjacent to the location of the HWTLs in the vicinity of the Chemistry Lab tank HWMU. Soil chemical samples were collected at 8 – 10 ft, 18 – 20 ft, and 38 – 40 ft bgs in soil boring 200-SB-07 and 8 – 10 ft, 28 – 30 ft, and 43 – 45 ft bgs in soil boring 200-SB-08. Multi-

² GORE[®] is a registered trademark of W.L. Gore & Associates, Inc.

³ The trade name Freon[®] is a registered trademark of E.I. du Pont de Nemours & Company Corporation (DuPont).

port soil vapor wells were installed within the borings with ports at 59 ft, 89 ft, and 119 ft bgs in 200-KV-150 (boring 200-SB-07) and 9 ft, 64 ft, 29 ft, and 49 ft bgs in 200-SV-08 (200-SB-08).

- Soil borings 200-SB-11 and 200-SB-12 were drilled to bedrock at a depth of 23 and 40 ft bgs, respectively adjacent to the location of the steel HWTLs located to the southwest of the Chemistry Lab tanks HWMU. Soil chemical samples were collected at 8 – 10 ft and 28 – 30 ft in soil boring 200-SB-11, and no samples were collected in 200-SB-12). Multi-port soil vapor wells were installed within the borings with ports at 9 ft and 29 ft bgs in 200-SV-11 (boring 200-SB-11) and at 14 ft bgs in 200-SV-12 (200-SB-12).
- Soil boring 200-SB-13 was drilled to bedrock at a depth of 45 ft bgs at the former 200 Area Burn Pit SWMU. This location coincides with the common header for the two steel HWTLs adjacent and south of the South Highbay. This location is also coincident with the locations for the accidental releases reported in the 200 Area HWTLs HIS that accompanies this report. Soil chemical samples were collected at 8 – 10 ft and 28 – 30 ft bgs within this soil boring. A multi-port soil vapor well was installed within the boring with ports at 14 ft and 34 ft bgs in 200-SV-13 (boring 200-SB-13).
- Soil borings 200-SB-16 and 200-SB-18 were drilled to bedrock at a depth of 123 and 96 ft bgs, respectively, adjacent to the location of the PVC HWTLs between the 200 Area and 600 Area Wastewater Lagoon. Soil chemical samples were collected at 28 – 30 ft, 48 – 50 ft, and 58 – 60 ft in soil boring 200-SB-16 and 88 – 90 ft bgs in soil boring 200-SB-18. Multi-port soil vapor wells were installed within the borings with ports at 19 ft, 59 ft, and 99 ft bgs in 200-SV-16 (boring 200-SB-16) and 29 ft, 59 ft, and 89 ft bgs in 200-SV-18 (200-SB-18).

The laboratory analytical results for soil chemical samples from the nine soil borings indicated inorganic results within the normal anticipated ranges and no detections for VOCs. Soil vapor concentrations were relatively elevated for VOCs in soil gas wells 200-SV-05 and 200-LV-150 adjacent to the former Clean Room tank HWMU. These concentrations increased with depth toward the local aquifer, which is known to contain VOCs through the sampling of nearby downgradient groundwater monitoring well 200-F.

2.5.2.4 Solid Waste Management Unit (SWMU) 10 Soil Removal Action (2012)

A preliminary investigation of the HWTLs occurred during the construction of the sanitary sewer pipeline which connected NASA to the City of Las Cruces Sanitary Sewer System. A review of the proposed layout of the sanitary sewer pipeline indicated that two portions of the sanitary sewer line would intersect with the HWTLs once in the 200 Area and once in the 600 Area. This required a Removal Action Plan in which NASA submitted an Abbreviated Investigation Work Plan to NMED (NASA, 2012c). As part of the investigation, the HWTL was located in the 200 Area and 600 Area at the intersection points. Soil above the HWTLs were excavated to expose the HWTL. Soil samples were taken 6 in. directly beneath the HWTLs and were analyzed for VOAs, semivolatile organics analyzed (SVOAs), metals, and hydrazines. The laboratory analytical results for the soil chemical samples from the excavated intersection points indicated that there were not hazardous constituents present above regulatory health screening levels. This allowed for the continued construction of the sanitary sewer pipeline. An Abbreviated Investigation Report for the SWMU 10 Soil removal was submitted to NMED (NASA, 2012d) and was approved on January 16, 2013.

3.0 Current Site Conditions

3.1 Surface Conditions

SWMU 10 is located within soils of the Nickel-Tencee Association (USDA, 1976). The Nickel series includes deep, well drained soils associated with old, coalescent alluvial fans derived from the adjacent

SAM to the east. The soils are formed in gravelly, medium textured alluvial sediments. The upper 5 ft are characterized by light brown to pink gravelly to fine sandy loam. Gravel content is approximately 50%.

The Nickel-Tencee unit is approximately 60% Nickel Gravelly Fine Sandy Loam and 25% Tencee Very Gravelly Loam. The soils are gently to steep sloping and are in similar positions on alluvial fans. Tencee soils dominate the older, more stable areas where the source of alluvial material was limestone bedrock.

3.2 Subsurface Conditions

The subsurface below SWMU 10 extending between the 200 and 600 Areas is comprised of alluvium deposits overlying a bedrock pediment slope. The alluvium is classified as the piedmont slope facies of the Camp Rice Formation, which forms part of the Quaternary Santa Fe Group. The alluvium consists of intercalated fan, interfan valley, and erosion surface veneer deposits derived from the SAM between Bear Canyon, located to the northeast, and Loman Canyon, located to the southeast of the WSTF industrial areas. The heterogeneous alluvial soil lithologies in the vadose zone have shallow but laterally extensive caliche horizons, porosities between 25 to 42% (NASA, in press), and consist primarily of tan to brown unconsolidated to moderately cemented, poorly sorted, pebble to boulder conglomerates with interbedded lenticular silty clays, sandy gravels, and sandy silts. The alluvium thickens moving from the SAM front westward, towards the JDMB.

Lithologic logs from groundwater wells located most proximal to the northwest half of SWMU 10 (indicated in [Figure 2.3](#)) have recorded alluvium thickness of 145 ft bgs at 200-B-240, decreasing to 130 ft at 200-I, and then to as little as 17 ft – 18 ft bgs in the vicinity of groundwater monitoring wells 200-F and 200-LV-150 located adjacent to the former Clean Room tank HWMU. Limestone bedrock pediment below the alluvium in this area comprises fractured Permian Hueco limestone. The limestone is described in the well logs as gray to brownish gray, indurated to weathered, microcrystalline with fossil-bearing zones or with silty laminated horizons, and indications of calcite-filled fractures.

Wells most proximal to the southwest half of SWMU 10 have recorded alluvium thickness of 117 ft bgs in well 100-HG-139, 132 ft bgs in well 600-SG-9, and 146 ft bgs in well 600-G-138. Bedrock lithology changes in this area from Permian limestone to Tertiary volcanics. The change is attributed to the northwest-striking Hardscrabble Hill Fault (HHF), a Late Tertiary, normal fault related to basin and range activity. The andesite bedrock (wells 600-SG-9 and 600-G-138) is described as gray to reddish brown with a weathered surface, microporphyritic with phenocrysts of plagioclase, dense, with minimal fracturing. A capping horizon of volcanic ash in the area (well 100-HG-139) is described in the well log as gray to green, aphanitic, with abundant alteration to clay. Groundwater resides at depth within a fractured bedrock aquifer within this area at depths between 150– 180 ft bgs, although a localized occurrence of perched groundwater on top of andesite bedrock at a depth of 143 ft bgs is identified by well 600-G-138.

4.0 Scope of Activities

The following activities will be performed during the investigation of SWMU 10.

- Field investigation to locate the eastern and southern portion of the HWTLs, including potholing, and selection of soil sampling locations based on field identification of the HWTLs.
- Field investigation of soil sampling locations. These locations will be based on:
 - Information within the SWMU 10 HIS
 - Information collected from previous vadose zone investigations in the area.

- Information identified in the field relative to any visible staining of soil or odors detected using portable field monitoring equipment.
- Daily health and safety briefings.
- Field data and global positioning system (GPS) survey data collection.
- Field operations for collection, management, and shipment of soil samples (including field quality control samples).
- Laboratory analyses (including laboratory quality control samples), analytical reporting, and data processing using the established WSTF data management system.
- Interpretation of field and analytical data for use in development of a final investigation report for SWMU 10.

4.1 Data Quality Objective Process

The investigation methodology was developed based on “Guidance on Systematic Planning Using the Data Quality Objectives [DQO] Process” (EPA, 2006) and the Corrective Action Site Investigations requirements of the Permit (NMED, 2009; Section VII.H). The data acquisition plan (i.e., sampling design) is based on the DQO process.

4.1.1 Problem Statement

The problem statement is summarized in the Permit (NMED, 2009; Section VII.H.1.b), which states that the IWP “...shall include schedules for implementation and completion of specific actions necessary to determine the nature and extent of contamination and the potential migration pathways of contaminant releases to the air, soil, surface water, and ground water.”

4.1.2 Decision Statement and Alternative Actions

The primary decision is whether additional corrective actions are warranted at these sites due to the presence of a residual contamination source(s). Alternative actions for the decisions include:

- Consider a “Corrective Action Complete” status determination.
- If needed, perform a corrective measures evaluation (CME) for the site(s) to identify remedial options for mitigation of source(s) of continuing contamination or human health risk.

4.1.3 Decision Inputs

COPC concentrations measured in the vadose zone soil and local groundwater are the primary inputs to the decision. COPCs for this investigation (Section 2.2) were identified using two primary information sources:

- Detailed information pertinent to the establishment and operational history of the HWTLs as documented in the historical information summaries for SWMU 10 through a variety of historical documents and reports, personnel interviews, and personnel questionnaires.
- Comprehensive analytical data sets for samples collected during previous investigations at WSTF in general and SWMU 10 in particular, including soil, soil vapor, and groundwater samples. Analytical methods selected for this investigation will be used to quantify COPC concentrations at or below NMED SSLs whenever possible (NMED, 2014).

4.1.4 Study Boundaries

The horizontal boundaries of the study represent the known extent of the SWMU as determined by historical research and confirmed by field surveys of the sites. The HWTLs will be investigated along its entire length as described in Section 4.2. This investigation addresses and is limited to the upper portion of the vadose zone specifically within areas that potentially experienced leaks from the 200 Area HWTLs. The vertical boundary of the HWTLs (SWMU 10) is expected to be up to 3 ft below the bottom of the underground pipeline. As indicated in Section 4.2, the vertical extent of the investigation will be expanded to 10 ft below the bottom of the HWTLs if evidence of leakage is discovered during the field investigation. Within industrialized parts of the 200 Area adjacent to the former Clean Room tank HWMU, the investigation depth could potentially be limited by the occurrence of bedrock that has been reported at depths as shallow as 17 – 18 ft bgs.

4.1.5 Study Constraints

4.1.5.1 Abandonment or Removal of Steel Section of HWTL

This stainless steel portion of the HWTLs in the 200 Area extends over a total length of approximately 1,420 ft (Figure 2.1). The industrialized 200 Area hosts a complex network of existing underground utility lines, paved parking lots, roadways, and existing structures, which are located proximally to the HWTLs and significantly limit accessibility. As a result, the HWTLs in this area will be abandoned in place if excavation and removal are not possible. Actual field conditions encountered during the investigation will be used to determine if the pipeline can be removed or if abandonment is the only option. In accordance with NMED IWP Approval with Modifications Comment #3, the HWTLs will be removed “from the ground to the extent practicable.” The condition of the pipeline will be assessed along the entire run and “adequate documentation of all pipe run inspection activities during excavation” will be provided in the investigation report. If any of the HWTL must be left in place, “adequate rationale for abandoning the stainless steel portion of the HWTLs in place” will also be provided in the investigation report (NMED, 2015a).

4.1.5.2 Removal of PVC Section of HWTLs between 200 Area and 600 Area Wastewater Lagoon

Significant portions of the PVC HWTLs that extend from the 200 Area wastewater lagoon southwest to the 600 Area wastewater lagoon share a common trench with a 4-in. diameter active sewer line. The two lines are juxtaposed within the trench with the active sewer line located directly below the HWTLs. Although the NMED-approved Wastewater Lagoon Areas Closure IWP (NASA, 2012b) indicated that the abandoned subsurface sewer lines will be rinsed and capped in place, NASA plans to remove both the HWTLs and sewer line where the two share a common trench. The sewer line will be flushed, capped, and abandoned in place within any sections that do not share a common trench with the HWTLs.

As a result of this co-location of the HWTLs and the sanitary sewer line, NASA expects to schedule investigation and removal of the HWTLs following abandonment of the active sewer line between the 200 Area wastewater lagoon and the 600 Area wastewater lagoon. The sewer line will be abandoned when the new sanitary sewer line is complete, tested, and put into service, at which time discharge to the WSTF wastewater lagoon will be terminated. Additional discussion is presented in Section 11.2.

4.1.5.3 Soil Sample Recovery

A primary component of the 200 Area HWTLs IWP is the collection of soil samples to verify the absence of any residual vadose zone contamination. Subsurface alluvial lithologies in the 200 Area can be problematic relative to soil sample recovery. Where soil sample collection is difficult using conventional

sampling methodologies, an alternate sample will be attempted at an adjacent location and the pertinent information logged in the field notebook and provided in the investigation report.

4.2 Soil Sampling Locations

The 200 Area Phase I shallow soil vapor grid incorporates approximately 3,910 of 4,750 total ft of the HWTLs (all of the steel line and the two northeastern PVC sections) or about 82% of the lines (NASA, 2013b). Existing vadose zone soil vapor information is available for the majority of the area through which the HWTLs is located to assist with the preliminary location of soil samples (Figure 2.3).

4.2.1 Industrialized 200 Area

Due to the dense network of existing utility lines in the vicinity of the 200 Area, asphalt and concrete coated parking lots, and the proximity of buildings and roads, the steel sections of the HWTLs will likely not be excavated and removed. Soil samples will be collected immediately adjacent to each terminus and elbow joint of the steel sections of the HWTLs (Figure 4.1). In accordance with NMED IWP Approval with Modifications Comment #3, additional soil samples will be collected at locations beneath any portion of the HWTL left in place “at any observed sections where the integrity of the pipeline has been degraded or compromised” as determined during the assessment described in Section 4.1.5.1 (NMED, 2015a). Following sampling and the receipt of analytical results, the underground stainless steel HWTLs will be removed to the extent practicable or flushed with water, capped, and abandoned in place. Samples of the rinsate will be analyzed for applicable COPCs to ensure that the HWTLs are effectively decontaminated.

The 3-in. diameter steel sections of the HWTLs total approximately 1,420 ft in length and are buried at approximately 3 ft bgs. The six sampling locations along the steel HWTLs are identified in Figure 4.1. The number of samples that will be collected are based on the length of pipe and the anticipated number of tees, elbows, and cleanouts, etc. Because pipe connections of this nature are generally more difficult to install than straight sections of pipe, they are typically more prone to leakage. If any areas of concern are identified during the excavation and sampling process such as pipe joint locations discolored or stained soil, the soil sample locations may be refined accordingly, or additional locations added. If any portion of the steel sections of the HWTL must be abandoned in place, additional soil samples will be collected in accordance with NMED IWP Approval with Modifications Comment #4, which requires the collection of “six additional soil samples along the pipe run” at specific locations to “provide shallow subsurface site characterization information along the stainless steel portion of the HWTL.” The NMED-required soil sample collection locations are identified in Figure 4.1 (NMED, 2015a).

Although the Permit (Attachment 17, Section 2.2.b.i Drilling) indicates that soil samples should be collected from 5 ft below the base of the steel HWTLs, NASA proposes to collect soil samples at depths of 0 – 0.5 ft and 1 – 2 ft below the level of the HWTLs at a location immediately adjacent to the line. This recommendation is based on the limited duration of use of the line and success characterizing the soil beneath and adjacent to the HWDL during the ETU Closure Certification (NASA, 2013a). Because the steel HWTLs was installed at a depth of 3 ft bgs, soil samples will be collected at depths of approximately 3 – 3.5 ft and 4 – 5 ft bgs. If analytical data from these soil samples indicates the presence of VOCs in soil, additional soil sampling using a drilling rig will subsequently be performed at a depth of 8 – 10 ft and 13 – 15 ft bgs immediately adjacent to the pipe at that location. The anticipated locations and number of soil samples for the steel HWTLs investigation are summarized in Table 4.1. Approximately three soil samples (including a duplicate soil sample for every 10 samples) are anticipated for the steel HWTLs within the industrialized part of the 200 Area.

In accordance with NMED IWP Approval with Modifications Comment #6, the HIS (NASA, 2015a) and additional WSTF photographs were utilized to determine that the bottoms of the two interim waste storage tanks were located approximately 3 – 4 ft bgs. The bottom of the excavation in which the tanks were installed is approximated at 7 – 8 ft bgs, with disturbance of the soil extending several ft below that. The four soil samples proposed at or near the location of the previous interim waste storage tanks will be collected from a depth “which accounts for the disturbance of any shallow subsurface soils during cleanup activities and the bottom of the storage tank staging area.” Based on the available information, soil samples will be collected at these four locations at depths of 13 – 15 ft bgs and 15 – 17 ft bgs.

4.2.2 200 Area to 600 Area Wastewater Lagoon and 600 Area Closure (HWMU Impoundments)

The 3-in. diameter PVC sections of the HWTLs total 2,330 ft in length and are buried at approximately 3 ft bgs. The lower strength and relatively brittle nature of the PVC pipe promotes a greater potential for damage related to stress during excavation, removal, and backfill; therefore caution will be taken to minimize any breakage of the PVC pipe during excavation and removal. Access to the pipe is anticipated to be straightforward due to the shallow depth of burial and the relatively remote setting of the area through which this pipe was installed.

Soil samples along the PVC HWTLs will be collected at approximate intervals of 200 ft ([Figure 4.1](#)). Sampling locations are spaced at greater intervals than the industrialized 200 Area due to the fact that this section of pipe was triple-rinsed, and capped after being used for only one month. Sampling location preference will be given to connection joints (tees, elbows, and cleanouts). If any areas of concern are identified during the excavation and sampling process, soil sample locations will again be refined accordingly, or additional locations added.

The PVC HWTLs were also installed at a depth of 3 ft bgs, so soil samples will be collected at depths of approximately 3 – 3.5 ft and 4 – 5 ft bgs. If analytical data from these soil samples indicates the presence of VOCs in soil, additional soil sampling using a drilling rig will subsequently be performed at a depth of 8 – 10 ft and 13 – 15 ft bgs immediately beneath the pipe at that location. The anticipated locations and number of soil samples for the PVC HWTLs investigation are summarized in [Table 4.1](#). Approximately 53 soil samples (including a duplicate soil sample for every 10 samples) will be collected for the PVC HWTLs at the sampling intervals specified between the 200 Area to the 600 Area wastewater lagoon and 600 Area Closure (HWMU Impoundments).

5.0 Investigation Methods

The 200 Area laboratories and testing facilities are located in a complex geological area of relatively shallow faulted Pennsylvanian to Permian limestones covered by a veneer of Quaternary alluvial fan deposits. Quaternary alluvium capping Pennsylvanian (Panther Seep) to Permian (Hueco) limestone bedrock is relatively thin in the vicinity of the Clean Room tank (as little as 17 ft), and increases to depths of up to 150 ft moving away from the central industrialized area after transecting the 200 Area block faults that displace bedrock downward to the southwest. Because of the shallow depth of the HWTLs at 3 ft bgs and the depth of soil sampling outlined in Section 4.2, it is not anticipated that bedrock will inhibit the ability to collect soil samples.

5.1 Soil Sampling Procedures

Soil samples will be collected systematically at locations separated by the prescribed interval in [Table 4.1](#) either adjacent to the location of the stainless steel HWTLs in the industrialized part of the 200 Area, or directly below the trench for the excavated PVC HWTLs. Soil samples will be collected at the prescribed depths based on standardized spacing, the location of joints or elbows, and any visible evidence for

potential soil contamination. Soil will be excavated from the trenches using a backhoe or equivalent piece of heavy equipment. The backhoe will be decontaminated prior to initiating fieldwork for the HWTLs field project. Clean backfill soil removed from above the excavated HWTLs trenches will be stockpiled at the surface adjacent to the trench and returned to the trench following soil sampling and the receipt of analytical results. All soil cuttings generated during the drilling and sampling process from below the location of the HWTLs will be containerized and managed in a less than 90-day accumulation area pending analyses in accordance with the 200 Area HWTLs Investigation-Derived Waste (IDW) Management Plan in [Appendix A](#).

Initial sampling activities at depths of 0 – 0.5 ft and 1 – 2 ft below the excavated HWTLs will be performed using a hand auger to penetrate the base of the excavated trench equipped with a 2-in. or 3-in. diameter sample collection barrel (based on drilling conditions). The unit will be decontaminated between each use as described in Section 6. If analytical data from the initial soil samples indicate a potential release of VOCs, subsequent deeper soil samples will be collected at 5 – 7 and 10 – 12 ft below the pipe using a hollow stem auger rig. If required, the drilling will be equipped with auto-hammer capability, 5-ft hollow stem augers to advance the soil borings to total depth, and 24-in. split spoons to collect soil samples at each soil sampling location. Soil samples will be collected by advancing the split spoons 18-in. into the formation using a drop hammer. Downhole drilling equipment and other non-disposable equipment will be decontaminated between individual auger boreholes as described in Section 6.

Soil samples will be logged by the on-site geologist. Information collected will comprise the general information name, location, dates, depths, and drilling details, along with the Unified Soil Classification System (USCS) description, sample interval, and recovery. Soil samples will be collected in accordance with established WSTF soil sampling protocol.

5.2 Equipment Access Procedures

Overhead and underground utilities, traffic management, and equipment access to the HWTLs excavation and sampling locations will be surveyed and evaluated following NMED approval of the proposed soil boring locations. The site inspection will include a review of the most current updated utility maps of the area to ensure that proposed sampling locations are not coincident with the location of known underground utilities and an evaluation to establish appropriate setback distance between equipment and any overhead utilities.

Because excavation and soil sampling locations in the industrialized 200 Area will be located in high traffic areas ([Figure 4.1](#)), traffic control devices will be used to reduce potential traffic problems and interference with field operations. NASA will also attempt to excavate and sample within the readily accessible but high traffic areas on scheduled site personnel off-days to further minimize traffic interference. Particular caution will be taken in the vicinity of the Clean Room tank HWMU due to the dense network of underground utilities in the area, relatively heavy traffic, and adjacent Building 200.

5.3 Sampling Procedures (Collection, Management, Shipment) and Requirements

5.3.1 Soil Samples

Soil collected for analysis will be transferred from the sampler or sample collection tool using decontaminated stainless steel or polyethylene spatulas or spoons and placed directly into clean sample containers provided by the laboratory contracted to analyze the investigation samples. Excess soil around the top of the sample container will be removed to ensure proper lid fit and container closure. Disposable gloves will be worn to collect soil samples and changed between sampling intervals. Gloves and other

disposable materials contacting the samples will be collected and managed in accordance with the 200 Area HWTLs Investigation-Derived Waste (IDW) Management Plan in [Appendix A](#).

5.3.2 Field Quality Control Samples

Field quality control samples will be collected as required in Attachment 17 of the Permit to ensure high quality data are generated during the investigation. Field quality control samples will be collected as indicated below.

- Field rinsate (equipment) blanks ~~will be~~ typically collected from the sampling tooling at the onset of the project prior to sampling activities and if the sampling tooling is required to leave the project site prior to completion of the project. In addition, field rinsate blanks will be collected at a rate of 10% or one per day in accordance with NMED IWP Approval with Modifications Comment #5 (NMED, 2015a).
- If not satisfied by the above requirement, field blanks will be collected at a frequency of one per day for each medium of the investigation.
- 10% field duplicate samples will be collected at select sampling locations. Duplicate samples will be analyzed for the same parameters as the primary samples.
- 5% matrix spike/matrix spike duplicate matrix spike/matrix spike duplicate (MS/MSD) samples will be collected for specified analyses.

NASA has developed comprehensive internal procedures for sample collection, shipping, and management. These procedures provide specific information on sample management and related documentation, including instructions for sample custody (internal to NASA and external during shipment), storage, packaging, shipment, delivery tracking, and related recordkeeping. These procedures will be utilized during this project to ensure appropriate sample management.

5.4 Analytical Tasks

NASA contracts services from off-site analytical laboratories as required to support program and project needs. Typically laboratories considered to support this project must be accredited by the National Environmental Laboratory Accreditation Program. The analytical tasks required to achieve the project objectives will be awarded to the laboratory that is successful in the competitive bid process. Potential laboratories must respond to a comprehensive statement of work developed to meet the project objectives defined in this IWP. Analytical standard operating procedures (SOPs), laboratory quality manuals, and other laboratory-specific documentation are provided by the analytical laboratory following award of the contract and are not available in advance. These documents are retained in the project record and will be available for NMED review as required.

The overall objective for laboratory analysis is to produce data of known and sufficient quality. Appropriate procedures and quality control (QC) checks will be used so that known and acceptable levels of accuracy and precision are maintained for each data set. All samples will be analyzed by a fully qualified laboratory in accordance with the laboratory's quality plan, which ensures that the contract laboratory adheres to standardized analytical protocols and reporting requirements and is capable of producing accurate analytical data.

Method blanks and laboratory QC samples are prepared and analyzed in accordance with the laboratory's method-specific SOPs. The analytical results of method blanks shall be reviewed to evaluate the possibility of contamination caused by analytical procedures. At a minimum, the laboratory will analyze method blanks and laboratory control samples at a frequency of one in 20 for all batch runs.

5.5 Health and Safety

Field activities will be conducted in accordance with requirements of Occupational Safety and Health Administration (OSHA) Standards for Hazardous Waste Operations and Emergency Response (HAZWOPER, 2014). The Contractor's Corporate-wide Safety and Health Plan (SHP) will be augmented with site-specific Job Hazard Analyses to address potential hazard foreseeable for the Project; and, will be followed in accordance with applicable requirements of the standards. The augmented SHP will address safety and health issues pertaining to work activities, including known and reasonably anticipated hazards associated with project scope of work as well as contingencies for unexpected conditions. The requirements of the SHP will apply to prime and sub-tier contractors as well as personnel requesting access to controlled areas of the investigation site. Project field personnel are required to be current in HAZWOPER training. In the event that new hazards are encountered that are not addressed by the SHP, the field team will stop work and contact the contractor Health and Safety Manager (HSM) to develop additional guidance on means to eliminate or mitigate any new threats. The SHP will be reviewed and approved by the contractor HSM. As required by the Hazardous Waste Operations and Emergency Response (2014), the SHP, and project-specific addenda will address:

- A safety and health risk or hazard analysis for each site task and operation found in this work plan.
- Employee training assignments.
- PPE to be used by employees for each of the site tasks and operations being conducted.
- Medical surveillance and fitness for duty requirements (based on nature of the project scope and COPCs).
- Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment to be used.
- Site control measures in accordance with the site control program.
- Decontamination procedures.
- An emergency response plan for safe and effective responses to emergencies, including the necessary PPE and other equipment.
- Confined space entry procedures.
- A spill containment program.
- Pre-entry briefing. The SHP shall provide for pre-entry briefings to be held prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of the SHP and that this plan is being followed.
- Inspections shall be conducted by the HSM or, in the absence of that individual, another individual who is knowledgeable in occupational safety and health.

During the project, subcontractors must comply with OSHA and EPA standards applicable to this IWP, the SHP, and area-specific (SWMU 16) addendum. Project subcontractor field personnel are required to be current in HAZWOPER training required under Hazardous Waste Operations and Emergency Response (2014).

Safety professionals, or their designees, will inspect subcontractor equipment prior to the commencement of work. Any significant health and safety concerns will be identified, and the subcontractor will be

allowed to address the concerns. If significant concerns cannot be rectified, this may be cause for termination of the subcontract.

5.6 Final Site Restoration and Grading

Final restoration and grading activities at the investigation site will commence after the completion of investigation field activities, receipt of the final analytical results, submittal of the investigation report to NMED, and receipt of concurrence from NMED. The excavated soils will be spread and graded to approximate natural contours. All site grading will be completed to prevent ponding of water at the site location. Site restoration and grading activities may also include the installation of best management controls (e.g., diversion culverts, temporary berms, silt fences, etc.) to direct storm water away from the site locations to prevent storm water runoff impacts. Site restoration activities will not include any efforts to reseed the areas. Vegetation will be allowed to return naturally along the length of the HWTL.

6.0 Decontamination

All equipment, including heavy equipment for excavations and drilling equipment (if required), must be decontaminated prior to commencement of investigation activities at WSTF. All sampling and soil boring equipment will be decontaminated after completion of each sampling event and any heavy equipment will be decontaminated prior to leaving the investigation site. General decontamination guidance available in ASTM International D 5088-02 (ASTM, 2008a) will be followed for this project.

Decontamination procedures will be performed by 40-hour HAZWOPER trained personnel wearing appropriate PPE. The decontamination of heavy equipment and the drilling rig will be performed under the supervision of the site supervisor or their designee.

6.1 Decontamination Area

Initial decontamination of large equipment is expected to be performed at the existing concrete decontamination pad in the 600 Area. Additional decontamination activities may also be performed at that location if the equipment can be safely transported without contaminating the travel route. In addition, at least one decontamination area is expected to be established at a central location along the HWTL. Individual smaller-scale decontamination pads may be constructed adjacent to individual sampling sites to collect and contain soil brushed from the sampling equipment. All contamination reduction or decontamination activities will be performed over a properly designed pad or containment device that will retain any waste generated during the decontamination process. Waste generated during the decontamination process will be managed in accordance with the 200 Area HWTL IDW Management Plan provided in [Appendix A](#). In the event that the decontamination pad requires any repairs to effectively contain decontamination fluids, activities that require decontamination will be halted until the decontamination pad is repaired.

Safeguards will be implemented to ensure no cross-contamination occurs between other projects that may be simultaneously conducted with this investigation. The decontamination area will be established within the contamination reduction zone in order to prevent any transport of contamination outside the investigation area. The decontamination area will be located away from the potential influence of the heavy equipment operations. Best practices will be employed to maintain the integrity of the decontamination process and protect the area from dust-producing site operations that could contaminate the equipment. Sampling and decontamination operations may be modified or delayed during dusty conditions, if necessary.

6.2 Decontamination Methods

Decontamination methods are described below.

6.2.1 Contamination Reduction

Excavation of the HWTLs is expected to be performed using a backhoe or equivalent piece of heavy equipment. Initial soil sampling activities will be performed using a hand auger to penetrate the base of the excavated trench. Drilling activities (if required subsequent to initial soil sampling) will be performed using hollow-stem auger without the application of drilling fluids (dry drilling). Adherence of the soil to the downhole equipment as well as production of liquid waste will be kept to a minimum with these methods. Soil will be removed from heavy equipment, drilling equipment, and sampling equipment using wire brushes and scraping tools such as spatulas or paint stirring sticks. Removal of solids will be performed over or inside an open-top 55-gallon drum or other suitable container using underlying plastic sheeting or over plastic sheeting to collect any soils.

6.2.2 Decontamination

Following the contamination reduction described above, decontamination will be performed to minimize the potential for cross-contamination between location and samples. Any tools or heavy equipment will be required to undergo contamination reduction and decontamination prior to exiting the area in order to ensure potentially contaminated soil or liquid is contained within the work area. Decontamination utilizes steam cleaning or pressurized heated water and/or detergent in conjunction with brushes, sprayers (as required), and a final rinse with purified water.

Equipment will be decontaminated between boreholes if it is to be reused at different sampling locations. All non-disposable equipment will be decontaminated at the end of the project or before leaving WSTF for any reason. Heavy equipment, the drilling rig, augers, and other reusable equipment that will not directly contact soil samples will be decontaminated using a steam cleaner or high pressure heated water wash followed by thorough rinsing with WSTF potable water. Hand augers, split spoons, and other reusable equipment that will contact soil samples will be decontaminated by first, hand washing the item with non-phosphate detergent such as Alconox^{®4} or by using a steam cleaner or high pressure heated water wash, then by rinsing with WSTF potable water, and finally by rinsing with purified water.

6.3 Decontamination of Field Screening Instruments

In the event field screening instruments are used to monitor the condition of the trench, dry decontamination followed by an alcohol free moist wipe will be used for moisture sensitive equipment such as a photoionization detector (PID). Solid waste materials removed from the equipment and the wipes used will be disposed of as IDW and managed as indicated in [Appendix A](#). Sampling tools will be wet decontaminated and rinsed with deionized water to ensure cleanliness.

7.0 Field Documentation Procedures

The field geologist or site supervisor will ensure that details of all activities related to this investigation are documented using a field logbook, field data records, and/or any required site-specific procedural documentation. Logbook entries will include, as applicable, information such as:

⁴ Alconox[®] is a registered trademark of Alconox, Inc.

- Standard Daily Header – project name, logbook number, date, weather conditions, team members present and their affiliations (including subcontractors), sample location identification, day's task(s), daily safety meeting topics, PPE to be used, equipment in use, and any calibration information, if applicable.
- Daily activities (time and observations recorded) – site arrival and departure, visitors and the purpose of their visit, sampling information, soil type, soil conditions, decontamination (i.e., method, equipment cleaned), reference data sheets or maps, if applicable.
- Daily summary – action items, materials used, changes or deviations made from planned protocol, plan for next day.
- Signatures (field personnel and logbook reviewer).

At a minimum, field records will include observations of soil conditions, [results of HWTL pipe inspections as required by NMED IWP Approval with Modifications Comment #3 \(NMED, 2015a\)](#), location surveys using GPS, and sample documentation. For analytical samples, the date, location, depth, sample type, collection method, identification number, sampler, and any circumstances, events, or decisions that could impact sample quality will be documented by the on-site geologist in the project field logbook. Even though each case may be unique, the geologist's decision must be documented as to conditions that precipitated any decisions for the unsuitability of samples for analyses. In addition to the field logbook notes for sampling events, chain-of-custody (CoC) forms will be completed for analytical samples and maintained with project documentation.

Evidential records for the entire project will be maintained in hard copy or electronic form and will consist of:

- Project IWP with any deviations redlined.
- Site-specific internal procedural documentation or plans.
- Project logbooks.
- Field data records (i.e., surveyed site location).
- Sample CoC forms.
- Correspondence with NMED.
- Final analytical data packages.
- Reports.
- Miscellaneous related records such as photos, maps, drawings, etc.

8.0 Investigation-Derived Waste Plan

As required in Permit Attachment 20 (Section 20.2.13), the IDW Plan is provided as [Appendix A](#). The IDW Plan provides a description of the potential wastes that will be generated from the 200 Area HWTLs investigation as well as procedures for waste management, waste characterization, and waste disposition. Wastes that may be generated as part of the investigation include: soil in the form of soil cuttings or remnants from sample collection; used sampling equipment; PPE; plastic sheeting; rags; miscellaneous debris contaminated by boring soil or fluids; and, water and soap solutions used for equipment decontamination.

9.0 Data Management Tasks

Data management tasks include project documentation and data review and assessment. The details related to these tasks are outlined below.

9.1 Project Documentation and Records

All facets of this investigation will be documented in detail by the responsible project personnel. Records are retained in the WSTF Operating Record and can be accessed at any time by authorized WSTF personnel.

9.1.1 Sample Collection and Field Measurements Data

Sample information and field measurements are recorded in the field logbook by the responsible project field personnel. These are reviewed by knowledgeable project personnel on a regular basis during the investigation and are retained in the project file. They are ultimately archived in the WSTF Records Management System as part of the Operating Record. As required for reporting, these data are also transferred to and archived in operational and historical databases.

9.1.2 Off-site Laboratory Data

Data packages from off-site analytical laboratories will consist of two primary components: comprehensive reports, to be submitted as Adobe portable document files (PDF) for review and archiving; and electronic data deliverable (EDD) files to facilitate transfer of chemical analytical data into WSTF's analytical database(s). The PDF report will include a variety of information, including laboratory name, report date, sample-specific information, analyte names and Chemical Abstract Service numbers, analytical results, QC sample results, data qualifiers and narratives, pertinent analytical notes, laboratory reviewer signatures, and a variety of other information specific to the laboratory and analytical method. The EDD will include the associated electronic data and follow the same review and approval cycle as the paper report.

9.2 Data Assessment, Review, and Corrective Action Procedures

A quality assurance and quality control (QA/QC) specialist will evaluate the sample data, field, and laboratory QC results for acceptability with respect to the project quality objectives. Chemical analytical data will be compared with the project quality objectives and evaluated using the data validation guidelines contained in EPA guidance documents, the latest version of *SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* and industry-accepted QA/QC methods and procedures (EPA, 2013).

9.3 Assessment and Response Actions

The conformance of investigation activities to the IWP will be evaluated on an ongoing basis while field activities are in progress. Additional verification will be provided through oversight of the field activities by the site supervisor or other responsible personnel. If a sample cannot be collected as planned, the site supervisor will be notified and, if possible, an alternate location or sampling method may be selected. Significant deviation from the number and locations of samples indicated in the IWP will be discussed with NMED for concurrence. The assessment process will include immediate evaluation of any change to the sampling plan so that, if necessary, an alternate field procedure may be quickly established. Daily quality field assessments may be conducted during drilling and sampling activities. Field assessments will be performed by environmental professionals who are not immediate members of the field team.

Following completion of field activities, a final review of field activities will be performed. Any deviations from the IWP or procedures will be documented and noted in the Investigation Report.

The contract laboratory will be required to notify NASA of significant data quality exceptions within one business day of discovery. Sample re-analysis will be performed, if possible. NASA will contact NMED as soon as practical to discuss any data quality exceptions that may affect the ability to meet the objectives of the investigation.

9.4 Data Review Process

A comprehensive review of sample analytical data will be conducted. Prior to conducting the review, the following information (where required and applicable) will be compiled and provided for the review.

- The NMED-approved IWP.
- Field sampling records and other pertinent field records.
- Laboratory reports.
- Statements of work and the laboratory Quality Management Plan.
- Electronic Data Deliverable Files.
- Standard Operating Procedures.
- Database tools.

9.5 Data Review Elements

Step I: Verification – Verification (review for completeness) is the confirmation by examination and provision of objective evidence that the specified requirements (sampling and analytical) have been completed (EPA, 2005).

Data verification is the process of determining whether data have been collected or generated as required by the project documents. The process consists of the following categories: 1) verifying that field sampling operations were performed as outlined in the IWP; 2) verifying that the data collection procedures and protocols were followed; 3) verifying completeness to establish that sufficient data necessary to meet project objectives have been collected; and 4) checking that QC sample results meet control limits defined in the analytical methods.

Step II: Validation – Validation is the confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled. Validation is a sampling and analytical process that includes evaluating compliance with method, procedure, or contract requirements and extends to evaluating against criteria based on the quality objectives developed (EPA, 2005).

The purpose of validation is to assess the performance of the sampling and analysis processes to determine the quality of specified data. Data validation consists of the following objectives: 1) verifying that measurements (field and laboratory) meet the user's needs; 2) providing information to the data user regarding data quality by assignment of individual data qualifiers based on the associated degree of variability; and 3) determining whether project quality objectives were met. Data management personnel will perform data validation in accordance with the requirements in this IWP and existing WSTF procedures.

Step III: Usability Assessment – Usability assessment is the determination of the adequacy of data, based on the results of validation and verification, for the decisions being made. The usability process involves assessing whether the process execution and resulting data meet project quality objectives (EPA, 2005).

The goal of the usability assessment is to determine the quality of each data point and to identify data that are not acceptable to support project quality objectives. Data may be qualified as being unusable or rejected (R), as based on established quality review protocols. Data qualified as estimated (J) are less precise, or less accurate, than unqualified data but are still acceptable for use. The data users, with support from the contractor environmental data management staff, are responsible for assessing the effect of the inaccuracy or imprecision of the qualified data on statistical procedures and other data uses. The data reporting will include a discussion of data limitations and their effect on data interpretation activities.

10.0 Current Monitoring and Sampling Programs

The most significant current monitoring program that contributes to this investigation is WSTF's ongoing groundwater sampling. Three groundwater monitoring wells – 200-KV-150 and 200-LV-150 (adjacent to the steel HWTL) and 200-SG-3 (adjacent to the PVC HWTL) – are present in the 200 Area ([Figure 2.3](#)). NASA relies on the data generated from groundwater monitoring to provide input for the development of IWP. NASA routinely collects groundwater samples from a comprehensive network of monitoring wells at WSTF in accordance with the NMED-approved Groundwater Monitoring Plan (GMP; NASA, 2014a). Groundwater samples are collected for the analysis of the following primary constituents: VOCs; N-nitrosodimethylamine (NDMA), bromacil, and metals. In addition to routine groundwater samples required by the GMP, samples for other chemical analyses are frequently collected at many of the groundwater monitoring wells. Because these samples are not a direct requirement of the GMP, the results of these analyses are provided in the appropriate project-specific report.

11.0 Schedule

This investigation consists of three primary phases: 1) pre-investigation planning and preparation; 2) execution of the field investigation activities; and 3) data assessment and preparation of the investigation report detailing the findings of the investigation. The schedule for these activities is presented below.

11.1 Planning and Preparation

In addition to NMED review of this IWP, NASA must complete several important activities prior to the initiation of field activities. Resource requirements must be clearly identified and scheduled using the established NASA process for planning, funding, and executing work at WSTF. In addition, off-site resources must be coordinated. NASA expects these activities to require three to four months after NMED approval of this plan, which ~~is expected in September 2015,~~ was received January 19, 2016.

11.2 Field Investigation

As indicated in Section 4.1.5.2, excavation of the PVC portion of the HWTLs is expected to be performed only after discharge to the 200 Area wastewater lagoon has been terminated. NASA currently expects that the cessation of discharge may occur as early as July 2015, though further unexpected project complications may delay access to the HWTLs that is collocated in the trench with the sanitary sewer line between the 200 Area and 600 Area wastewater lagoon. NASA will continue to update NMED on the status of the sanitary sewer project and will notify NMED if continued delays in that project negatively impact the proposed schedule for the HWTLs investigation.

Investigation of the HWTLs and excavation of the HWTLs are expected to be completed approximately four to five months after initiation. Unforeseen field conditions, off-site resource availability, delays in approval of this IWP, or other complications possibly impacting this schedule will be discussed with NMED as they arise to determine the best resolution.

11.3 Data Assessment and Reporting

Chemical analytical data from samples collected during the investigation should be fully available for verification and validation by NASA scientists within 30 days of the completion of field activities. These data will be evaluated as previously described, a process that typically requires up to two months. Additional resources, guidance, or supporting data will also be assessed and utilized to support the investigation. The results of these evaluations will be incorporated into a final report for submittal to NMED by ~~September 30, 2016~~January 31, 2017. Unforeseen delays in the completion of field investigation activities or data evaluation may adversely impact the completion of the report on this schedule and will be discussed with NMED as soon as possible upon NASA becoming aware of a problem.

12.0 References

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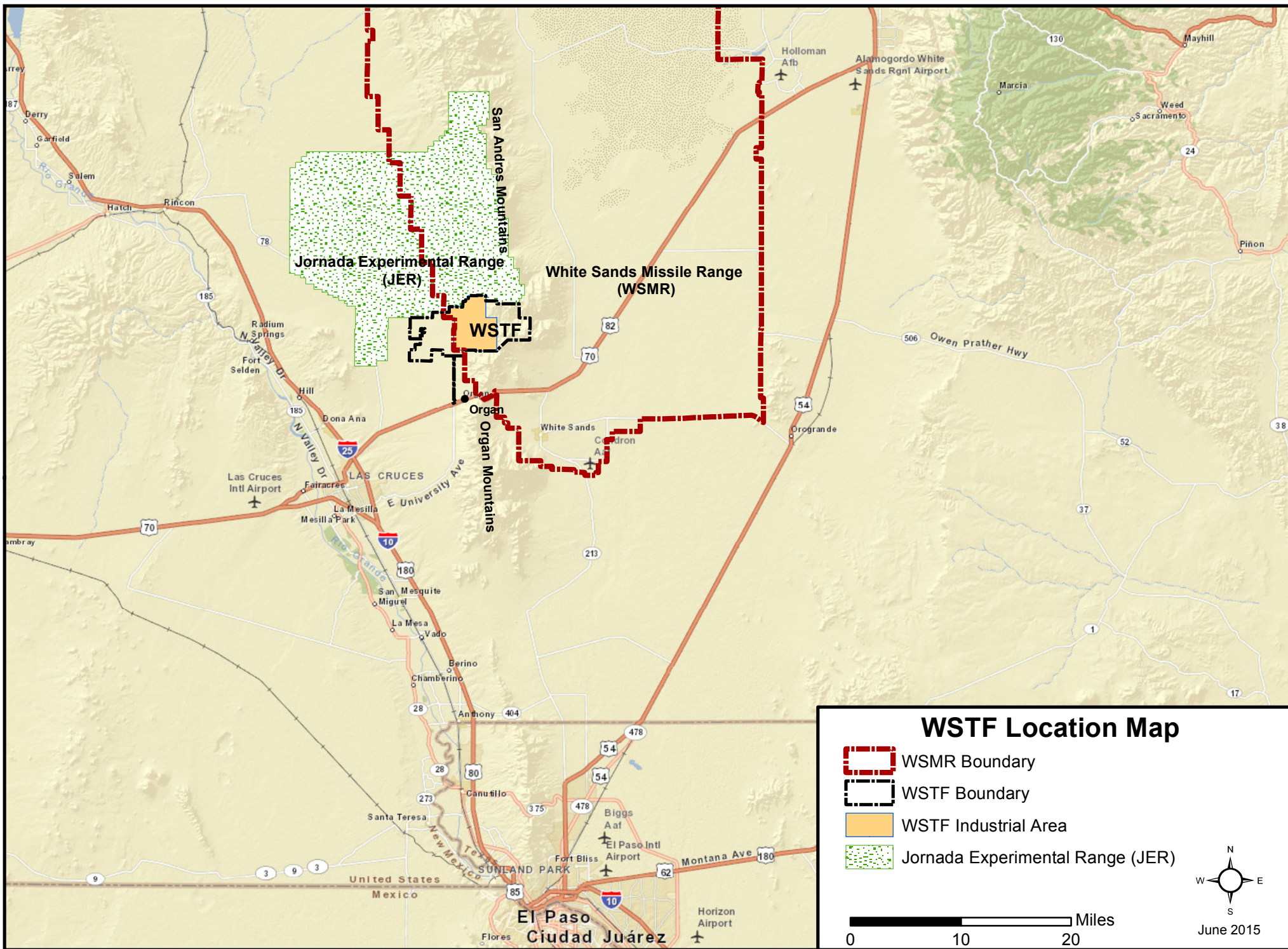
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Representative Sampling Methods, 40 C.F.R. § 261, Appendix I (2012).

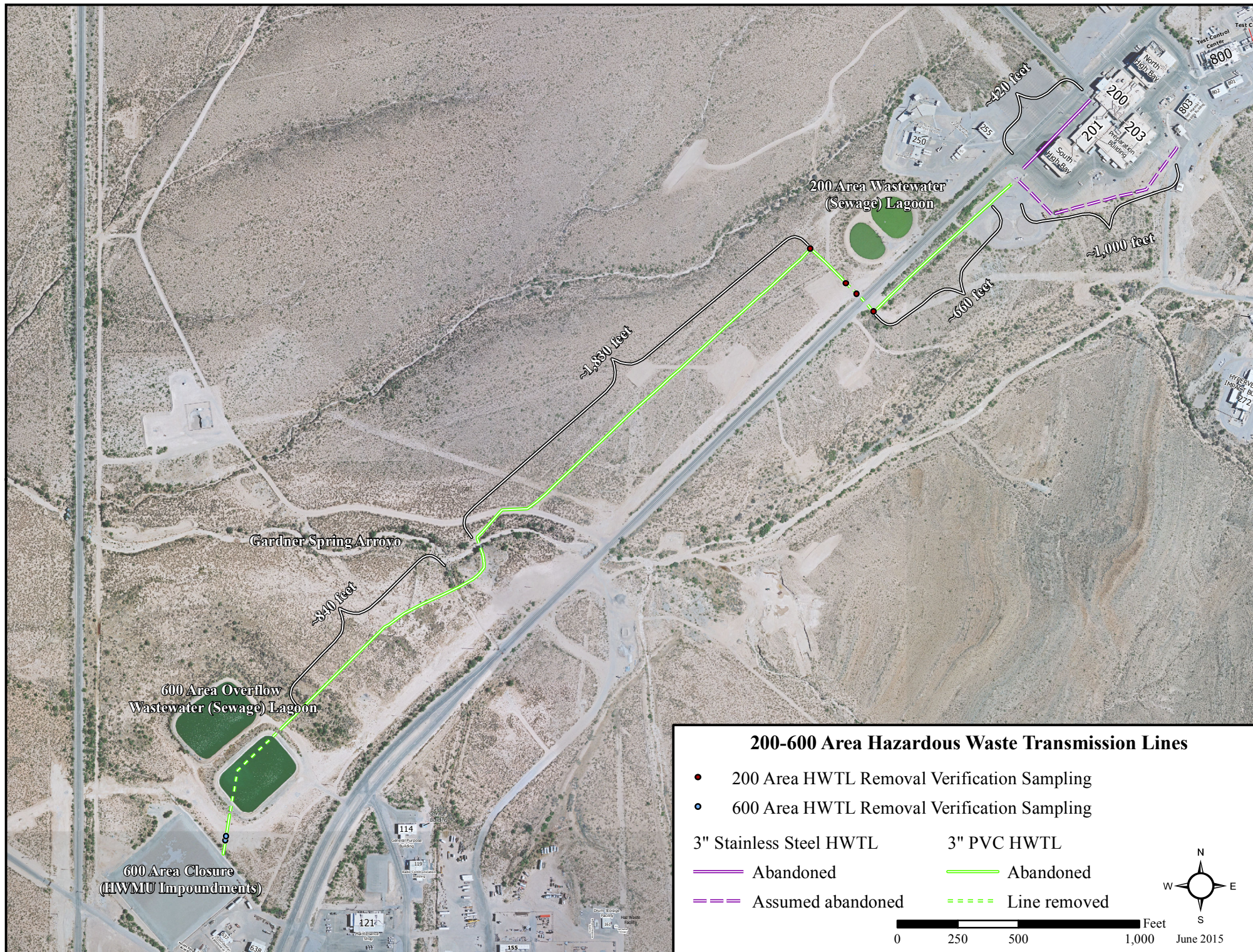
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Figures

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Site Conceptual Exposure Model

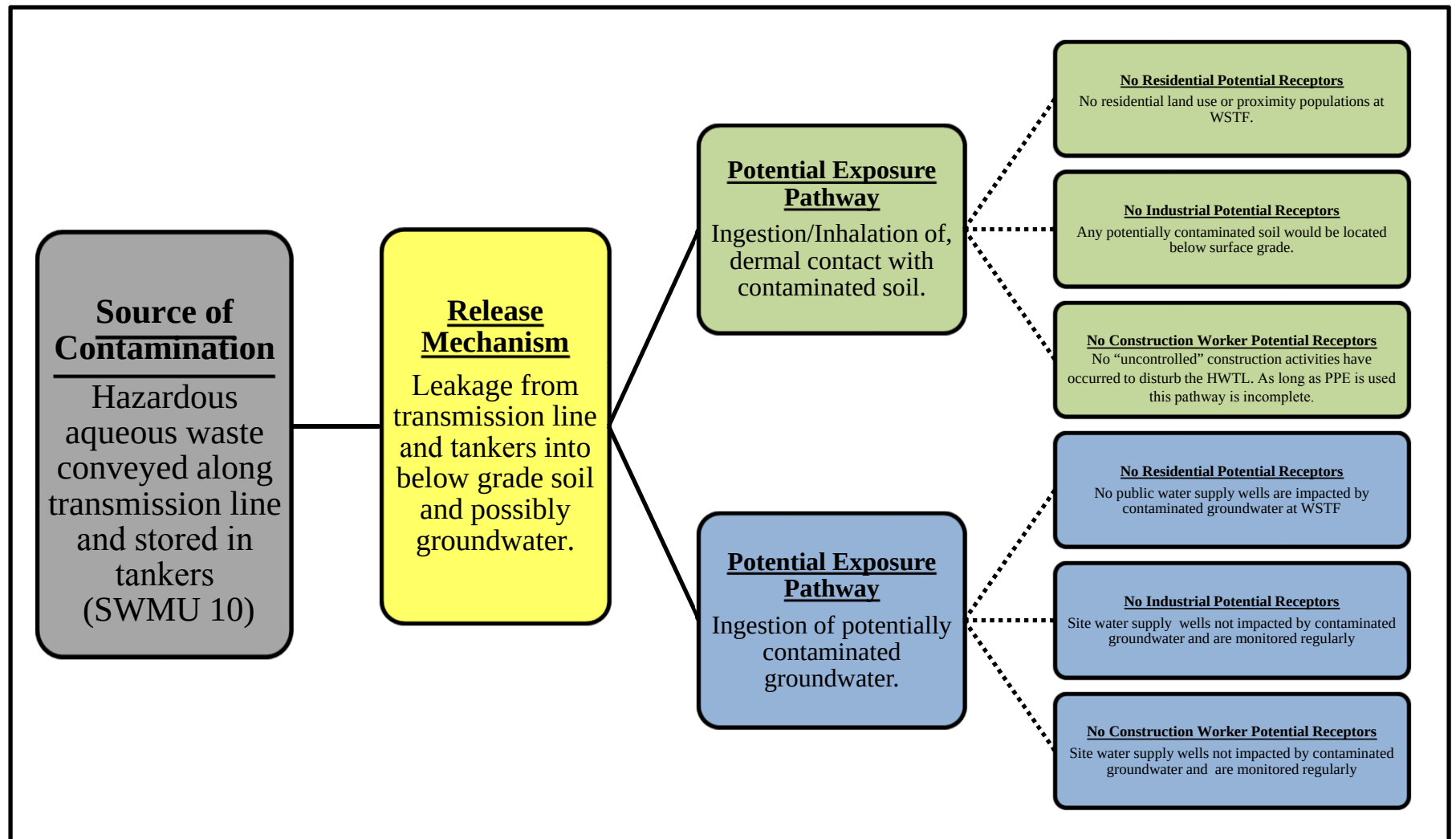
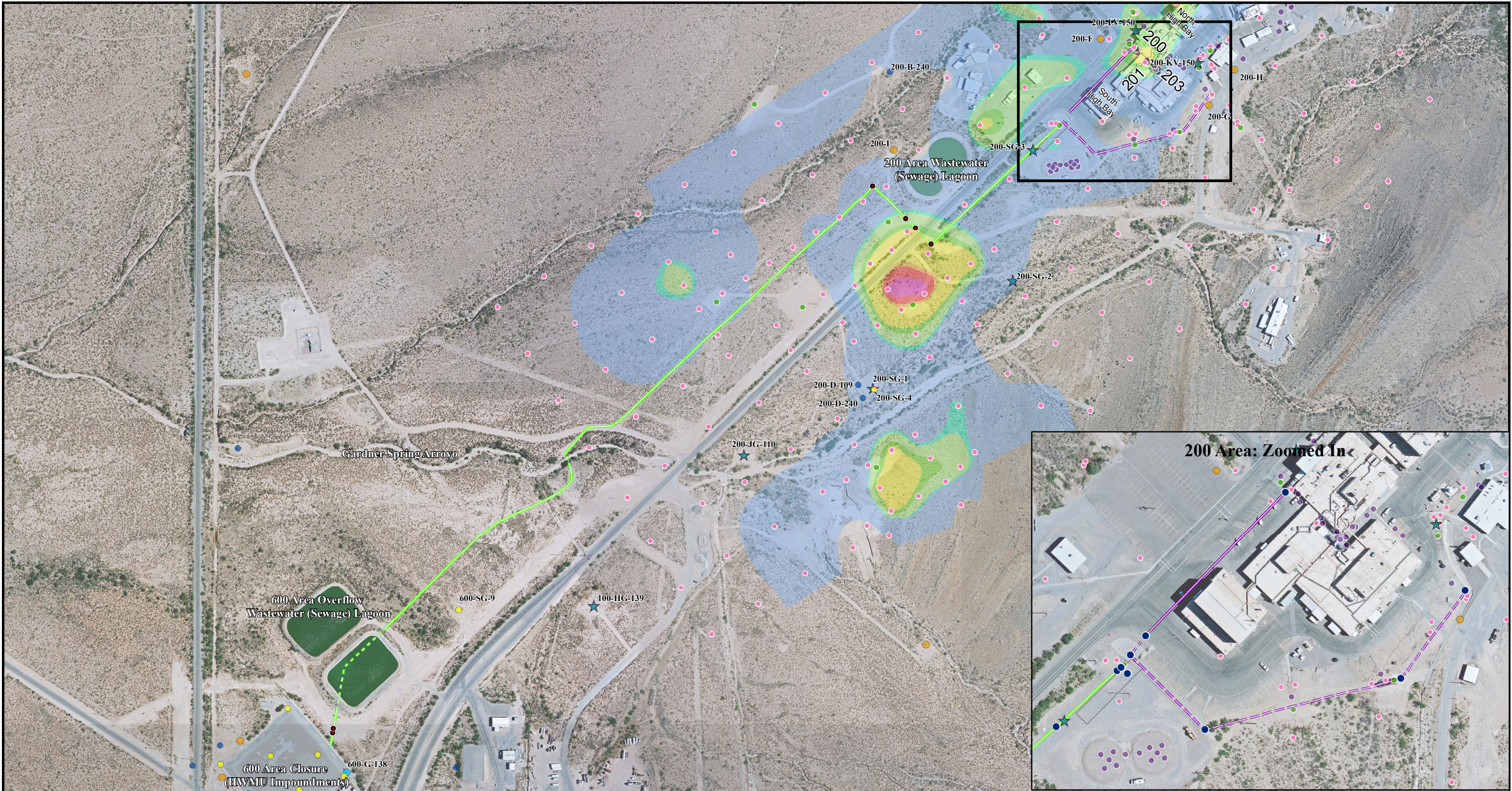


Figure 2.3 Recent Investigations in the Vicinity of the Hazardous Waste Transmission Lines

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Recent Investigations in the Vicinity of the Hazardous Waste Transmission Line

3" Stainless Steel HWTL

Abandoned

Assumed abandoned

3" PVC HWTL

Abandoned

Line removed

ETU/HWDL Investigation Boring (2012)

- 200 Area Phase I Soil Vapor Point (2013)
- HWTL Removal Verification Sampling (2014)
- 200 Area Phase II Investigation Boring (2014)
- Soil Vapor Well

- Conventional Well
- Perched Well
- Multiport Well
- MSVGM Well

HWTL Proposed Sampling Locations

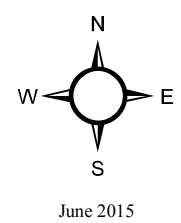
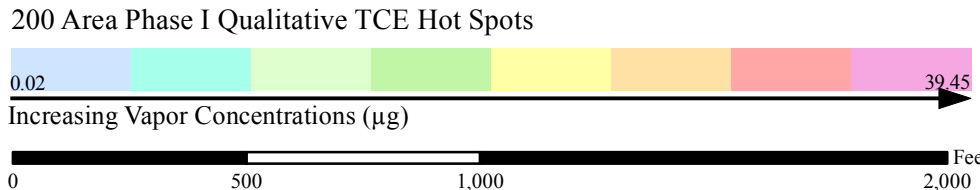
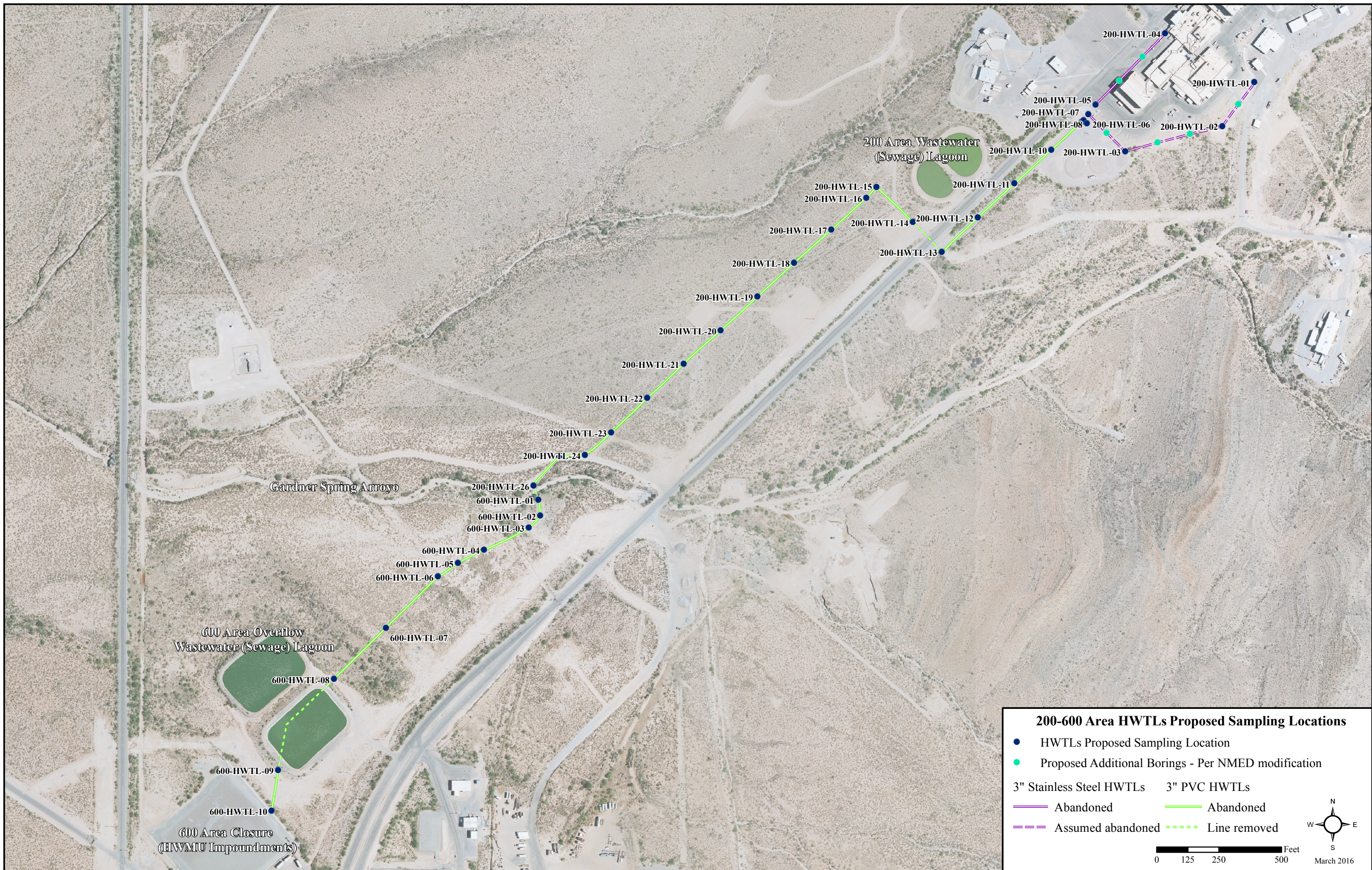


Figure 4.1 200 – 600 Areas Hazardous Waste Transmission Lines Proposed Sampling Locations

NMED IWP Approval w/ Mods, Comment #4: If the stainless steel HWTLs are to be abandoned in place, the Permittee must collect six (6) additional soil samples along the pipe run. Two additional samples must be collected at evenly spaced intervals along the pipeline run between proposed sample locations 200-HWTL-04 and 200-HWTL-05; one additional sample must be collected at the midpoint of the pipe run between proposed sample locations 200-HWTL-08 and 200-HWTL-03; two additional samples must be collected at evenly spaced intervals along the pipe segment between proposed sample locations 200-HWTL-02 and 200-HWTL-03; and one additional sample must be collected along the pipe run at the midpoint between proposed sample locations 200-HWTL-01 and 200-HWTL-02. The additional sample points are required to provide shallow subsurface site characterization information along the stainless steel portion of the HWTL.

NMED IWP Approval w/ Mods, Comment #6: Figure 5.7 of the HIS depicts the two tanks previously used for interim waste storage near the South High Bay to be in a pit below surface grade. The Permittee must determine the depth below grade that the tanks were originally located prior to sampling. Historical information also indicates that at least three releases of waste effluent from the 200 Area occurred between July and August of 1986 along with subsequent spill clean-up including excavation activities which may have disturbed shallow subsurface soils at the location of the former waste storage tank staging area and stainless steel to polyvinyl chloride pipe couple. Based on the current understanding of this information, proposed sampling locations 200-HWTL-06, 200-HWTL-07, 200-HWTL-08 and 200-HWTL-09 must be extended to a depth which accounts for the disturbance of any shallow subsurface soils during cleanup activities and the bottom of the storage tank staging area. Any additional information regarding spill cleanup activities, additional storage tank information, and any resulting variances in the proposed sampling plan must be adequately documented in the investigation report.

(SEE NEXT PAGE)



Tables

Table 2.1 List of COPCs for the 200 Area HWTLs Investigation

Constituent	Sample Type/ <u>EPA Method</u>
Hydrazine	HYDRAZINE Hydrazines by SW-846 Method 8315
Monomethylhydrazine (MMH)	HYDRAZINE
Unsymmetrical Dimethylhydrazine (UDMH)	HYDRAZINE
Arsenic	METALS Metals by most appropriate lab-identified method; SW-846 Method and 7199 for h Hexavalent c Chromium
Barium	METALS
Cadmium	METALS
Chromium (Total)	METALS
Chromium (VI)	METALS
Lead	METALS
Mercury	METALS
Selenium	METALS
Silver	METALS
N-Nitrosodimethylamine	NITROSAMINES by Modified EPA Method 607M
Pyridine	SVOC by SW-846 Method 8270C w/ low level PAH
1,1,1-Trichloroethane	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	
2-Butanone (Methyl Ethyl Ketone)	VOC by SW-846 Method 8260C
Acetone	VOC
Benzene	VOC
Carbon Tetrachloride	VOC
Chloroform	VOC
Ethyl Benzene	VOC
m-Xylene & p-Xylene	VOC
Tetrachloroethylene (PCE)	VOC
Toluene	VOC
Trichloroethylene (TCE)	
Trichlorofluoromethane (Freon 11)	
<u>Bromacil</u>	XXX SW-846 Method by 8321B
<u>Dioxins/Furans</u>	DIOXINS/FURANS by SW-846 Method 8280/8290
<u>Nitrate/Nitrite</u>	INORGANICS by EPA Method 300.0
<u>Cyanide</u>	SW-846 Method XXX by 9012B
<u>Perchlorate</u>	XXX by SW-846 6850
<u>Chloride</u>	SW-846 90056A
<u>pH</u>	SW-846 Method 9045D

Note: List of COPCs taken from Abbreviated Investigation Work Plan for SWMU 10 Soil Removal (NASA, 2012c) and based on information provided in the SWMU 10 HIS (NASA, 2015).

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Table 4.1 Summary of Planned Sampling and Analytical Methods

HWTLs Area Location	Soil Boring -Well ID and Location ¹	Anticipated Boring Depth	Number of Samples	Sample Collection Summary			
				Soil Chemical ³	Duplicates ⁴	Spikes ⁴	Blanks ⁵
200 Area East of Bldg. 203 at start of line	200-HWTL-01	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X	Field Duplicate		Rinsate Blank & Trip Blank
200 Area Southeast of Bldg. 203	200-HWTL-02	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area South of South High Bay	200-HWTL-03	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X		Matrix Spike	Rinsate Blank & Trip Blank
200 Area West at start of line	200-HWTL-04	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area Southwest of South High Bay	200-HWTL-05	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area Southwest of South High Bay at approximate location of Stainless Steel T-joint	200-HWTL-06	5' 17'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X	Field Duplicate		Rinsate Blank & Trip Blank
200 Area Southeast of South High Bay at approximate location of T-joint to tankers	200-HWTL-07	5' 127'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank

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Table 4.1 Summary of Planned Sampling and Analytical Methods

HWTLs Area Location	Soil Boring -Well ID and Location ¹	Anticipated Boring Depth	Number of Samples	Sample Collection Summary			
				Soil Chemical ³	Duplicates ⁴	Spikes ⁴	Blanks ⁵
200 Area Southeast of South High Bay at approximate location of tanker ramp.	200-HWTL-08	5-127'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area Approximate location of Stainless Steel and PVC connection	200-HWTL-09	5-127'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X		Matrix Spike	Rinsate Blank & Trip Blank
200 Area ETU Access Road	200-HWTL-10	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area ETU Access Road	200-HWTL-11	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X	Field Duplicate		Rinsate Blank & Trip Blank
200 Area ETU Access Road	200-HWTL-12	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area ETU Access Road	200-HWTL-13	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area South of 200 Area Lagoon	200-HWTL-14	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank

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Table 4.1 Summary of Planned Sampling and Analytical Methods

HWTLs Area Location	Soil Boring -Well ID and Location ¹	Anticipated Boring Depth	Number of Samples	Sample Collection Summary			
				Soil Chemical ³	Duplicates ⁴	Spikes ⁴	Blanks ⁵
200 Area South of 200 Area Lagoon at PVC Elbow	200-HWTL-15	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd.	200-HWTL-16	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X	Field Duplicate		Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd.	200-HWTL-17	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd.	200-HWTL-18	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd.	200-HWTL-19	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area South of 200 Area Lagoon	200-HWTL-20	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X		Matrix Spike	Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd.	200-HWTL-21	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X	Field Duplicate		Rinsate Blank & Trip Blank

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Table 4.1 Summary of Planned Sampling and Analytical Methods

HWTLs Area Location	Soil Boring -Well ID and Location ¹	Anticipated Boring Depth	Number of Samples	Sample Collection Summary			
				Soil Chemical ³	Duplicates ⁴	Spikes ⁴	Blanks ⁵
200 Area West of Apollo Blvd.	200-HWTL-22	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd.	200-HWTL-23	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd. Elbow	200-HWTL-24	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd. Elbow	200-HWTL-25	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
200 Area West of Apollo Blvd. Terminus	200-HWTL-26	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X	Field Duplicate		Rinsate Blank & Trip Blank
<u>200 Area East of Bldg. 203</u>	<u>200-HWTL-TBD⁶</u>	<u>5'</u>	<u>Soil chemical (2²)</u> <u>Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	<u>X</u>			<u>Rinsate Blank & Trip Blank</u>
<u>200 Area Southeast of Bldg. 203</u>	<u>200-HWTL-TBD⁶</u>	<u>5'</u>	<u>Soil chemical (2²)</u> <u>Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	<u>X</u>		<u>Matrix Spike</u>	<u>Rinsate Blank & Trip Blank</u>

NASA White Sands Test Facility

Table 4.1 Summary of Planned Sampling and Analytical Methods

HWTLs Area Location	Soil Boring -Well ID and Location ¹	Anticipated Boring Depth	Number of Samples	Sample Collection Summary			
				Soil Chemical ³	Duplicates ⁴	Spikes ⁴	Blanks ⁵
<u>200 Area Southeast of Bldg. 203</u>	<u>200-HWTL-TBD⁶</u>	<u>5'</u>	<u>Soil chemical (2²)</u> <u>Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	<u>X</u>			<u>Rinsate Blank & Trip Blank</u>
<u>200 Area Southwest of South High Bay</u>	<u>200-HWTL-TBD⁶</u>	<u>5'</u>	<u>Soil chemical (2²)</u> <u>Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	<u>X</u>			<u>Rinsate Blank & Trip Blank</u>
<u>200 Area West of Bldg. 200</u>	<u>200-HWTL-TBD⁶</u>	<u>5'</u>	<u>Soil chemical (2²)</u> <u>Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	<u>X</u>	<u>Field Duplicate</u>		<u>Rinsate Blank & Trip Blank</u>
<u>200 Area West of South High Bay</u>	<u>200-HWTL-TBD⁶</u>	<u>17'</u>	<u>Soil chemical (2²)</u> <u>Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	<u>X</u>			<u>Rinsate Blank & Trip Blank</u>
600 Area West of Apollo Blvd. Start of Line	600-HWTL-01	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
600 Area West of Apollo Blvd. at possible joint	600-HWTL-02	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X	Field Duplicate		Rinsate Blank & Trip Blank
600 Area West of Apollo Blvd. at possible joint	600-HWTL-03	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank

NASA White Sands Test Facility

Table 4.1 Summary of Planned Sampling and Analytical Methods

HWTLs Area Location	Soil Boring -Well ID and Location ¹	Anticipated Boring Depth	Number of Samples	Sample Collection Summary			
				Soil Chemical ³	Duplicates ⁴	Spikes ⁴	Blanks ⁵
600 Area West of Apollo Blvd. at possible joint	600-HWTL-04	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
600 Area West of Apollo Blvd. at possible joint	600-HWTL-05	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
600 Area West of Apollo Blvd. at possible joint	600-HWTL-06	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
600 Area West of Apollo Blvd.	600-HWTL-07	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X	Field Duplicate		Rinsate Blank & Trip Blank
600 Area West of Apollo Blvd.	600-HWTL-08	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X		Matrix Spike	Rinsate Blank & Trip Blank
600 Area between 600 Area Lagoon and 600 Area Closure	600-HWTL-09	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank
600 Area between 600 Area Lagoon and 600 Area Closure at the terminus	600-HWTL-10	5'	Soil chemical (2 ²) Parameters: VOCs, Hydrazines, NDMA/DMN, SVOCs, <u>Bromacil, Dioxins/Furans, Metals (total), Nitrate/Nitrite, Cyanide, Perchlorate, Chloride, soil pH, and Hexavalent Chromium</u>	X			Rinsate Blank & Trip Blank

Table 4.1 Summary of Planned Sampling and Analytical Methods

HWTLs Area Location	Soil Boring -Well ID and Location ¹	Anticipated Boring Depth	Number of Samples	Sample Collection Summary			
				Soil Chemical ³	Duplicates ⁴	Spikes ⁴	Blanks ⁵
Maximum Sample Totals:				Sample Blank/Duplicate Totals:			
Soil Chemical Parameters: VOCs (7284 Samples), Hydrazines (XX84 Samples), NDMA/DMN (7284 Samples), SVOCs (7284 Samples), <u>Bromacil (84)</u> , <u>Dioxins/Furans (84)</u> , Metals (total) (7284 Samples), <u>Nitrate/Nitrite (84 Samples)</u> , <u>Cyanide (84 Samples)</u> , <u>Perchlorate (84 Samples)</u> , <u>Chloride (84 Samples)</u> , <u>soil pH (84 Samples)</u> , and <u>Hexavalent Chromium (84 Samples)</u> .				1 x trip blank (VOCs using distilled water in a 40 mL vial) for each soil sampling shipment (estimated 18 samples) 1 x rinsate blank per HWTLs segment (estimated 6 samples) Field Duplicates + Matrix Spikes Samples: Soil Chemical Parameters: VOCs (8+49+5 samples), Hydrazines (X+X9+5 samples), NDMA/DMN (8+49+5 samples), SVOCs (8+49+5 samples), <u>Bromacil (9+5 samples)</u> , <u>Dioxins/Furans (9+5 samples)</u> , Metals (total) (8+49+5 samples), <u>Nitrate/Nitrite (9+5 Samples)</u> , <u>Cyanide (9+5 Samples)</u> , <u>Perchlorate (9+5 Samples)</u> , <u>Chloride (9+5 Samples)</u> , <u>soil pH (9+5 Samples)</u> , and <u>Hexavalent Chromium (9+5 Samples)</u> .			
Notes:							
1	Refer to Figure 2.2 <u>Figure 4.1</u> for soil boring locations.						
2	If any soil samples indicate a potential release of VOCs, additional soil sampling will subsequently be performed at a depth of 8-10 ft and 13-15 ft bgs directly below the pipe location.						
3	Sample collection planned at 3 ft and 5 ft bgs, <u>except at borings 200-HTWL-06 – 09, at which samples will be collected at 413 and 815 ft bgs.</u> Anticipated order, preparation, and analytical methods: VOCs – SW-846 Method 8260C; <u>hydrazines – SW-846 Method 8315; NDMA/DMN – SW-846 Method 607M;</u> SVOCs – SW-846 Method 8270C – including low level polynuclear aromatic hydrocarbons (PAH); <u>bromacil – SW-846 Method 8321B; dioxins/furans – SW-846 Method 8280/8290; inorganics (total metals, nitrates, and chloride) – most appropriate methods; nitrate/nitrite/chloride – SW-846 Method 300; cyanide – SW-846 Method 9012/9013; Perchlorate – SW-846 Method 6850; soil pH – SW-846 Method 9045D; and hexavalent chromium – SW-846 Method 7199;</u> hydrazines – most appropriate method.						
4	Duplicates and Spikes: 1 x field duplicate per 10 soil sample, 1 x matrix spike per 20 soil samples.						
5	Field blanks: 1 x trip blank per soil sampling shipment and 1 x rinsate blank for each SWMU and AOI.						
6	<u>If any portion of the steel sections of the HWTL must be abandoned in place, additional soil samples will be collected in accordance with NMED IWP Approval with Modifications Comment #4, which requires the collection of “six additional soil samples along the pipe run” at specific locations to “provide shallow subsurface site characterization information along the stainless steel portion of the HWTL.” The NMED-required soil sample collection locations are identified in Figure 4.1 (NMED, 2015a).</u>						

Appendix A
200 Area HWTLs (SWMU 10)
Investigation-Derived Waste Management Plan



National Aeronautics and
Space Administration

200 Area Hazardous Waste Transmission Lines (SWMU 10) Investigation-Derived Waste Management Plan

June 2015

NM8800019434
NASA Johnson Space Center White Sands Test Facility
12600 NASA Road Las Cruces, New Mexico 88012

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List of Acronyms

COPC	Contaminant of Potential Concern
CFR	Code of Federal Regulations
DOT	Department of Transportation
EPA	Environmental Protection Agency
FR	Federal Register
ft	Foot/feet
HIS	Historical Information Summary
HWTL	Hazardous Waste Transmission Lines
IDW	Investigation-derived waste
IWP	Investigation Work Plan
NASA	National Aeronautics and Space Administration
NMED	New Mexico Environment Department
PPE	Personal protective equipment
RCRA	Resource Conservation and Recovery Act
RO	RCRA Online
RSSL	Residential Soil Screening Levels
SAP	Sampling and Analysis Plan
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
WSI	WSTF Standard Instruction
WSTF	White Sands Test Facility

1.0 Waste / Activity Description

The National Aeronautics and Space Administration (NASA) will conduct a Solid Waste Management Unit (SWMU) investigation of the 200 Area Hazardous Waste Transmission Lines (HWTLs; SWMU 10). The purpose of this investigation is to determine if any possible residual contamination exists above regulatory limits in the soils adjacent to the HWTLs due to activities conducted at SWMU 10 and to identify if any future corrective action measures for the SWMU is required. The HWTLs are an underground pipeline system that commences in the 200 Area and terminates in the 600 Area. In accordance with the SWMU 10 Investigation Work Plan (IWP; NASA, 2015), NASA plans to install soil borings at depths of 0 – 0.5 feet (ft) and 1 – 2 ft below the excavated HWTLs at designated locations, or at a depth approved by the New Mexico Environment Department (NMED), and collect soil chemical samples for analysis. This Investigation-Derived Waste (IDW) Plan will address the management of IDW that will be generated from the investigation activities.

Various types of IDW are expected to be generated from the SWMU 10 Investigation. For the purpose of this IDW Plan, the types of IDW anticipated are identified as:

- Soil cuttings from the borehole installation and sampling process.
- Decontamination water.
- Contact waste, including:
 - Non-dedicated sampling equipment.
 - Personal protective equipment (PPE).
 - Plastic sheeting.
 - Rags.
 - Other debris contaminated by soil or fluids.
 - Equipment maintenance wastes (e.g., grease, contaminated rags, oil, lubricants, diesel, soil contaminated with hydraulic fluids, etc.)

As a best management practice, NASA will conduct a preliminary waste characterization determination for the IDW anticipated to be generated based on acceptable knowledge and information obtained from the SWMU 10 Historical Information Summary (HIS; NASA, 2015).

2.0 Preliminary Waste Characterization (Acceptable Knowledge)

Based on information gathered from the SWMU 10 HIS, the types of wastes generated from the 200 Area Chemistry Laboratories and discharged to the 600 Area Overflow Lagoons (currently referred to as the 600 Area Impoundments) from 1986-1987 were:

- Spent halogenated solvents (carrying F001 and F002 Environmental Protection Agency [EPA] waste codes); and
- Heavy metals such as cadmium, chromium, and lead (carrying D006, D007, and D008 EPA waste codes, respectively).

The HWTL operated from April, 1986 through June, 1986, a period of one month.

2.1 Soil Cuttings (Environmental Media)

NASA anticipates generating soil cuttings (environmental media) as a result of the borehole installation and soil sampling process. From the information obtained in the SWMU 10 HIS, the soils beneath the HWTL, and therefore the soil cuttings, have the potential to be contaminated with the aforementioned hazardous constituents. Per the EPA's Contained-In Policy, if an environmental media is contaminated with a waste that has been designated as a listed hazardous waste, the media automatically is considered to contain that listed waste. Land Disposal Restrictions (2012) would apply to the media once that media is actively managed (i.e., removed from the ground) according to 54 Federal Register (FR) 36597 (1989) and 57 FR 37298 (1992; EPA, 2005). As a result, contaminated environmental media is considered to be a solid waste and is therefore subject to the Resource Conservation and Recovery Act (RCRA) hazardous waste identification and management requirements at the time that it is removed from a soil boring or borehole. A final hazardous waste determination for the soil cuttings cannot be made without analytical verification, therefore the soil cuttings will be managed as hazardous waste, pending analytical verification.

2.2 Decontamination Water

Decontamination water will be generated as a result of decontaminating down-hole boring equipment (i.e., augers, split-spoons, etc.) and non-disposable sampling equipment (i.e., stainless steel sampling spoons, stainless steel sampling bowl, etc.). This is to ensure cross-contamination between soil borings does not occur. The decontamination water will consist of site tap water and a surfactant such as Alconox^{®1} or detergent. By coming into contact with the soil and per the EPA's Contained-In Policy, the decontamination water has the potential to contain listed hazardous constituents.

2.3 Contact Waste

In addition to contaminated environmental media and decontamination water, non-dedicated disposable sampling equipment, personal protective equipment, plastic sheeting, rags, and other debris contaminated by contact with soil or fluids, and water and soap solutions used to wash and decontaminate equipment will be generated. Debris containing contaminated environmental media is also subject to regulation. Therefore, all IDW is a generator declared hazardous waste (Criteria for Listing Hazardous Waste, 2012) carrying EPA Waste Codes F001 and F002, pending analytical verification.

3.0 Waste Management

IDW will be accumulated and placed into containers and will be managed in accordance with WSTF Standard Instruction (WSI) 22-SW-0005 incorporating Accumulation Time (2011) regulations. This includes, but is not limited to, container content labels, accumulation start dates, less-than-90-day accumulation areas, hazardous waste labels, and Department of Transportation (DOT) container specifications. Per Applicability (2012) standards do not apply to waste management units that are used solely for on-site storage of hazardous waste that is placed in the unit as a result of implementing remedial activities required under the corrective action authorities of RCRA.

The following IDW will be managed and accumulated in accordance with WSI 22-SW-0005.E incorporating Accumulation Time (2011) regulations:

¹ Alconox[®] is a registered trademark of Alconox, Inc.

- Used personal protective equipment, plastic sheeting, and other debris will be containerized in DOT compliant drums or bulk containers (roll-offs, Super Sacks², or similar).
- Soils, cuttings, generated during drilling and sampling will be containerized in DOT compliant drums or bulk containers (Roll-offs, Super Sacks, or similar).
- Decontamination fluids, muddy water, etc. will be either absorbed and managed with the unsaturated soils, or containerized in DOT compliant drums.
- Wastes typically associated with equipment maintenance (e.g., grease, contaminated rags, oil, WD-40^{®3}, diesel, soil contaminated with hydraulic fluids, etc.) may also be generated and will be managed as a hazardous waste.
- Any inadvertent spills onto the soil (e.g., discharged IDW decon. water to grade) are also considered IDW and will be containerized in DOT compliant drums or bulk containers (roll-offs, Super Sacks, or similar). All spills will be documented and evaluated for Reportable Quantity Notifications per WSTF procedures. All spills will be handled immediately in order to minimize the volume of waste generated.

4.0 Final Waste Characterization

Final waste characterization for the IDW will be completed in accordance with Attachment 12: Waste Analysis Plan of the NASA WSTF Hazardous Waste Permit (NMED, 2009) incorporating the SWMU 10 Investigation Work Plan (IWP). The contaminants of potential concern (COPCs) and analytical parameters are summarized in Table 2.1 of the SWMUs 10 IWP (NASA, 2015).

The characteristic determinations for the IDW will be based on the analytical data generated from the investigation samples (i.e., samples collected from the boreholes). To evaluate the toxicity characteristic, the total concentration of each reported constituent may be divided by 20 to determine the maximum theoretical leachate concentration that could result from performing the toxicity characteristic leaching procedure (TCLP – EPA Method 1311). These concentrations will be compared to the values listed in Table 1 of Toxicity Characteristics (2012) to determine if the waste exhibits the characteristic of toxicity. Alternatively, NASA may perform TCLP analysis on representative soil samples to evaluate the toxicity characteristic.

5.0 “No Longer Contained-In” Determination

For environmental media that are identified as containing listed wastes per Lists of Hazardous Waste (2012), a request for a “no longer contained-in” determination may be submitted to the NMED Hazardous Waste Bureau (Land Disposal Restrictions, 2012).

To perform a “no longer contained-in” determination, the analytical data generated from borehole sampling may be compared to the applicable Land Disposal Restrictions (2012) Treatment Standards and the NMED Residential Soil Screening Levels (RSSLs) to determine whether the material poses an unacceptable risk (NMED, 2014). If contaminant concentrations are found to not pose an unacceptable risk, then NMED may determine that the wastes can be managed as no-longer containing listed wastes. Written approval by NMED of NASA’s request for a “no longer contained-in” determination will be required to document such a determination.

² Super Sack[®] is a registered trademark of Better Agricultural Goals Corporation DBA/ B.A.G. Corp.

³ WD-40[®] is a registered trademark of WD-40 Manufacturing Company.

6.0 Waste Disposal

For IDW characterized as hazardous waste (Identification and Listing of Hazardous Waste, 2012), Land Disposal notifications (Land Disposal Restrictions, 2012), disposal facility profiles, and hazardous waste manifests (Standards Applicable to Generators of Hazardous Waste, 2011) will be completed as required (US, 2013). Waste will be transported for treatment and disposal at a permitted RCRA Treatment, Storage, and Disposal Facility (US, 2013).

Upon receipt of an NMED “no longer contained-in” determination, soil (environmental media) will be spread on the ground in the vicinity of the soil borings, but in an area that will not be readily accessible to routine traffic or easily subject to runoff. Also, IDW debris that is determined to be non-hazardous waste will be disposed of as solid waste.

7.0 Reusable Materials

Any materials, equipment, and structures associated with the SWMUs 10 investigation (e.g., plastic sheeting, non-contaminated piping, etc.) will be evaluated for potential recycling or reuse.

8.0 References

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