National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
White Sands Test Facility
P.O. Box 20
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June 27, 2013

Reply to Attn of: RE-13-070

New Mexico Environment Department
Attn: Michael Montoya
Liquid Waste Program
1170 North Solano Drive, Suite M
Las Cruces, NM 88001

Subject: NASA White Sands Test Facility (WSTF) Septic Tanks (SWMU 21 – 27) Investigation Work Plan and WSTF Septic Tanks Historical Information Summary

This transmittal provides the *WSTF Septic Tanks (SWMU 21 – 27) Investigation Work Plan* (IWP) and the *WSTF Septic Tanks Historical Information Summary* (HIS). The IWP and HIS were prepared in accordance with the WSTF Hazardous Waste Permit. The *WSTF Septic Tanks Removal Plan* is Appendix A of the IWP. On-site liquid waste system abandonment forms for septic tanks that are registered through your office are provided in Attachment A of this appendix.

Enclosure 1 provides paper copies of the Executive Summaries for the WSTF Septic Tanks IWP and HIS. Enclosure 2 provides a bound paper copy of the IWP and HIS. 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 knowing violations.

If you have any questions or comments concerning this submittal, please contact Michael Jones of my staff at 575–524–5604.

Radel Bunker-Farrah
Radel Bunker-Farrah
Chief, Environmental Office

Enclosures (3)

National Aeronautics and
Space Administration

WSTF Septic Tanks (SWMU 21 – 27) Investigation Work Plan

June 2013

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

WSTF Septic Tanks (SWMU 21 – 27) Investigation Work Plan

June 2013

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.

Radel Bunker-Farrah
Chief, NASA Environmental Office

6-26-13
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. Eight WSTF septic tanks are identified in the Permit as SWMUs:

- SWMU 21 – 100 Area Septic Tank at Guard Shack (Building 116 Main Guard Gate).
- SWMU 22 – 100 Area Septic Tank at Building 114.
- SWMU 23 – 200 Area Septic Tanks at Building 272 (Tanks A and B).
- SWMU 24 – 300 Area Septic Tank at Main Parking Lot.
- SWMU 25 – 300 Area Septic Tank at Building 320.
- SWMU 26 – 300 Area Septic Tank at Building 364.
- SWMU 27 – 400 Area Septic Tank at Main Parking Lot.

A Historical Information Summary (HIS) was developed for the above listed SWMU septic tanks and eight additional known septic tanks at WSTF. These additional tanks are located at:

- 100 Area Septic Tank at Building 117 (WSTF Forward Guard Gate).
- 250 Area Septic Tank (area of interest).
- 200 Area Septic Tank at Building 272 (Tank C)
- 400 Area Septic Tank at Building 463.
- 400 Area Septic Tank at Building 447.
- 600 Area Septic Tank at Building 650.
- 800 Area Septic Tank at Buildings 802/803.
- Second Tracking and Data Relay Satellite System Ground Terminal (STGT) facility.

These additional tanks include a tank at the STGT facility located north of the WSTF industrial complex and a tank in the WSTF 250 Area that was identified as an area of interest in the WSTF 200 Area Investigation Work Plan (NASA, 2012).

The only evidence found during HIS research of hazardous constituents being discharged to any of the above listed tanks was at SWMU 22, the Building 114 septic tank. Building 114 was the WSTF document reproduction shop from approximately 1963 – 1985. During that time, a plate maker used a silver salt diffusion transfer process to create master forms for an offset press. Silver-bearing and possibly cyanide waste from this process was discharged to a sink in Building 114 that drained to SWMU 22. NASA estimates that approximately three gallons of this waste was discharged to the Building 114 septic tank every two months. Concentration of silver in the discharge is estimated at 200 ppm. It is also possible that spent solutions containing small amounts of cyanide were discharged to the Building 114 septic tank. The nature and volume of these potential discharges are unknown.

No evidence was found during the HIS Investigation that SWMUs 21 and 23 – 27 ever received hazardous constituents. NASA is therefore proposing no investigation at these tanks because no process has been identified that would have permitted hazardous constituents to be discharged at these locations. The septic tanks at SWMUs 21 and 23 – 27 will be removed and the associated leach lines will be abandoned in accordance with NMED Liquid Waste Program (LWP) regulations, as described in the WSTF Septic Tanks Removal Plan in Appendix A.

This IWP describes the activities required to carry out an investigation of SWMU 22 to confirm that no hazardous constituents exist above regulatory levels in the soil adjacent to the Building 114 septic tank and associated leach lines. Pre-investigation activities will be conducted to provide site characterization data. These activities will provide information for preliminary planning activities and help refine tank removal, site investigation, and site restoration requirements. Pre-investigation activities will include the sampling and characterization of septage in the Building 114 septic tank and the performance of a site survey of the Building 114 septic tank and associated leach field.

NASA intends to investigate and collect supporting data to confirm that hazardous constituents do not exist in the soil adjacent to SWMU 22 above cleanup levels. The investigation will specifically target silver because of the known process that discharged silver-containing waste to the Building 114 septic tank, and cyanide because of the potential discharges to the tank. Prior to investigation, NASA will remove the Building 114 septic tank and inspect its integrity. If the structural integrity of the tank is determined to have been compromised, NASA will install two soil boings within the tank excavation and one boring downgradient of the tank. These three soil borings will not be installed if the tank is found to be intact. Additional soil borings will be installed within and downgradient of the leach field. One boring will be installed upgradient of the septic tank and leach field location to determine background soil conditions. At least two samples will be collected from each boring, which will be approximately 10 ft deep. Site restoration will be conducted after the investigation, during which the tank excavation will be filled and the land surface will be returned to its approximate original elevation.

An estimated timeline for performance of fieldwork, data evaluation, and WSTF Septic Tanks Investigation Report submittal is presented in this IWP. This schedule is considered realistic; however, the assumption is made that several individual milestones can be met. Pre-investigation activities are expected to begin within 30 days of submission of this IWP to NMED. Investigation of the Building 114 septic tank is expected to begin after the completion of pre-investigation activities, NMED review and approval of the IWP and associated WSTF Septic Tanks Removal Plan (Appendix A), and removal of the non-SWMU and SWMU septic tanks.

NASA anticipates beginning removal of non-SWMU septic tanks on or before November 21, 2013, after NMED LWP approval of the WSTF Septic Tanks Removal Plan. SWMU septic tank removal is anticipated to begin on or before January 16, 2014, after completion of the removal of non-SWMU tanks and NMED HWB approval of this IWP and WSTF Septic Tanks Removal Plan. Investigation of the Building 114 tank is anticipated to begin on or before March 13, 2014, after SWMU tank removal is complete. Data evaluation and investigation report development will follow fieldwork, with submittal of the investigation report anticipated by August 15, 2014.

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List of Acronyms

AOC	Area of concern
ASTM	American Society for Testing and Materials
bgs	Below ground surface
CAP	RCRA Corrective Action Program
CLC	City of Las Cruces
CLCWS	City of Las Cruces Wastewater System
cm/sec	Centimeters per second
CoC	Chain-of-custody
COPC	Contaminant of potential concern
DQOs	Data quality objectives
DTR-Process	Silver salt diffusion transfer process
EDD	Electronic data deliverable
EPA	Environmental Protection Agency
Ft	Feet
GPM	Gallons per minute
GPS	Global Positioning System
GWQB	Ground Water Quality Bureau
HAZWOPER	Hazardous waste operations and emergency response
HHF	Hardscrabble Hill Fault
HIS	Historical Investigatiformation Summary
HWB	Hazardous Waste Bureau
HWMU	Hazardous waste management unit
IDW	Investigation-derived waste
IWP	Investigation Work Plan
JSC	Johnson Space Center
LWP	Liquid Waste Program
MS/MSD	Matrix spike/matrix spike duplicate
MSDS	Material Safety Data Sheet
NASA	National Aeronautics and Space Administration
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
PDF	Portable document format
PID	Photoionization detector
PLSS	Public Land Survey System
PPE	Personal protective equipment
ppm	Parts per million
QA/QC	Quality assurance and quality control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
ROEC	Record of Environmental Consideration
SAM	San Andres Mountains
SCEM	Site conceptual exposure model
SJMB	Southern Jornada del Muerto Basin
SOP	Standard operating procedure

SSL	Soil screening level
STGT	Second Tracking and Data Relay Satellite System Ground Terminal
SWMU	Solid waste management unit
USDA	United States Department of Agriculture
WSP	WSTF Standard Procedure
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 for nearly 50 years and continues to operate as a field test facility under the jurisdiction of JSC in Houston, Texas. The WSTF U.S. Environmental Protection Agency (EPA) Facility Identification Number is NM8800019434.

The WSTF Hazardous Waste 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 preparation and submittal of an IWP to NMED for closure and/or investigation. The following eight WSTF septic tanks are identified in the Permit attachment:

- SWMU 21 – 100 Area Septic Tank at Guard Shack (Building 116 Main Guard Gate).
- SWMU 22 – 100 Area Septic Tank at Building 114.
- SWMU 23 – 200 Area Septic Tanks at Building 272 (Tanks A and B).
- SWMU 24 – 300 Area Septic Tank at Main Parking Lot.
- SWMU 25 – 300 Area Septic Tank at Building 320.
- SWMU 26 – 300 Area Septic Tank at Building 364.
- SWMU 27 – 400 Area Septic Tank at Main Parking Lot.

Section VII.H.1.c of the Permit requires the submittal of a Historical Information Summary (HIS) in conjunction with each IWP. Attachment 16 of the Permit requires the submittal of the IWP and HIS for the above listed septic tanks to the NMED Hazardous Waste Bureau (HWB) by June 30, 2013. This IWP and accompanying HIS satisfy that requirement.

In addition to those tanks identified as SWMUs in the Permit, NASA is also responsible for eight other septic tanks:

- 100 Area Septic Tank at Building 117 (WSTF Forward Guard Gate).
- 200 Area Septic Tank at Building 272.
- 250 Area Septic Tank (area of interest).
- 400 Area Septic Tank at Building 463.
- 400 Area Septic Tank at Building 447.
- 600 Area Septic Tank at Building 650.
- 800 Area Septic Tank at Buildings 802/803.
- Second Tracking and Data Relay Satellite System Ground Terminal (STGT) facility.

The septic tanks described in this IWP were installed at different times for the disposal of sanitary sewage at different areas. Thirteen of these septic tanks are currently operational and three are inactive. The 250 Area septic tank was identified as an area of interest during development of the 200 Area HIS and was included in the 200 Area Investigation Work Plan (NASA, 2012). The Building 117 septic tank will be retained in service and not removed or investigated.

A historical investigation of all WSTF septic tanks has been performed and is summarized in the HIS that accompanies this IWP (NASA, 2013). Information from the HIS was used to develop the investigation portion of this project. Specifically, evidence collected during the HIS investigation process was reviewed to determine if any historical process had resulted in the discharge of hazardous constituents to any septic tank. Only one tank, associated with SWMU 22, was found to have received hazardous constituents. The SWMU 22 septic tank has served WSTF Buildings 114 and 119. A document production and reproduction process was used in Building 114 from 1963 through the mid-1980s that generated a small quantity of silver-containing waste as a byproduct. This silver-containing byproduct from the offset press was discharged to a sink, which drained to the septic tank that served the building. Another process in the building may have generated a spent solution containing cyanide. This spent solution was potentially discharged to the septic tank as well.

NASA proposes to focus the investigation portion of this project on the septic tank and leach field associated with SWMU 22 because of its identified history of receiving small quantities of silver and potentially receiving cyanide. No evidence of hazardous constituents being discharged to SWMUs 21 and 23 through 27 was discovered during the HIS research. Accordingly, NASA proposes no investigation at these tanks.

The SWMU 22 septic tank continues to serve buildings 114 and 119. Building 114 is currently unoccupied and is used for storage. Building 119 is the WSTF Communication Support Facility. Three personnel work in this building on an intermittent basis. Installation of a replacement septic tank or other arrangements for sanitary sewer facilities is required prior to the removal and investigation of the current tank. This will be done in conjunction with a project that NASA initiated to connect WSTF to the City of Las Cruces (CLC) Wastewater System (CLCWS). The anticipated date for completion of the wastewater pipelines connecting WSTF to the CLCWS is July 31, 2013 and the CLC is expected to issue the Significant User Wastewater Discharge Permit shortly after the connection to the CLCWS is complete. The NMED HWB required notification by August 1 in the delay of the CLCWS project beyond August 31, 3013 (NMED, 2013). In accordance with this requirement, NASA will notify the HWB by August 1, 2013 if the August 31, 2013 completion date is unfeasible.

NASA intends to remove the septic tanks identified in this IWP and to abandon the associated leach fields. The WSTF Septic Tanks Removal Plan is provided in Appendix A. The Removal Plan includes details on the removal of the SWMU 22 tank and all other tanks that will be removed after the site receives sanitary sewer service from the CLC. Fifteen of the sixteen WSTF septic tanks, including all SWMU tanks, will be removed. Associated leach lines will be abandoned in-place, in accordance with NMED Liquid Waste Program (LWP) guidelines.

The CLCWS project does not include Building 119 because of the excessive distance between the building and the sewer pipelines. NASA initially planned to retain the Building 114 septic tank, but the current tank will be removed to facilitate this investigation. NASA anticipates installing a new septic tank or making other sanitary facilities available at Building 119 in mid-to late 2013.

The WSTF Septic Tanks IWP, HIS and Removal Plan are submitted to the NMED LWP and HWB because the removal of the septic tank associated with SWMU 22 is subject to regulation under both entities. HWB and LWP concurrence and approval are required before NASA can commence removal of the Building 114 septic tank. The investigation portion of the project is subject to regulation exclusively by the HWB. A courtesy copy of these documents has also been provided to the NMED Ground Water Quality Bureau (GWQB) because of that bureau's historical involvement in the WSTF septic tank program. NASA anticipates beginning tank removal and investigation at SWMU 22 in accordance with the schedule provided in Section 12 of this plan after receiving notification from NMED to proceed.

1.1 Objectives and Scope

The objective of the WSTF Septic Tanks IWP is to describe the activities that will be necessary to investigate SWMU 22. The objective of this investigation is to verify that no hazardous constituents exist in the soil adjacent to the SWMU 22 septic tank and leach field. SWMU 21 and 23 – 27 are not included in the investigation portion of this project because the HIS research for those tanks revealed no evidence of discharge of hazardous constituents to these tanks. Planned activities for SWMU 22 include:

- Removal of the existing septic tank.
- Completion of an investigation to verify that there is no vadose zone contamination above regulatory limits beneath and downgradient of the septic tank and leach field. If contaminants of potential concern (COPCs) are detected at concentrations above regulatory limits, the data may be used to guide remedial action, if necessary.
- Removal and management of wastes generated during tank removal and site investigation activities. Likely project waste includes septage, concrete debris, potentially contaminated soil, and other investigation-derived waste (IDW) as described in the WSTF Septic Tanks Investigation-Derived Waste Management Plan (Appendix B).

1.2 Approach and Implementation

The investigation of SWMU 22 will consist of the following activities:

- Review and approval of this IWP by the NMED HWB, with concurrence by the NMED LWP.
- Approval of the WSTF Septic Tanks Removal Plan by the NMED HWB and LWP.
- Pre-removal sampling of septage from the SWMU 22 septic tank in order to facilitate waste characterization and project planning.
- Installation of a replacement septic tank or other facilities for the personnel working in Building 119.
- Removal activities including removal of septage; tank inspection, excavation, and removal; initial soil sampling below the tank (if required); and waste management.
- Investigation activities including the installation of soil borings and soil sample collection and analysis.
- Development and submittal of a WSTF Septic Tanks Investigation Report to NMED.
- Site restoration and grading.

1.3 Regulatory Framework

Removal and investigation activities are regulated by the NMED LWP and NMED HWB. The following sections provide a summary of the applicable regulatory requirements.

1.3.1 NMED Liquid Waste Program

The abandonment of septic tanks is regulated by the LWP, as described in the New Mexico Administrative Code (NMAC) 20.7.3.307. Regulation requires that NASA pump the remaining waste from the tank and dispose of it properly. Once the septage is removed, regulation states that the septic tank may be abandoned in-place by rupturing or collapsing the tank to prevent it from retaining water. NASA proposes to remove the tank in lieu of abandonment in-place to facilitate the investigation portion of this project. For abandonment in-place, regulation requires a LWP inspection of the tank prior to covering the tank and site restoration. NASA will not abandon this tank in-place, but will remove it and dispose of it properly. The LWP will be notified via telephone that the tank has been removed and that the tank excavation site is available for inspection, if required.

1.3.2 NMED Hazardous Waste Bureau

The investigation of SWMUs and AOCs is regulated by the HWB through 40 CFR 264, Subpart F (US, 2012[b]) and the WSTF Hazardous Waste 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 and AOCs 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

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 (SJMB). A six-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.

2.1 SWMU 22 Historical Information

2.1.1 SWMU 22 Tank Description

There is limited information available for the Building 114 septic tank. Its capacity is reported as 1,200 gallons and its design rate is 600 gpd. The tank was installed before the 100 Area sewage system was constructed. It is believed to be serviced by a tile drain field. No drawings are available that contain quantitative data regarding the septic system (i.e. setbacks, length, width, leach field properties, etc.). The tank and leach field locations will be surveyed during pre-investigation activities.

2.1.2 Septic Tank Permit Status

The SWMU 22 septic tank was installed during initial site construction in 1963. There was no requirement for septic tank permits from NMED at the time this tank was installed.

2.1.3 Operational History

The septic tank and leach field associated with SWMU 22 currently serve WSTF Buildings 114 and 119. The septic system was originally constructed in 1963 to serve Building 114 and a temporary trailer located adjacent to Building 118. This temporary trailer contained a bathroom with commodes and sinks and was used by the WSTF Fire Department until a dedicated fire department building was completed in approximately July 1964. The septic system continued to serve Building 114 exclusively until Building 119 was built and connected to the system in the mid-1990s.

Building 114 was initially used as a shop and general purpose building and contained the WSTF document reproduction facility. Document processing operations in Building 114 ceased in the mid-1980s when the offset press and other document reproduction equipment was moved to Building 101. Building 114 is presently unoccupied and used for storage. Building 119 was built as a control center to operate a satellite in the mid-1990s. It now serves as the WSTF Communication Support Building. Three personnel continue to occupy Building 119 on an intermittent basis.

The Building 114 septic tank performed adequately until the system backed-up in 2007. A blocked pipe leading from Building 119 to the septic tank was found to be the cause of the backup. The blocked section of pipe was removed and replaced. No other evidence of operational problems with the tank was discovered during the HIS research. In October 2008, the Building 114 septic tank was excavated and manholes were installed in 2009 to facilitate annual inspections.

Ancillary evidence found during the HIS research suggests that the Building 114 septic tank was pumped in 1994 and 2007. The HIS research found primary evidence that the septic tank was pumped by an off-site contractor in 2012, at which time it was determined to be approximately one-third full. The septage was removed from the tank and disposed of by the off-site contractor in accordance with applicable LWP regulations. The fact that the tank was only one-third full in 2012 suggests that the tank was previously pumped or that the tank may have been leaking. The condition of the tank will be documented upon its removal.

2.1.4 Discharge History of Hazardous Constituents at SWMU 22

The only evidence found during the HIS research of potentially hazardous constituents discharged to any of the WSTF septic tanks was at SWMU 22. It was discovered that between approximately 1963 and 1985, waste plate-maker machine chemicals were discharged down the bathroom sink at Building 114. The drain to this sink ultimately discharged to the Building 114 septic tank.

2.1.4.1 Discharge Details

Three different plate-maker machines were used historically at WSTF. The machines were used to make a master copy of forms for reproduction on an offset press. The manufacturer of the plate-maker machines provided Material Safety Data Sheets (MSDSs) for the chemicals they believed were used in the machines utilized at WSTF. These MSDSs are provided in Appendix D of the HIS.

Two different plate-making processes were used at WSTF: a photographic process and an electrostatic process. Residual chemicals from the photographic process were historically discharged to the Building

114 septic tank. Two of the three plate-maker machines used at WSTF employed different versions of the photographic process. The first type of photographic machine was used from 1963 until approximately 1974. The second type of photographic machine was used from approximately 1973 to the mid-to late 1980s. However, it is known that spent waste discharges to the Building 114 septic tank ceased in 1985, at which time wastes from the reproduction facility began being containerized. As part of the reproduction process, these photographic chemicals were diluted with water before use in the machines. When the chemicals stopped performing, the contents of the machines were emptied into the bathroom sink in Building 114. Both machines were emptied approximately every two months, depending on how much the plate-maker was used, with a total discharge of approximately three gallons of waste each time.

Based on information collected during HIS research, it is believed that the photographic process plate-maker machines most likely used the silver salt diffusion transfer process (DTR-process) to produce master copies of forms and documents. In the DTR-process, non-developed silver halide of an image-wise exposed photographic silver halide emulsion layer material is transformed with a silver halide solvent into soluble silver complex compounds. These are allowed to diffuse into an image-receiving element and are reduced with a developing agent. This is done generally in the presence of physical development nuclei to form a reversed silver image. Based on this process knowledge and information gained from interviews during the HIS investigation, a silver-bearing waste stream was most likely discharged to SWMU 22. The waste stream consisted of silver salts dissolved in water.

The amount of silver present in the waste stream is dependent on usage. Waste streams generated from commercial industrial photographic and imaging processing are known to contain up to 12,000 ppm of silver (EPA, 1999). Sampling of a similar photographic process at WSTF with similar amounts of waste yielded up to 200 ppm of silver.

2.1.5 Suspected Discharge

Based on information obtained during HIS research, an electrostatic plate-maker machine was used at WSTF in addition to the photographic process plate-maker machines described in the preceding section. It is unknown when use of this machine began at WSTF; however, use of the machine ended approximately in 1973. This machine contained approximately four quarts of liquid, which consisted of two types of hydrocarbons and a water-soluble cyanide chemical. Appendix D of the HIS provides the MSDSs for these chemicals. Chemicals were added to the machine as needed during use. It is believed that spent solutions containing these compounds were infrequently generated as part of the process. Though undocumented, these solutions could have been discharged to the Building 114 septic tank.

2.2 Contaminants of Potential Concern

Based on an evaluation of the discharges as described in the preceding section, it was determined that silver was discharged to the Building 114 septic tank and may have subsequently been discharged to the soil through the leach field. In addition, cyanide salts may have been released to the environment at SWMU 22. Therefore, silver and cyanide have been designated as the COPCs for this investigation.

2.3 Topographic and Geologic Settings

2.3.1 Topography

The local topography at WSTF is typical of the Basin and Range physiographic province of the southwestern United States, formed as a result of late Tertiary extensional tectonism. The adjacent SAM represent an uplifted northwest-trending mountain block adjacent to and east of WSTF. The SAM are separated from surrounding mountain ranges by broad intermountain basins. The SJMB is located on the west side of the SAM and the adjacent alluvial-covered bedrock pediment slope on which WSTF is located.

2.3.2 Climate

The climate at WSTF is characterized by abundant sunshine, wide diurnal variation in temperature, low relative humidity and variable precipitation. WSTF typically receives an average of ten inches of precipitation per year with the majority of rainfall occurring in intense brief localized thunderstorms during the late summer.

2.3.3 Surface Water

The major perennial surface water body in the region is the Rio Grande. It is located approximately 15 miles west of WSTF within the Mesilla Basin. The Mesilla Basin is separated from the SJMB by a partially buried horst that extends north – south from Goat Mountain and the Dona Ana Mountains to Tortugas Mountain. There is some flow of groundwater from the SJMB to the Mesilla Basin over portions of the buried horst, specifically near HWY 70. But overall connectedness between the Mesilla Basin and SJMB is limited.

Gardner Spring is the only natural surface water feature at WSTF. It is located approximately 1.1 miles northeast of SWMU 22. Gardner Spring is an intermittent spring and ceases flow for long periods of up to several years between rare periods of heavy mountain-front rainfall. The nearest natural body of water of significant scale is the ephemeral Isaacs Lake. It is located approximately ten miles to the southwest of WSTF at the lowest point of the SJMB (4,285 ft above mean sea level).

WTSF is characterized by high evaporation and infiltration rates which are typical of a desert climate. Precipitation from the brief intense thunderstorms is transported downstream via arroyos. Arroyo surface flow generally terminates within hours after the end of a precipitation event.

2.3.4 Groundwater

NASA 4 is the closest groundwater well to SWMU 22, located approximately 400 ft to the southwest. Groundwater occurs approximately 10 ft below the top of the Permian Hueco Limestone bedrock at 136 ft below ground surface (bgs). Well 100-HG-138 is located approximately 565 ft northeast of SWMU 22. Depth to water at well 100-HG-138 is 125 ft bgs. Groundwater flows generally from east to west across the site, and is primarily controlled by bedding plane solution channels within limestone bedrock in this area. Well productivity in the area is typically less than five gallons per minute (gpm). Hydraulic conductivity within the fractured limestone bedrock aquifer is approximately 10^{-5} centimeters per second (cm/sec) and hydraulic conditions are defined as semi-confined.

2.3.5 General Soil Lithology

SWMU 22 is located within soils of the Nickel-Tencee Association. The Nickel series includes deep, well drained soils associated with old, coalescent alluvial fans. The soils are formed in gravelly, medium-textured alluvial sediments. The upper five feet 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 moderately 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.

2.3.6 Biology and Native Vegetation

Biotic resources at WSTF are typical of those found in the arid southwest desert area. The average rainfall of ten inches per year makes it difficult to support agriculture without the assistance of irrigation water. As is typical with all deserts and semi-arid areas, the overall species diversity is low.

Major vegetation within WSTF includes a combination of woody shrubs and grasses characteristic of the Chihuahuan Desert Shrub Biotic Community. These shrubs include Louisiana White Sage, Creosote bush, Honey Mesquite, Tarbush, Broom Snakeweed, and Lotebush. Common grasses include Alkali Sacaton, Side-Oats Grama, Fluff Grass, Tobosa Grass, and Purple Three Awn. In addition to Gardner Spring Arroyo, numerous other well-developed arroyos are present but hidden from sight within the low profile topography and vegetation. Plant species diversity is low relative to that in better drained upland slopes. Shrubs provide a microhabitat for warm season grasses and forbs as well as reptiles and small mammals.

WSTF is considered to be a low affectability area. The facility receives little use by wildlife species because it has been physically altered by human disturbance or overgrazing. The area provides reduced topographic relief and vegetation diversity associated with food and cover.

2.4 Preliminary Site Conceptual Exposure Model

A preliminary site conceptual exposure model (SCEM) was developed for this investigation (Figure 2.1) to provide an understanding of the potential for exposure to hazardous contaminants at the site. The SCEM is based on the source of contamination, the release mechanism, the exposure pathway, and the potential receptor(s).

The septic tank and soil below the tank and within the leach field are considered the primary sources for the conceptual model. Surface soil or exposed subsurface soil outside of the septic tank that may have come in contact with septage are a potential secondary source.

Five release mechanisms are identified within the SCEM as follows:

1. Hydraulic Pressure. This release mechanism is most applicable to the septic tank if it has poor integrity. Hazardous constituents may have leaked from the tank to the soils beneath the source. Under this release mechanism, the mass of the hazardous substances is pulled by gravity toward the subsurface strata through the path of least resistance.
2. Leaching. This release mechanism refers to the movement of soluble chemicals via infiltration into subsurface soils. This release mechanism could be viewed as the combined mechanisms of gravitational force, hydraulic pressure, and solubility. Leaching also serves as a migration pathway that transports wastewater to other media or locations.
3. Runoff. This release mechanism refers to surface water moving downgradient; moving the wastewater or wastes from the source. Runoff occurs when the rate of precipitation is greater than the infiltration capacity of the medium. Runoff also serves as a migration pathway that transports wastewater or wastes to other media or locations. Runoff is applicable to areas with measurable topographic relief, such as arroyos.
4. Digging. This mechanism refers to human activities that may intercept soils that have accumulated wastes as a result of infiltration, leaching, or runoff. Construction activities that entail soil or sediment excavation are examples of this release mechanism.
5. Wind Erosion. This release mechanism refers to the frictional force posed by air movement near the earth’s surface that removes the hazardous constituents from the source to air. Under this release mechanism, the hazardous substances or their constituents are released from the matrix surface into air. This release mechanism is most applicable to metals in dry and dusty environments.

Three potential exposure pathways are identified: 1) incidental ingestion of soil; 2) inhalation of particulate emissions (dust); and 3) dermal contact with soil.

There are no current or future residential land use scenarios anticipated in the vicinity of SWMU 22. The area is within a controlled test site on land owned by the Department of Defense (U.S. Army White Sands Missile Range). There are no encroaching residential areas. Therefore, there are no complete exposure pathways for a residential receptor population. A risk assessment of the groundwater itself will not be conducted as part of this investigation because the investigation will not intercept groundwater.

There are no additional industrial/occupational land use scenarios anticipated for the area immediately adjacent to SWMU 22 beyond the current use scenario. Building 118 is the closest structure to SWMU 22, located approximately 50 ft to the southwest. It is a storage building with no occupants. There is no intention to develop this area for future additional industrial use at this time. Based on the current industrial land use scenario for SWMU 22, no complete exposure pathways are identified for an industrial/occupational receptor population.

A construction worker scenario represents a potential complete exposure pathway during the investigation. Inadvertent ingestion of, inhalation of, or dermal contact with soil may be considered a complete exposure pathway for this evaluation. To mitigate this risk, personal protection equipment (PPE) requirements will be identified in the project-specific Health and Safety Plan Addendum for this project. The worker exposure pathway is assumed to be incomplete once the septic tank is removed, the investigation (which includes investigation of the leach field) is complete, and the former tank location has been re-graded.

2.4.1 Fate and Transport

There are three general categories of processes affecting contaminant fate and transport: hydrodynamic, abiotic, and biotic processes. Hydrodynamic processes include advection, dispersion, and preferential flow. Abiotic processes include adsorption, volatilization, ion exchange, hydrolysis, precipitation or dissolution, cosolvation, redox processes, and colloid transport. Biotic processes include metabolism and/or cometabolism by microorganisms.

For possible contaminants at SWMU 22, the most likely mechanisms for transport of wastes or COPC(s) into the vadose zone would be any of the hydrodynamic processes as a result of leaching due to operation of the septic tank. Because septage comprises the majority of the discharge load to the septic tank, biotic as well as abiotic processes are also occurring. Subsurface analytical data is required to determine the presence and concentration of COPC(s) in the vadose zone.

2.4.2 Data Gaps

Available analytical data for SWMU 22 is not complete enough to determine whether or not hazardous constituents are present in the tank liquid or soil directly beneath the septic tank or leach field at concentrations exceeding regulatory limits. The data necessary to make these determinations will be gathered during the removal and investigation process to ensure appropriate management of all derived waste and materials. Subsequent sections of this IWP discuss the processes to collect the data necessary to evaluate the constituents and concentrations present at SWMU 22.

3.0 Current Site Conditions at SWMU 22

3.1 SWMU 22 Description

The septic tank and leach field associated with SWMU 22 is located within the 100 Area in the central area of WSTF, approximately 90 feet east-northeast of Building 114 (Figure 3.1). The septic tank continues to serve sanitary facilities in Buildings 114 and 119. Three personnel currently work in Building 119 on an intermittent basis and Building 114 is unoccupied.

3.2 Surface Conditions

Surface conditions in the vicinity of SWMU 22 are characterized by the U.S. Department of Agriculture (USDA) Soil Classification (USDA, 1999) Nickel-Tencee Association (60% Nickel gravelly fine sandy loam and 25% Tencee very gravelly loam), as described previously in Section 2.3. Approximately 125 ft of alluvium overlies the limestone bedrock pediment slope in the vicinity of the Building 114 septic tank. The alluvium is classified as the piedmont slope facies of the Camp Rice Formation, which forms part of the Quaternary Santa Fe Group (Seager, 1981).

3.3 Subsurface Conditions

Alluvium in the vadose zone below SWMU 22 includes Quaternary to Tertiary intercalated fan, interfan valley, and erosion surface veneer deposits derived from the SAM between Bear Canyon, located to the northeast, and Lohman Canyon, located to the southeast of the WSTF industrial areas. The heterogeneous alluvial soil lithologies in the vadose zone have porosities up to 20 percent and consist primarily of unconsolidated to moderately cemented, poorly sorted, pebble to boulder conglomerates with interbedded lenticular sandy gravels, and sandy silts.

The vadose zone alluvium in the area of SWMU 22 is a poorly to moderately cemented pebble to boulder conglomerate. The lithology logs for well 100-HG-139, located approximately 565 ft northeast of SWMU 22, indicated a calcite-cemented horizon at 30 – 40 ft bgs. These carbonate cemented zones, caliche horizons, and clay lenses occur sporadically throughout the alluvial unit and are usually discontinuous in nature. Well 100-HG-138 intercepted Tertiary volcanic ash bedrock at a depth of 117 ft bgs.

Permian Hueco limestone bedrock was intercepted by monitoring well NASA 4, located 400 ft southwest of SWMU 22, at a depth of 125 ft. A Late Tertiary, northwest trending normal fault related to Basin and Range activity, known as the Hardscrabble Hill Fault (HHF), is located in the vicinity well NASA 4. It represents one of the oldest known Basin and Range faults in the area, as indicated by the beveled pediment slope below the 600 Area Closure and lack of any bedrock surface displacement visible within shallow seismic cross-sections. The HHF has significant inferred displacement, estimated between 1,000 ft (Seager, 1981) and 7,900 ft (Maciejewski, 1996).

Groundwater below SWMU 22 occurs within a fractured limestone bedrock aquifer at approximately 130 ft bgs. Groundwater flow in the area of SWMU 22 is controlled by bedding plane solution channels within the limestone which results in a general flow direction of east to west. Well productivity in the area is typically less than five gpm and hydraulic conductivity is estimated at approximately 10^{-5} cm/sec.

4.0 Scope of Activities

No evidence of hazardous constituents being discharged to SWMUs 21 and 23 through 27 was identified during the HIS research. Based on these findings, the septic tanks associated with SWMUs 21 and 23 – 27 will be removed and leach fields abandoned in-place without investigation.

HIS research did identify document reproduction processes that discharged silver and possibly cyanide waste streams to SWMU 22. The SWMU 22 septic tank and soil below the tank and within the leach field will be investigated. The scope of this investigation includes activities that will be undertaken in order to verify that no hazardous constituents are detected at concentrations above regulatory limits in the soil at SWMU 22.

4.1 Analytical Requirements

HIS research included all 16 septic tanks at WSTF. SWMU 22 was found to have received minute quantities of document processing byproducts that contained silver and may have contained cyanide. Silver and cyanide are the only COPCs that will be targeted for this investigation. The septage in the tank and soil under the tank and within the leach field will be sampled for RCRA metals using EPA Method 6010/6020/7470 and cyanide using SW-846 Method 9012 (or other applicable analytical methods specified by the contracted analytical laboratory).

4.2 SWMU 22 Pre-Investigation Activities

Pre-investigation activities will be conducted at SWMU 22 to provide site characterization data. These activities will provide necessary information for preliminary planning activities and will help refine removal, site investigation, and site restoration requirements. These activities will also provide data to assist with characterization of the septage and sludge (if any) in the septic tank. These data will be used to develop procedures for sampling and disposal of the septage and other waste generated, refine waste volume estimates, refine the list of COPC(s) (if necessary), and prepare data to refine health and safety parameters required to support the field work.

Major pre-investigation activities will include the development of a Record of Environmental Consideration, a septic tank and leach field Global Positioning System (GPS) survey, underground utility identification, septic tank replacement or substitution for Building 119, and an initial waste profile and septage sample collection.

4.2.1 Record of Environmental Consideration

A Record of Environmental Consideration (ROEC) will be developed in accordance with WSTF Standard Procedure (WSP) 22-0020 “Evaluation of Environmental Aspects and Impacts”. The ROEC will include the removal of 16 WSTF septic tanks, including the Building 114 septic tank, and the investigation at SWMU 22. Significant aspects considered in the ROEC are natural resources, cultural resources, air compliance, hazardous waste, energy concerns, and water use/management.

4.2.2 SWMU 22 Septic Tank and Leach Field GPS Survey

Historical engineering and construction documentation associated with the Building 114 septic tank is limited. A GPS survey of SWMU 22 will be conducted to confirm and supplement the existing data set. The survey will focus on identifying the tank, leach field, and associated plumbing using NASA’s GPS surveying equipment. Exploratory excavation may be conducted by on-site contractors to fully locate the leach field.

The data collected during this survey will provide additional information necessary to refine waste volume estimates, estimate the required backfill volume for the septic tank, and design final grading elevations and contours for the site restoration phase of the project.

4.2.3 Underground Utility Identification

Underground utilities will be identified in accordance with WSP-24-0005 prior to removal and investigation activities. No excavation will take place at SWMU 22, or any of the septic tanks that will be removed, until a permit to excavate has been approved by WSTF personnel.

4.2.4 Building 119 Septic Tank Replacement

A replacement septic tank or other alternate facilities will be required prior to removal and investigation activities at SWMU 22. NASA is currently considering the option to replace the tank versus providing alternative facilities for Building 119 personnel. A replacement septic tank will be properly permitted through the NMED LWP prior to installation, if this option is selected.

4.2.5 SWMU 22 Pre-Investigation Septage Sampling

The estimated volume of septage in the Building 114 septic tank is approximately 400 gallons. Composite septage samples will be collected from the tank and analyzed for RCRA metals and total cyanide to determine the presence of the COPCs identified in Section 2.2. The results will be used to characterize the expected waste and refine the list of COPC(s), if necessary.

4.3 Data Quality Objective Process

4.3.1 Investigation Methods

NASA develops and maintains project-specific internal Quality Assurance Project Plans (QAPPs) that describe quality assurance/quality control (QA/QC) activities associated with specific projects or investigations at WSTF. A QAPP was completed and will be maintained in the WSTF Operating Record for this investigation. Data will be collected, reviewed, and maintained according to the QAPP.

This section addresses the activities related to the acquisition and evaluation of field data for the SWMU 22 investigation. Data quality objectives (DQOs) are first established for the field data as these have a strong influence on the design of field methodologies. Soil boring installation methodologies, field sampling activities, septage and soil samples, and the health and safety aspects pertinent to the performance of this work are described. Analytical methods for the septage and soil samples along with an explanation of associated quality assurance/quality control (QA/QC) procedures are addressed to demonstrate the integrity of the analytical results that will be used. A description of how the DQOs process (EPA, 2006) applies to this investigation is provided in the following sections.

4.3.2 Problem Statement

The problem statement for the investigation of SWMU 22 is: Confirm that the soil below and downgradient of the septic tank and leach field does not contain hazardous constituents at concentrations above regulatory limits as a result of present or past operations.

4.3.3 Decision Statement

The primary decision is whether corrective action is required due to the presence of residual COPC(s) above regulatory cleanup levels at SWMU 22.

4.3.4 Information Inputs

The primary input to determining whether residual contamination is present as a result of historical discharges to the Building 114 septic tank is the concentration of COPC(s) in the tank septage and soil surrounding the tank and leach field. COPC concentrations will be determined by sampling these media during pre-investigation activities and during the investigation itself, respectively.

COPC concentrations in soil will be compared to cleanup levels established using Permit Attachment 15 of the Hazardous Waste Permit (NMED, 2009). The cleanup levels will be used to determine if COPC concentrations in site soils require further investigation or corrective action under the RCRA Corrective Action Process. Analytical methods must be capable of quantifying the concentration of each of the COPC(s) at or below the cleanup levels. Should the site require further action, the information inputs presented here will also provide data for a corrective measures evaluation or further analysis of site-specific risk.

4.3.5 Boundaries of the Study

This investigation is limited to the soil beneath and adjacent to the SWMU 22 septic tank and leach field.

4.3.6 Decision Rule

The purpose of this investigation is to determine whether soils beneath and adjacent to the SWMU 22 septic tank and leach field contain COPC(s) at concentrations above applicable cleanup levels. However, as required by the Permit (NMED, 2009; Section 17.4.1) and EPA guidance (EPA, 1989), all complete exposure pathways will be evaluated. Potential exposure pathways were discussed in Section 2.4. The decision rules are best addressed based on identified complete pathways.

In accordance with the NMED soil screening guidance (NMED, 2012), validated analytical results from soil samples collected during the investigation will be compared to direct exposure screening values for construction workers. If multiple contaminants are detected, the cumulative effects of those contaminants will be considered as described in the guidance.

Analytical results from soil samples collected during the investigation will also be compared to migration to groundwater pathway values. These values are concentrations that, if present in soil, would cause groundwater to be contaminated above drinking water limits. Because the hydrogeological assumptions used to develop the generic leaching values in the NMED guidance may not hold true at this site, NASA may develop site-specific soil leaching values to evaluate the potential impact of any identified source terms on groundwater. Additionally, migration of soil contamination to groundwater is unlikely given the small quality of hazardous constituents and liquid discharged at SWMU 22 leach field and significant distance to groundwater in the area.

Project DQOs are summarized in the following statements:

- If COPC concentrations in vadose zone soils exceed the appropriate risk-based cleanup levels developed according to direction in Permit Attachment 15 (e.g., New Mexico soil screening levels [SSLs] or EPA Regional SSLs) for direct exposure routes under the construction worker scenario, then a RCRA Corrective Measures Study will be performed to determine the appropriate soil remediation. Otherwise, consider a no further action determination.

- If COPC concentrations in vadose zone soils exceed the appropriate risk-based cleanup levels (e.g., New Mexico SSLs or site-specific levels developed per the NMED guidance) for the migration to groundwater pathway, then a RCRA Corrective Measures Study will be performed to determine the appropriate soil remediation. Otherwise, consider a no further action determination.

Additional site characterization may be required if this investigation fails to fully determine the nature and extent of contamination, even if the DQOs are achieved.

4.3.7 Performance or Acceptance Criteria

The analytical approach is designed to minimize the occurrence of false positive results through the use of duplicate samples, method blanks, and field rinsate blanks. In the event of contamination, the laboratory will evaluate the method blank as to the nature of the interference and the effect on the analysis of each sample within the batch. If contamination is present in any blank sample, the affected samples will be appropriately qualified and equipment decontamination procedures will be reviewed and improved if necessary.

The risk of a false negative error is mitigated by a conservative soil screening approach. Maximum concentrations in soil samples will be compared to regulatory limits or SSLs in order to determine whether further action is required. The overall screening approach is conservative with respect to protection of human health and the environment. This is because the generic SSLs that will be used for this site were developed using conservative assumptions and maximum concentrations for the screening and evaluation, rather than using less conservative SSLs developed by the lesser mean or 95 percent upper confidence limit concentrations. No correction factor will be applied to either the data or the SSLs prior to comparison.

4.3.8 Plan for Data Acquisition

The selected sampling design for all samples proposed for this IWP takes into consideration cost and geologic conditions along with the DQO outputs developed throughout Section 4.3.

4.4 Stormwater Controls

Stormwater will be managed in accordance with the WSTF Stormwater Pollution Prevention Plan (NASA, 2010). Stormwater controls will be installed around the tank excavation and soil boring sites to divert surface water away from the work areas. This may include site grading and the installation of best management measures to prevent runoff/run-on during septic tank removal and investigation activities.

4.5 SWMU 22 Removal Activities

Removal of the Building 114 septic tank will be conducted in accordance with NMED and other applicable state and federal regulations. Planned removal activities for the Building 114 tank are described below. Refer to the Septic Tanks Removal Plan (Appendix A) for additional details regarding removal activities.

4.5.1 Septage Removal

Characterization of the septage in the Building 114 septic tank will be accomplished through the analysis of composite samples collected during the pre-investigation phase of the project. NASA anticipates that the septage is non-hazardous and may be pumped by a qualified septage pumper, as defined by LWP regulations. The septage will be pumped and disposed of by the off-site septage pumper contractor. If pre-investigation samples indicate the presence of hazardous constituents above regulatory levels in the septage, the septage will be managed as a RCRA hazardous waste in accordance with appropriate state and federal regulations.

4.5.2 Septic Tank Removal

Upon receipt of septage sample results, NASA will determine the appropriate disposition of the tank. The septage analytical results will be used to determine how to dispose of the tank. Given that the tank has been pumped at least once and possibly three times since 1994, NASA anticipates that no hazardous constituents will be detected in the septage samples. If this is the case, the tank will be disposed of as a solid waste. Details for tank removal are provided in Appendix A. Given the age of the tank, it may not be possible to remove it intact. Because of this uncertainty, some specific details of tank removal will be determined by the subcontractor and NASA at the time of tank excavation.

In the event data from the septage sample indicates the presence of hazardous constituents above regulatory levels, the tank will be removed and disposed of as a RCRA hazardous waste.

4.5.3 Septic Tank Surface Soil Samples

Upon removal of the SWMU 22 septic tank, the tank and soil beneath it will be inspected to determine if there is evidence of the tank leaking. If there is evidence of leakage from the tank, two soil samples will be collected from the surface of the soil located immediately below the tank and analyzed for the COPCs identified in Section 2.2. Soil sample locations beneath the tank will be selected based on an evaluation of soil staining or areas of saturation to ensure that samples are collected from locations most likely to be impacted by a tank leak, if present. If there is no evidence of leakage from the tank, these surface samples will not be collected.

5.0 Subsurface Investigation Activities

The subsurface soil investigation phase of this project will be initiated following Building 114 septic tank removal activities, as described in Section 4.5 and in Appendix A. Investigation of the subsurface will include sampling soil from soil borings in order to determine if the septic tank or leach field has impacted adjacent soils. Up to 11 soil borings will be installed in and around the tank excavation and leach field.

5.1 Drilling Method and Rig Access

Hollow-steam auger or mini-sonic drilling methods are the primary drilling methods proposed for this investigation. NASA had recent success drilling with a hollow-steam auger and sampling with split spoons during the ETU Closure project. Drilling and sampling conditions for this investigation are expected to be similar to those encountered during the ETU project. The final technique will be chosen after discussions with an off-site drilling contractor selected through a competitive procurement process.

Rig access to SWMU 22 will be accomplished by pre-grading the site as necessary. Appropriate dirt work will be performed to allow rig access to the tank excavation site, if these borings are required. All drilling equipment will be underlain with plastic sheeting to minimize the impact of any potential leaks or spills. Overhead utilities, traffic, and rig access to SWMU 22 were considered while selecting the proposed boring locations. Underground utility maps of the area will be reviewed during the pre-investigation phase of this project, as discussed in Section 4.2.3, to ensure no underground utilities are impacted during investigation activities. The area will also be investigated for previously unidentified underground utilities prior to the commencement of drilling.

5.2 Boring and Sampling Locations

Five borings will be installed in the leach field area. A boring will be installed upgradient of the leach field and two additional borings will be installed downgradient. If there is evidence of the tank leaking, three additional borings will be installed: two in the tank excavation and one downgradient of the tank excavation. The locations of the planned borings are shown in Figure 5.1.

Soil collected from the borings will be observed for saturation or staining so that soil samples can be collected from locations most likely to have been impacted by liquid discharges. If there are no visible indications of potential contamination, the target sampling depths for the borings in the tank excavation are five and 10 ft bgs (if these borings are required). The remaining borings will be sampled at the level of the discharge in the leach field and the total depth of 10 ft in the absence of an indication of contamination.

5.3 Soil Sampling Procedures

All samples collected for this investigation will be handled in a manner that maintains their integrity. The following procedures will be used before, during, and after sample collection:

- The inside of the soil sample container will not be touched, and dedicated chemical resistant gloves will be donned prior to sample collection to prevent contamination.
- All samples will be collected in a manner that will minimize the introduction of foreign material (e.g., dust, rain, and snow).
- Specified holding times, containers, and preservatives will be strictly followed.
- For samples that require temperature preservation, samples will be placed in a cooler with ice immediately following collection.
- Equipment decontamination procedures will be completed before initial use and between individual sample collection locations to prevent contamination and cross-contamination of samples.
- Sampling equipment will be either single-use pre-cleaned (per EPA protocol as with sample containers) or multiple-use decontaminated as indicated in the applicable site-specific internal procedural documentation and plans following American Society for Testing and Materials (ASTM) D 5088-02 “Standard Practice for Decontamination of Field Equipment Used at Waste Sites” guidance (ASTM, 2008[a]).

Soil sampling locations were selected to provide analytical data to determine whether there are COPC(s) present at and downgradient of SWMU 22. At least two subsurface soil samples will be collected from each soil boring. If soil sample recovery is insufficient for the required analyses at any of the proposed sampling depths, drilling will resume and sampling will be attempted again as soon as the alluvium appears uniform enough that soil sample recovery may be possible. If two soil samples cannot be collected, NASA will relocate the boring and attempt to resample. If samples cannot be obtained a second time, the boring will again be relocated and resampled. If sampling fails in the third attempted boring, NASA will notify NMED as early as practicable that conditions have been encountered that do not allow the advancement of borings for sampling at the location(s) and depths specified in this work plan. An appropriate course of action will be determined at that time.

Soil sampling will be performed using split spoon samplers during hollow-stem auger drilling or from continuous core samples during mini-sonic drilling. If hollow-stem auger drilling is used, soil samples will be collected directly from the split spoon. If mini-sonic drilling is selected, core samples will be extruded and recovered into a new or decontaminated sample collection tool from which soil samples will be collected. Following the collection of each sample, the split spoon or core barrel will be decontaminated as described in Section 6.0. Soil samples collected from these borings will be analyzed for the COPC(s) identified in Section 2.2.

After each boring has been drilled to total depth and the required soil samples have been collected, the boreholes will be abandoned. The investigation area will remain secure until analytical data from samples collected from the borings have been received and evaluated. If the analytical data indicate that COPC concentrations are below applicable regulatory levels, the borings will be backfilled with the soil removed during the investigation. If analytical data indicate that COPC concentrations exceed applicable regulatory levels, an alternate abandonment strategy will be determined after consultation with the NMED HWB.

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

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 WSTF Septic Tanks Investigation-Derived Waste Management Plan in Appendix B.

Field quality control samples will be collected to ensure high quality data is generated during the investigation. Field quality control samples will be collected as indicated below.

- Field rinsate (equipment) blanks will be collected from the drill rig sampling tooling, (1) at the onset of the project prior to drilling the first boring, (2) between sampling activities at the leach field and at the septic tank excavation (if required), and (3) if the equipment tooling is required to leave the project site prior to completion of the project.
- Three field duplicate samples will be collected at select sampling locations. Duplicate samples will be analyzed for the same parameters as the primary samples.
- One 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.

5.4.1 Perched Water Sampling

Groundwater is not anticipated at any of the proposed soil boring locations. However, in the event that groundwater is encountered during drilling, a bailer will be lowered into the borehole and groundwater sample collection attempted. If collected, groundwater samples will be analyzed for the COPCs identified in Section 2.2.

5.4.2 Stockpiled Soils Material Sampling

Borehole soils will be stockpiled during excavation of the subsurface soil. These soil materials will be sampled and managed in accordance with the WSTF Septic Tanks Investigation-Derived Waste Management Plan (Appendix B).

5.5 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 WSTF Septic Tanks Investigation Report to NMED, and receipt of concurrence from NMED. The septic tank excavation will be backfilled by adding clean fill obtained from local WSTF borrow pits or regional suppliers. The location will be graded to approximate natural contours. All site grading will be completed to prevent ponding of water in the former tank 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 former septic tank location to prevent storm water runoff impacts.

The location of the Building 114 septic tank will remain on the WSTF facility as-built drawings and be marked with at least one survey monument. Site restoration activities will not include any efforts to reseed the areas. Vegetation will be allowed to return naturally at each site.

6.0 Decontamination

All drilling equipment, including the drilling rig and downhole tools, must be decontaminated prior to commencement of drilling activities at WSTF. All drilling and sampling equipment will be decontaminated after completion of each boring and prior to removal from WSTF. General decontamination guidance available in American Society for Testing and Materials (ASTM) D 5088-02 (ASTM, 2008[a]) will be followed for this project.

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

6.1 Decontamination Area

A decontamination area will be established at the SWMU 22 investigation site. Individual smaller-scale decontamination pads may be constructed adjacent to each soil boring site to collect and contain soil brushed from the downhole sampling equipment. Waste generated during the decontamination process will be managed in accordance with the WSTF Septic Tanks Investigation-Derived Waste Management Plan provided in Appendix B.

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.

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 drilling operations. Every attempt will be made to locate the decontamination area away from dust-producing site operations that could contaminate the equipment. NASA acknowledges that the WSTF Lagoon Investigation and Closure project may ongoing during the investigation of the Building 114 septic tank. The 600 Area Lagoons are located approximately 650 ft to the west of the Building 114 septic tank. Safeguards will be implemented to ensure no cross-contamination occurs between projects caused by blowing dust. This will include implementing appropriate dust control measures during investigation and closure activities at the 600 Area Lagoon and modifying or delaying sampling and decontamination operations during dusty conditions, if necessary.

6.2 Decontamination Methods

Decontamination methods are described below.

6.2.1 Waste Reduction of Solid Materials from Equipment

Drilling during the investigation will be performed using hollow-stem auger or mini-sonic drilling without the application of drilling fluids (dry drilling). Adherence of the soil to the down-hole drilling equipment as well as production of liquid waste will be kept to a minimum with these methods. Soil will be removed from downhole drilling 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 using underlying plastic sheeting or over plastic sheeting to collect any soils.

6.2.2 Decontamination

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. The decontamination area will be constructed on a decontamination pad designed to contain any liquids generated during the decontamination process. 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.

All drilling equipment will be decontaminated prior to beginning the first borehole, in between each subsequent borehole, and at the end of the project before leaving the site. Decontamination activities will be conducted on a pad to contain the decontamination fluids. All downhole drilling tools, sample collection and sample preparation equipment, will be decontaminated in accordance with the following three-step procedure:

1. Wash with nonphosphate detergent (e.g. Fantastik®[1], Alconox, Liqui-Nox®[2]).
2. Wash with pressurized steam cleaning or heated pressure washing equipment.
3. Rinse with WSTF potable water or deionized water.

6.3 Decontamination of Field Screening Instruments

The use of field screening instruments is not anticipated. In the event they are utilized, 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 B. Sampling tools will be wet decontaminated and rinsed with deionized water to ensure cleanliness.

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[1] Fantastik is a registered trademark of S.C. Johnson & Son, Inc.
[2] Liqui-Nox is a registered trademark of Alconox, Inc.

6.4 Decontamination IDW

Decontamination IDW, both liquid and solid, as well as contaminated debris, will be managed in accordance with the WSTF Septic Tanks Investigation-Derived Waste Management Plan presented in Appendix B.

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:

- 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, 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 Laboratory Analysis, Reporting, Data Review

NASA contracts off-site analytical laboratories accredited by an industry-recognized accreditation body. 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 comprehensive statements of work developed by on-site environmental professionals to meet the project objectives. Analytical standard operating procedures (SOPs), laboratory quality manuals, and other laboratory-specific documentation are provided by the analytical laboratory following award of the contract.

The overall objective for laboratory analysis is to produce data of known and sufficient quality. Appropriate procedures and quality control 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 an accredited laboratory in accordance with the laboratory quality assurance plan. The use of an accredited laboratory 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 quality control 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.

9.0 Data Management Tasks

Data management tasks include project documentation and data review and assessment. Details 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 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 and geologist logs.
- 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 Sampling and Analysis

An internal sampling and analysis plan was developed based on the requirements of this work plan. The sampling and analysis plan describes the procedures that will be used to collect and analyze samples during the investigation.

10.1 Sample Collection Procedures

Sampling procedures and equipment will be in accordance with generally accepted EPA guidance (EPA, 1986). Sampling procedures and equipment will be selected in accordance with 40 CFR 261, Appendix I, Test Methods for Evaluating Solid Wastes (US, 2012[b]), Physical/Chemical Methods EPA (SW-846; EPA, 2013), the RCRA Waste Sampling Draft Technical Guidance EPA 530-D-02-002 (EPA, 2002), and the Standard Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities (ASTM 6232, 2008[b]).

All operations will be performed in accordance with WSTF work authorizing documents. WSTF procedures are available upon request. When applicable, sampling operations will be performed per the procedures and requirements outlined in Permit Attachment 12, Waste Analysis Plan (NMED, 2009).

11.0 Health and Safety

The WSTF internal Health and Safety Plan addresses general Environmental Department activities falling within the scope of 29 CFR 1910.120(e) (US, 2012[a]), Hazardous Waste Operations and Emergency Response for RCRA Corrective Actions. A site-specific addendum has been generated for this investigation to address any additional site-specific hazards or requirements.

12.0 Schedule

An approximate timeframe for performing the removal of the septic tank and investigation at SWMU 22 has been developed based on predecessors to the project and other site activities. The anticipated schedule of activities is contingent upon NMED approval of this IWP and associated WSTF Septic Tanks Removal Plan. The major elements of the project schedule are as follows:

- Pre-investigation activities will begin within 30 days following submittal of this work plan. These activities include:
    - Development of Record of Environmental Consideration for project.
    - Septic tank and leach field GPS survey.
    - Underground utility identification.
    - Septic tank replacement for Building 119.
    - Initial waste profile and septage sample collection.
- NASA anticipates beginning removal of non-SWMU septic tanks on or before November 21, 2013, after NMED LWP approval of the WSTF Septic Tanks Removal Plan (Appendix A).
- SWMU septic tank removal is anticipated to begin on or before January 16, 2014, after NMED HWB approval of this IWP and associated WSTF Septic Tanks Removal Plan and the completion of non-SWMU tank removal.
- Investigation of the Building 114 tank is anticipated to begin on or before March 13, 2014, after SWMU tank removal.
- Data evaluation and investigation report development will follow fieldwork, with submittal of the investigation report anticipated by August 15, 2014.

13.0 References

ASTM. *Standard Practice for Decontamination of Field Equipment used at Waste Sites*. American Society for Testing and Materials. ASTM D 5088-02. 2008(a).

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EPA. *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document.* Environmental Protection Agency, Office of Waste Programs Enforcement Solid Waste Emergency Response. September 1986.

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USDA. *Soil Taxonomy, A Basic System of Soil Classification for Making and Interpreting Soil Surveys.* United States Department of Agriculture Natural Resources Conservation Service, Washington DC. 1999.

Figures

Figure 1.1 **WSTF Location Map**

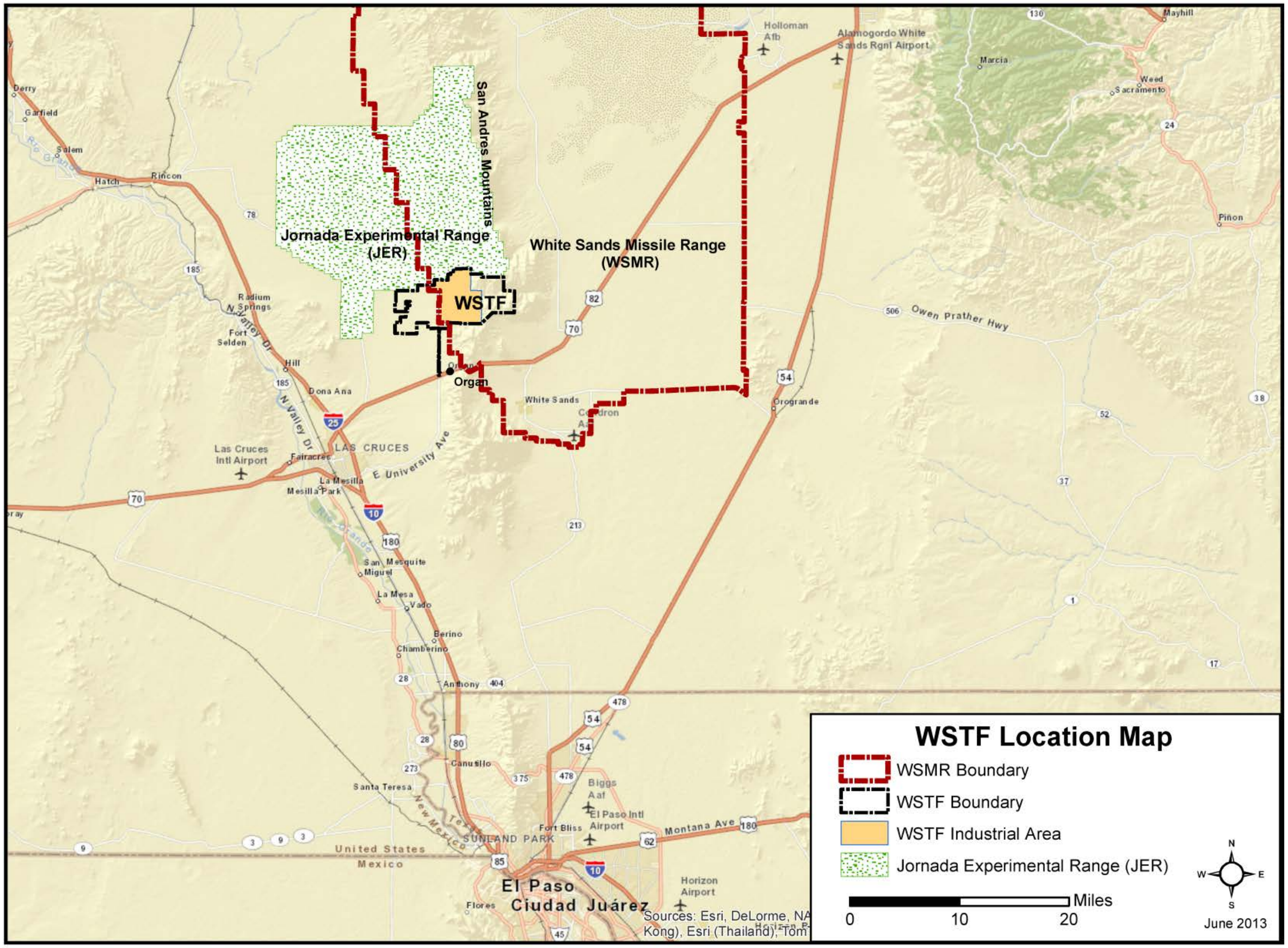
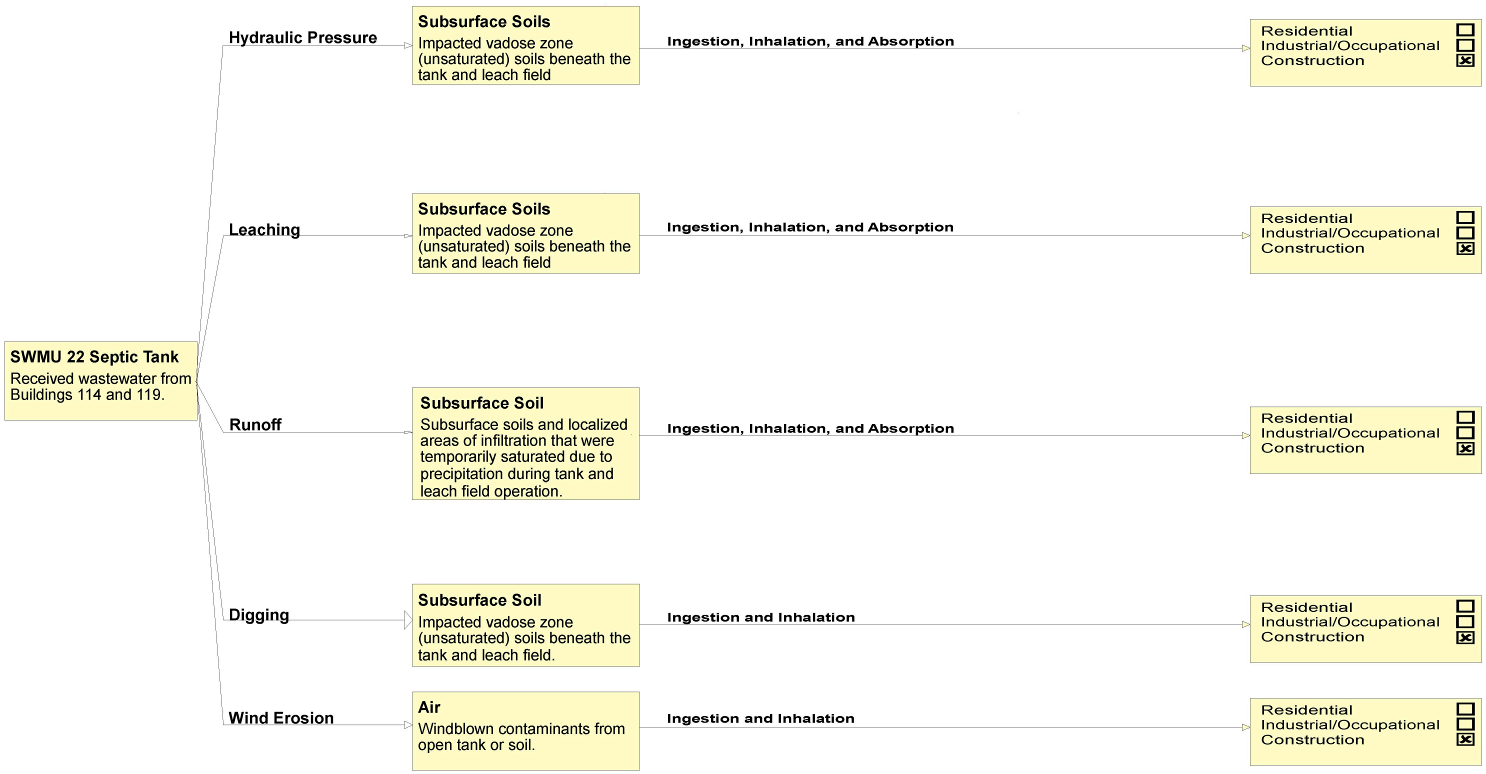


Figure 2.1 Preliminary Site Conceptual Exposure Model



Note:

✖ Indicates a potential complete exposure pathway.

* Construction exposure is limited to removal and investigation activities.

Figure 3.1 **Building 114 Septic Tank**

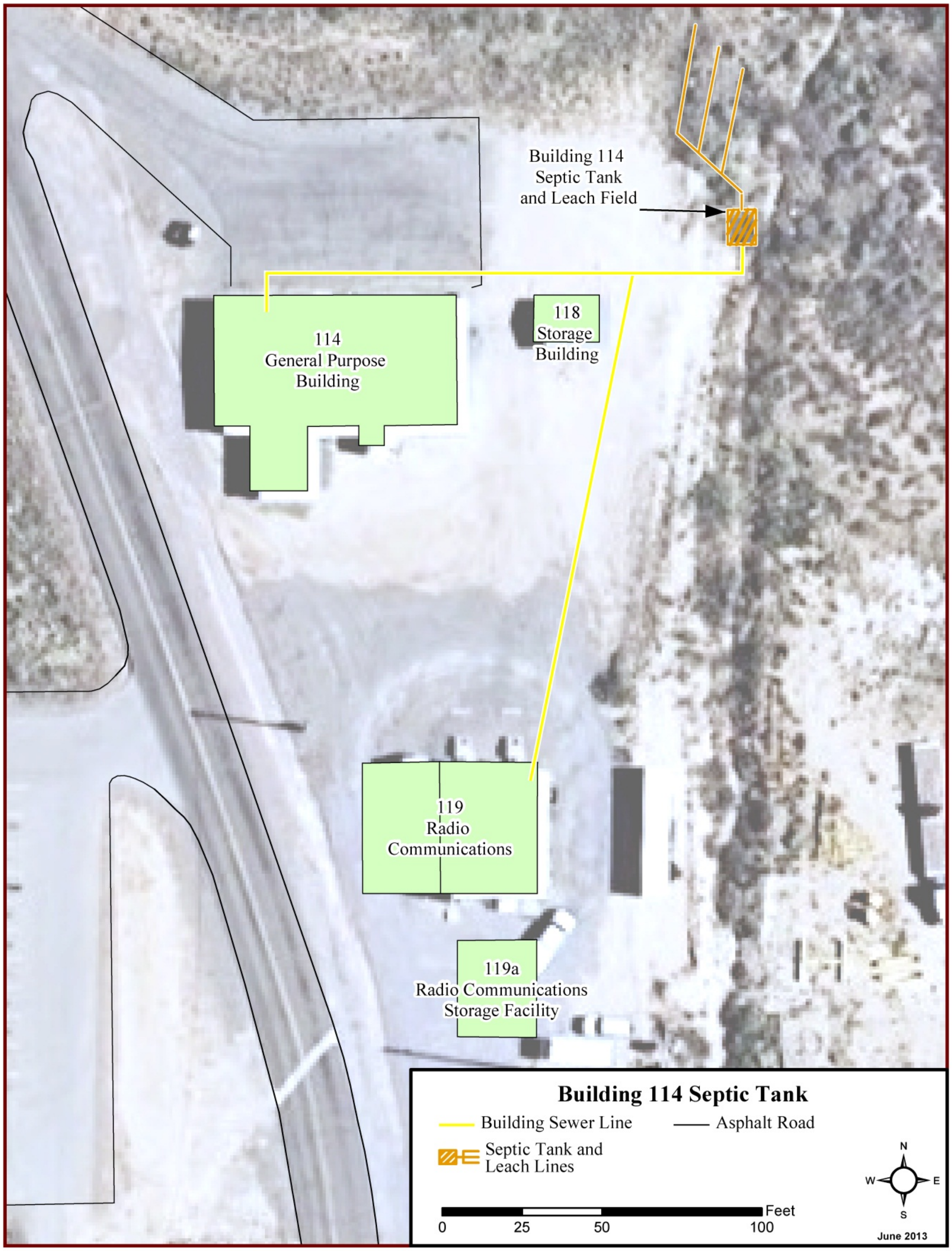
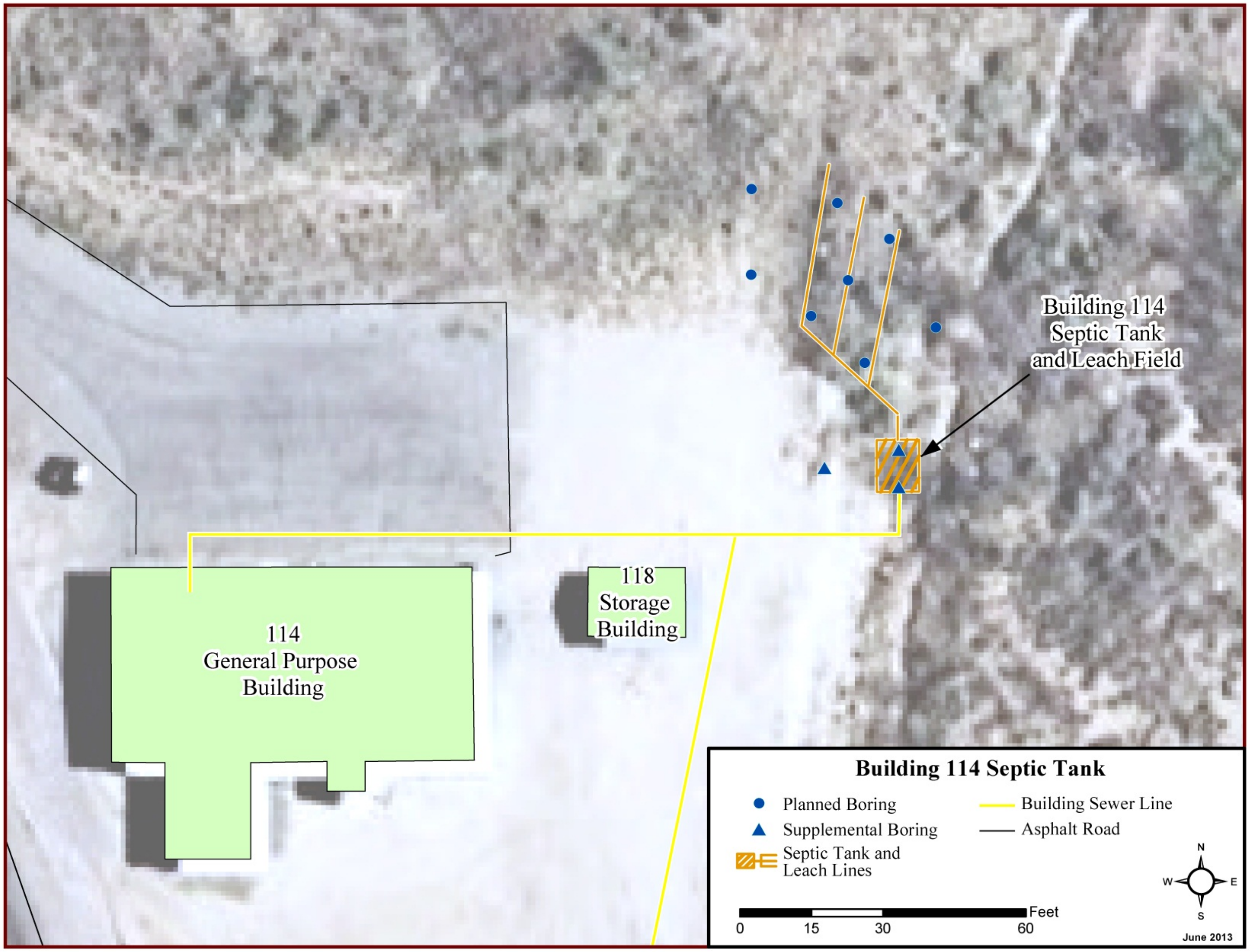


Figure 5.1 **Planned Soil Borings (Building 114)**



Appendix A WSTF Septic Tanks Removal Plan

National Aeronautics and
Space Administration

WSTF Septic Tanks Removal Plan

June 2013

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

WSTF Septic Tanks Removal Plan

June 2013

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.

Radel Bunker-Farrah
Chief, NASA Environmental Office

6-26-13
Date

Table of Contents

List of Acronyms

CLC	City of Las Cruces
CLCWS	City of Las Cruces Wastewater System
EPA	Environmental Protection Agency
Ft.	Feet
GPS	Global Positioning System
GWQB	Ground Water Quality Bureau
HASP	Health and Safety Plan
HIS	Historical Information Summary
HWB	Hazardous Waste Bureau
IWP	Investigation Work Plan
JSC	Johnson Space Center
LWP	Liquid Waste Program
NASA	National Aeronautics and Space Administration
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
RCRA	Resource Conservation and Recovery Act
STGT	Second Tracking and Data Relay Satellite System Ground Terminal
SWMU	Solid Waste Management Unit
UPC	Universal Plumbing Code
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 Dona 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 for nearly 50 years and continues to operate as a field test facility under the jurisdiction of NASA JSC in Houston, Texas. The WSTF U.S. Environmental Protection Agency (EPA) Facility Identification Number is NM8800019434.

NASA has initiated a project to connect WSTF to the City of Las Cruces (CLC) Wastewater System (CLCWS). Once operational, the CLCWS service will allow NASA to discontinue using most septic tanks at WSTF and the adjacent Second Tracking and Data Relay Satellite System Ground Terminal (STGT) facility. This document provides NASA's plan to remove 15 of the 16 septic tanks at WSTF. One septic tank will be retained at the facility's forward guard gate (Building 117) because sanitary sewer service will not be provided to that area. A list of the WSTF septic tanks is provided in Table 1.1. A location map for the septic tanks is provided in Figure 1.2.

This document was prepared and submitted in conjunction with a Historical Information Summary (HIS) that summarizes the operational history of all 16 known septic tanks at WSTF. The WSTF Septic Tanks HIS (NASA, 2013[a]) also supports an Investigation Work Plan (IWP) (NASA, 2013[b]) that was developed for WSTF septic tanks identified as solid waste management units (SWMUs) 21 through 27 in the WSTF Hazardous Waste Permit (Permit) (NMED, 2009). Research during the HIS found evidence of hazardous constituents being discharged to the Building 114 septic tank (SWMU 22). No evidence of hazardous constituents being discharged to the remaining 15 tanks was found. In the WSTF Septic Tanks IWP, NASA proposes an investigation of the soil at the leach field for the Building 114 septic tank and beneath the tank if it is found to have compromised integrity. The remaining WSTF septic tanks will be removed without investigation.

This removal plan is submitted in conjunction with the WSTF Septic Tanks HIS and IWP to the New Mexico Environmental Department (NMED) for concurrence and approval from both the Liquid Waste Program (LWP) and Hazardous Waste Bureau (HWB). The removal process is subject to regulation under both the LWP for all tanks and the HWB for tanks identified as SWMUs in the Permit. A courtesy copy has also been provided to the NMED Ground Water Quality Bureau (GWQB) because of that bureau's past involvement in the WSTF septic tank program. Removal activities at non-SWMU septic tanks will begin after NASA receives notification from the LWP that this removal plan is acceptable. Removal of SWMU septic tanks will occur after NASA receives LWP and HWP approval of this plan and HWB approval of the WSTF Septic Tanks IWP.

1.1 Objectives and Scope

The objective of this document is to describe the activities necessary to remove 15 septic tanks at WSTF. An on-site liquid waste system abandonment form for each septic tank is provided in Attachment A.

1.2 Approach and Implementation

The removal of septic tanks will be conducted in two phases. Removal of the seven septic tanks not classified as SWMUs in the Permit will be conducted during the first phase, after LWP approval of this plan. Removal of the eight SWMU septic tanks will be conducted during the second phase of the project after NASA receives HWB approval of the WSTF Septic Tanks IWP and this plan.

1.3 Regulatory Overview

The proposed removal activities are regulated by the NMED LWP for all septic tanks and NMED HWB for the SWMU tanks. Applicable regulatory requirements are summarized below.

1.3.1 NMED Liquid Waste Program

Nine of the fifteen tanks that will be removed are permitted through the LWP. The remaining six tanks were installed during site construction prior to the promulgation of LWP regulation requiring permits for septic tanks. Table 1.2 provides a list of the WSTF septic tanks that are permitted through the LWP.

The abandonment of septic tanks is regulated by the LWP, as described in New Mexico Administrative Code (NMAC) 20.7.3.307. Regulation requires that the remaining waste in the tank be pumped by a qualified septage pumper prior to tank abandonment. Once the septage is removed, regulation states that the septic tank may be abandoned in-place by rupturing or collapsing the tank to prevent it from retaining water. In lieu of abandoning the tanks in-place, NASA is proposing to remove the tanks. The leach lines associated with each tank will be abandoned in-place. An LWP inspection is usually required when a septic tank is abandoned in-place. NASA will notify the LWP via telephone that the tanks have been removed and that the excavation sites are available for inspection, if required.

1.3.2 NMED Hazardous Waste Bureau

Seven septic tanks identified as SWMUs 21 through 27 in the Permit fall under the jurisdiction of the HWB through 40 CFR 264, Subpart F (US, 2012[a]) and the WSTF Hazardous Waste Permit (NMED, 2009). NASA is proposing a RCRA investigation at the Building 114 septic tank (SWMU 22) where hazardous constituents may have been discharged (NASA, 2013[a]). This investigation is described in the WSTF Septic Tanks IWP and will begin after the SWMU septic tanks are removed. No investigation is proposed in the IWP for SWMUs 21 and 23 – 27 because no evidence of hazardous constituents being discharged to these tanks was found during HIS research.

2.0 Scope of Activities

Fifteen septic tanks will be removed and their associated leach fields abandoned in-place during this project. NASA anticipates the use of an offsite contractor to pump, remove, and dispose of the tanks.

2.1 Pre-Removal Activities

Pre-removal activities will be conducted in conjunction with the pre-investigation activities identified in the WSTF Septic Tanks IWP. Pre-removal activities will include a GPS site survey of each tank location. The GPS survey will be used to confirm and supplement historical engineering and construction documentation associated with the WSTF septic tanks.

Identification of all underground and overhead utilities will be performed. An initial waste profile for the disposal of the tanks will also be performed. NASA anticipates that the tanks will be disposed as a solid waste. Data collected during the pre-removal activities will be used to finalize tank removal activities and waste profile and characterization for the tanks. This material will also provide additional information necessary to design adequate stormwater controls, estimate the required backfill volume for the septic tank excavations, and design final grading elevations/contours for the site restoration phase of the project.

2.2 Stormwater Control Activities

Stormwater will be managed in accordance with the WSTF Stormwater Pollution Prevention Plan (NASA, 2010). Stormwater controls will be installed around the tank excavation sites to divert surface water away from the work areas. This may include site grading and the installation of best management measures to prevent runoff/run-on during septic tank removal and investigation activities.

2.3 Removal Activities

WSTF septic tank removal activities will be conducted in accordance with applicable LWP regulations (NMAC 20.7.3).

2.3.1 Septage Removal

The remaining waste in the septic tanks will be pumped and disposed of by a qualified septage pumper prior to tank removal, as required by LWP regulations (State of NM, 2012). The septage from the Building 114 septic tank will be characterized prior to it being pumped and disposed of. Characterization will be accomplished through the analysis of composite samples collected from the tank during pre-investigation activities at SWMU 22, as described in the WSTF Septic Tanks IWP. NASA anticipates that the septage in the Building 114 septic tank will be non-hazardous. Should the characterization sample indicate the presence of hazardous constituents, the septage will be evaluated for disposal as a RCRA hazardous waste in accordance with appropriate state and federal regulations. As necessary and after consultation with the contractor septage pumper, NASA may rinse the septic tanks to facilitate further removal of any residual septage in the tanks. The rinsate from this process will be disposed of in the same manner as the septage.

2.3.2 Septic Tank Removal

Removal of the septic tanks will be conducted in two phases by a qualified septic tank contractor.

2.3.2.1 Phase I Removal – Non-SWMU Septic Tanks

The seven septic tanks not identified as SWMUs in the Permit will be removed and disposed of during the first phase of the project. These include a septic tank in the 250 Area; Tank C at Building 272; septic tanks at Buildings 447, 650, and 802/803; STGT; and the tank in the area of removed Building T463. The tanks will be excavated and the associated plumbing and leach field will be disconnected and capped in accordance with applicable sections of the Uniform Plumbing Code (UPC). The tanks will be removed intact, if possible; however, conditions may dictate that the tank be cut or crushed to facilitate removal. Following removal, the tanks will be disposed of as a solid waste.

2.3.2.2 Phase II Removal – SWMU Septic Tanks

The eight septic tanks identified as a SWMU will be removed during the second phase of the project. These include tanks at Building 116 (WSTF Guard Gate), Building 114, Building 272 (Tanks A and B), 300 Area Main Parking Lot, Building 320, Building 364, and the 400 Area Main Parking Lot. Except for the septic tank at Building 114 (SWMU 22), the tanks will be removed and disposed of in the same manner of the non-SWMU tanks. WSTF Septic Tanks HIS research found no evidence that hazardous constituents were discharged to any of these tanks. The 300 Area and 400 Area main septic tanks will not be removed intact because of their large size. The 300 Area main tank has a 5,800 gallon capacity and the 400 Area main tank has a 6,200 gallon capacity. The tanks are partially exposed and will require minimal dirt work during excavation. Once removed, the 300 and 400 Area tanks will be dismantled, and disposed of as a solid waste.

Hazardous constituents were discharged to the Building 114 (SWMU 22) septic tank in small quantities [NASA, 2013(a)]. Waste streams discharged to this tank contained silver and cyanide compounds. Results from pre-investigation sampling of the septage in the tank will be used to classify the tank for disposal. NASA anticipates that the characterization sample will show that no hazardous constituents are present in the tank and that the tank can be removed and disposed of in the same manner described for the previous tanks. The tank will be removed and evaluated for disposal as a RCRA Hazardous Waste if hazardous constituents are detected in the characterization sample.

2.3.3 Septic Tank Permit Cancelation

NASA will request cancellation of the applicable LWP permits associated with the tanks that were removed in writing within 60 days after the completion of each phase of the removal project.

2.3.4 Final Site Restoration

Except for the Building 114 septic tank (SWMU 22), final site restoration and grading activities will commence after the removal activities are complete for each phase. The septic tank excavations will be backfilled by adding clean fill obtained from local WSTF borrow pits or regional suppliers. The location for each tank will be graded to approximate natural contours. All site grading will be completed to prevent ponding of water in the former tank 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 stormwater away from the former septic tank location to prevent impacts due to runoff.

At the Building 114 septic tank (SWMU 22), final site restoration and grading activities will commence after the completion of investigation field activities, receipt of the final analytical results, submittal of the WSTF Septic Tanks Investigation Report to NMED, and approval of the Investigation Report by the NMED HWB.

3.0 Health and Safety

The WSTF internal Health and Safety Plan (HASP) addresses general WSTF Environmental Department activities falling within the scope of 29 CFR 1910.120(e) (US, 2012[b]), Hazardous Waste Operations and Emergency Response for RCRA Corrective Actions. Removal of the SWMU tanks falls under this scope. An addendum to the general HASP has been developed for this project to address any additional project-specific hazards or requirements.

4.0 Schedule

LWP regulations require that septic tanks be abandoned within 30 days of connecting to a public sewer system (NMAC 20.7.3.307[d]). NASA anticipates that the sanitary sewer will be operational by July 31, 2013, but NASA does not anticipate being able to remove all tanks within 30 days after connection to the CLCWS. This is due to the number of tanks that will be removed and the fact that eight of the fifteen tanks are SWMUs that also require NMED HWB concurrence of this plan and approval of the WSTF Septic Tanks IWP prior to removal. Given these limitations, NASA proposes the following schedule for the removal of the septic tanks:

- NASA anticipates beginning removal of non-SWMU septic tanks on or before November 21, 2013, after NMED LWP approval of this plan
- SWMU septic tank removal is anticipated to begin on or before January 16, 2014, after NMED HWB approval of the WSTF Septic Tanks IWP and this plan and the completion of non-SWMU septic tank removal activities.

5.0 References

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Figures

Figure 1.1 **WSTF Location Map**

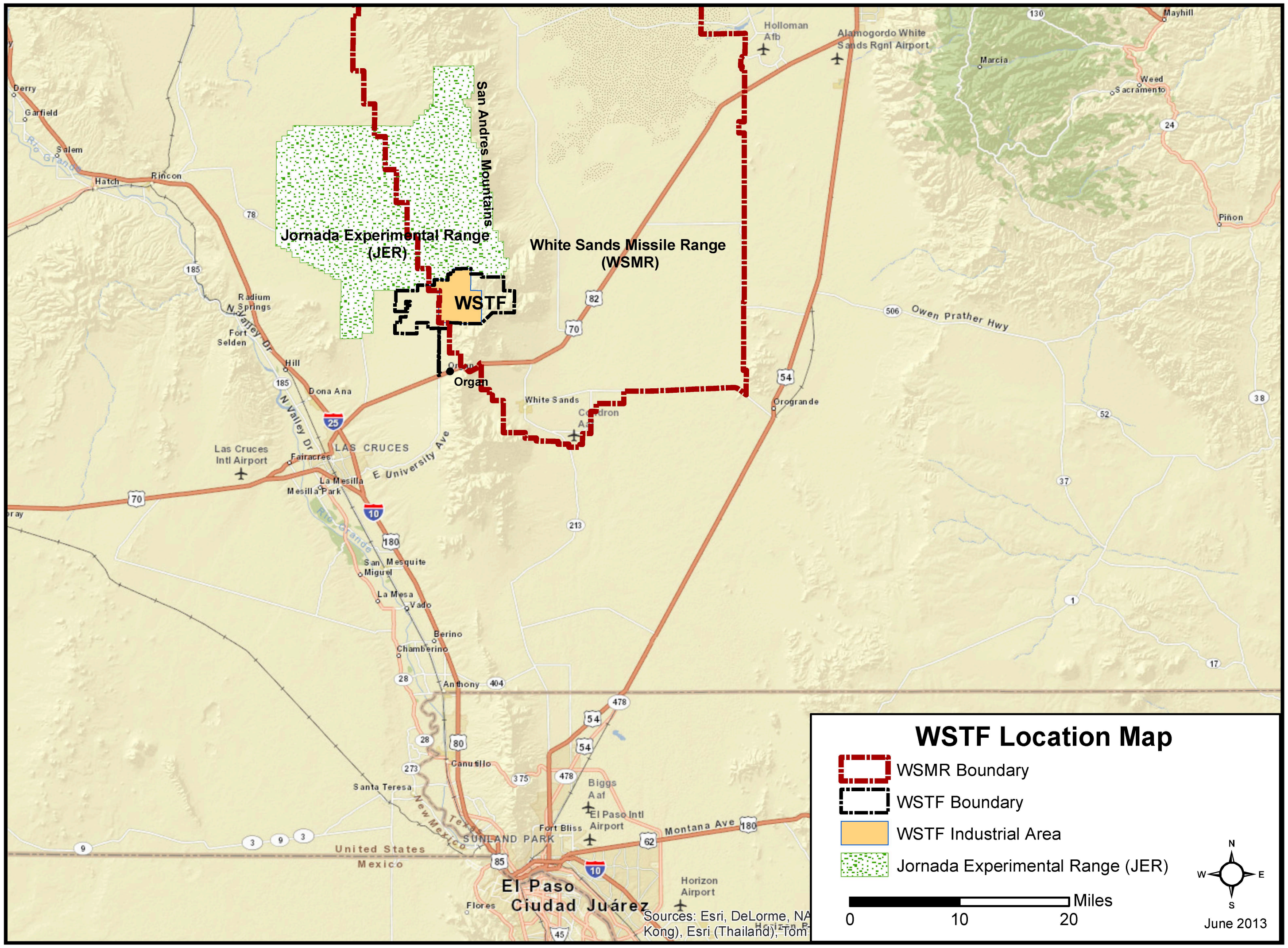
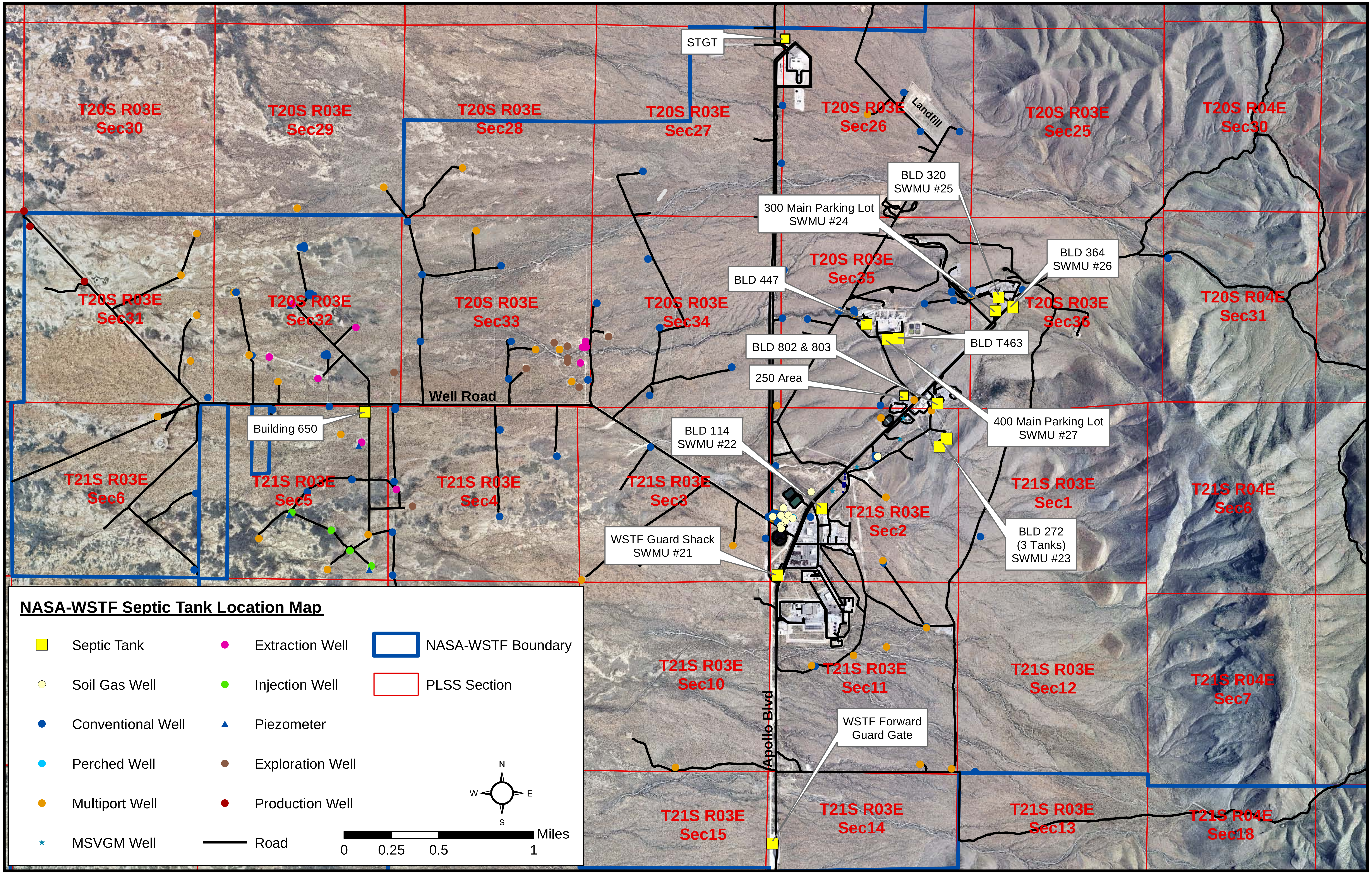


Figure 1.2 **Septic Tank Locations at WSTF**

(SEE NEXT PAGE)


NASA-WSTF Septic Tank Location Map
Septic Tank
Soil Gas Well
Conventional Well
Perched Well
Multiport Well
MSVGM Well
Extraction Well
Injection Well
Piezometer
Exploration Well
Production Well
Road
NASA-WSTF Boundary
PLSS Section
N
W
E
S
0
0.25
0.5
1
Miles
STGT
Landfill
BLD 320 SWMU #25
300 Main Parking Lot SWMU #24
BLD 364 SWMU #26
BLD 447
BLD T463
BLD 802 & 803
250 Area
400 Main Parking Lot SWMU #27
BLD 114 SWMU #22
Building 650
WSTF Guard Shack SWMU #21
BLD 272 (3 Tanks) SWMU #23
WSTF Forward Guard Gate
Well Road
Apollo Blvd
T20S R03E Sec30
T20S R03E Sec29
T20S R03E Sec28
T20S R03E Sec27
T20S R03E Sec26
T20S R03E Sec25
T20S R04E Sec30
T20S R03E Sec31
T20S R03E Sec32
T20S R03E Sec33
T20S R03E Sec34
T20S R03E Sec35
T20S R03E Sec36
T20S R04E Sec31
T21S R03E Sec6
T21S R03E Sec5
T21S R03E Sec4
T21S R03E Sec3
T21S R03E Sec2
T21S R03E Sec1
T21S R04E Sec6
T21S R03E Sec10
T21S R03E Sec11
T21S R03E Sec12
T21S R04E Sec7
T21S R03E Sec15
T21S R03E Sec14
T21S R03E Sec13
T21S R04E Sec18

Tables

Table 1.1 WSTF Septic Tanks

Septic Tank Location	SWMU Number	Capacity (Gallons)	Additional Information
Building 116 (Main Guard Gate)	21	500	
Building 114	22	1,200	
Building 272	23	1,200	Two Tanks (A&B). Each has 1,200 gallon capacity.
300 Area Main Parking Lot	24	5,800	
Building 320	25	1,200	
Building 364	26	1,200	
400 Area South Main Parking Lot	27	6,200	
250 Area	N/A	Approx. 2,600	Identified as an area of interest in the WSTF 200 Area Closure Work Plan (NASA, 2012)
Building 272	N/A	900	Tank C
Building T463	N/A	1,200	Septic tank was installed for a temporary building that was removed.
Building 447	N/A	750	
Buildings 802/803	N/A	1,500	
Building 650	N/A	1,200	
STGT	N/A	1,200	
Building 117 (Forward Guard Gate)	N/A	900	Tank will be retained for use.

Table 1.2 WSTF Septic Tanks with NMED LWP Permits

Septic Tank Location	LWP Permit Number
Building 272 (Tanks A & B)	LC 910939
Building 320	LC 930858
Building 364	LC 910918
Building T463	LC 920527
Building 447	LC 900333
Buildings 802/803	LC 870401
Building 650	DA 010359
STGT	LC 890939

Attachment A
WSTF Septic Tanks On-Site Liquid Waste System Abandonment Forms

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
ON-SITE LIQUID WASTE SYSTEM ABANDONMENT

NMED Permit No.: LC 9190939

System Owner's Name: NASA Johnson Space Center White Sands Test Facility

Address: Environmental Department
12600 NASA Road Las Cruces, New Mexico 88012

BUILDING SEWER:

✓ Connected to Sewer Lines or Plugged/Capped based on UPC Requirements

ON-SITE LIQUID WASTE SYSTEM TYPE:

- [x] Septic Tank
- [ ] Seepage Pit
- [ ] Sec./Tert. Treatment Unit
- [ ] Other:
- [ ] Holding Tank
- [ ] Cesspool

ABANDONMENT PROCEDURE:

✓ System Pumped
N/A Bottom of System Opened or Ruptured or Unit Collapsed
N/A System filled with Earth, Sand, Gravel, Concrete, or Other Approved Material
N/A Top Cover Removed or Collapsed
N/A System Filled to the Top of Sidewalls or above the Level of any Outlet Pipe
N/A System Filled Level with Top of Ground Surface

COMMENTS/VIOLATIONS:

Two septic tanks (A and B) at Building 272 exist under this permit. The septic tanks will be removed in accordance with the WSTF Septic Tanks Removal Plan.

ABANDONMENT PERFORMED BY:

Company Name: Not yet contracted.

Address:

NMED ACTION TAKEN:

- [ ] Abandonment **Approved**
- [ ] Abandonment **Approved w/conditions** (See Comments/Violations)
- [ ] Abandonment **Not Approved** (See Comments/Violations)

FINAL APPROVAL:

- [ ] Granted
- [ ] Not Granted

NMED Inspector Date

OK - If Abandoned and meets Requirements	N/C - Not Compliant
N/I - Not Inspected	N/V - Not Verified
N/A - Not Applicable	

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
ON-SITE LIQUID WASTE SYSTEM ABANDONMENT

NMED Permit No.: LC 930858

System Owner's Name: NASA Johnson Space Center White Sands Test Facility

Address: Environmental Department
12600 NASA Road Las Cruces, New Mexico 88012

BUILDING SEWER:

✓ Connected to Sewer Lines or Plugged/Capped based on UPC Requirements

ON-SITE LIQUID WASTE SYSTEM TYPE:

- [X] Septic Tank
- [ ] Sec./Tert. Treatment Unit
- [ ] Holding Tank
- [ ] Seepage Pit
- [ ] Other:
- [ ] Cesspool

ABANDONMENT PROCEDURE:

✓ System Pumped
N/A Bottom of System Opened or Ruptured or Unit Collapsed
N/A System filled with Earth, Sand, Gravel, Concrete, or Other Approved Material
N/A Top Cover Removed or Collapsed
N/A System Filled to the Top of Sidewalls or above the Level of any Outlet Pipe
N/A System Filled Level with Top of Ground Surface

COMMENTS/VIOLATIONS:

Septic tank is located at Building 320. The septic tank will be removed in accordance with the WSTF Septic Tanks Removal Plan.

ABANDONMENT PERFORMED BY:

Company Name: Not yet contracted.

Address:

NMED ACTION TAKEN:

- [ ] Abandonment **Approved**
- [ ] Abandonment **Approved w/conditions** (See Comments/Violations)
- [ ] Abandonment **Not Approved** (See Comments/Violations)

FINAL APPROVAL:

- [ ] Granted
- [ ] Not Granted

NMED Inspector Date

OK - If Abandoned and meets Requirements	N/C - Not Compliant
N/I - Not Inspected	N/V - Not Verified
N/A - Not Applicable	

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
ON-SITE LIQUID WASTE SYSTEM ABANDONMENT

NMED Permit No.: LC 910918

System Owner's Name: NASA Johnson Space Center White Sands Test Facility

Address: Environmental Department
12600 NASA Road Las Cruces, New Mexico 88012

BUILDING SEWER:

✓ Connected to Sewer Lines or Plugged/Capped based on UPC Requirements

ON-SITE LIQUID WASTE SYSTEM TYPE:

- [x] Septic Tank
- [ ] Seepage Pit
- [ ] Sec./Tert. Treatment Unit
- [ ] Other:
- [ ] Holding Tank
- [ ] Cesspool

ABANDONMENT PROCEDURE:

✓ System Pumped
N/A Bottom of System Opened or Ruptured or Unit Collapsed
N/A System filled with Earth, Sand, Gravel, Concrete, or Other Approved Material
N/A Top Cover Removed or Collapsed
N/A System Filled to the Top of Sidewalls or above the Level of any Outlet Pipe
N/A System Filled Level with Top of Ground Surface

COMMENTS/VIOLATIONS:

Septic tank is located at Building 364. The septic tank will be removed in accordance with the WSTF Septic Tanks Removal Plan.

ABANDONMENT PERFORMED BY:

Company Name: Not yet contracted.

Address:

NMED ACTION TAKEN:

- [ ] Abandonment **Approved**
- [ ] Abandonment **Approved w/conditions** (See Comments/Violations)
- [ ] Abandonment **Not Approved** (See Comments/Violations)

FINAL APPROVAL:

- [ ] Granted
- [ ] Not Granted

NMED Inspector Date

OK - If Abandoned and meets Requirements	N/C - Not Compliant
N/I - Not Inspected	N/V - Not Verified
N/A - Not Applicable	

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
ON-SITE LIQUID WASTE SYSTEM ABANDONMENT

NMED Permit No.: LC 920527

System Owner's Name: NASA Johnson Space Center White Sands Test Facility

Address: Environmental Department
12600 NASA Road Las Cruces, New Mexico 88012

BUILDING SEWER:

✓ Connected to Sewer Lines or Plugged/Capped based on UPC Requirements

ON-SITE LIQUID WASTE SYSTEM TYPE:

☒ Septic Tank ☐ Sec./Tert. Treatment Unit ☐ Holding Tank
☐ Seepage Pit ☐ Other: ☐ Cesspool

ABANDONMENT PROCEDURE:

✓ System Pumped
N/A Bottom of System Opened or Ruptured or Unit Collapsed
N/A System filled with Earth, Sand, Gravel, Concrete, or Other Approved Material
N/A Top Cover Removed or Collapsed
N/A System Filled to the Top of Sidewalls or above the Level of any Outlet Pipe
N/A System Filled Level with Top of Ground Surface

COMMENTS/VIOLATIONS:

Septic tank is located at the former location of Building T463. The septic tank will be removed in accordance with the WSTF Septic Tanks Removal Plan.

ABANDONMENT PERFORMED BY:

Company Name: Not yet contracted.

Address:

NMED ACTION TAKEN:

☐ Abandonment **Approved**
☐ Abandonment **Approved w/conditions** (See Comments/Violations)
☐ Abandonment **Not Approved** (See Comments/Violations)

FINAL APPROVAL:

☐ Granted ☐ Not Granted

NMED Inspector Date

OK - If Abandoned and meets Requirements	N/C - Not Compliant
N/I - Not Inspected	N/V - Not Verified
N/A - Not Applicable	

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
ON-SITE LIQUID WASTE SYSTEM ABANDONMENT

NMED Permit No.: LC 900333

System Owner's Name: NASA Johnson Space Center White Sands Test Facility

Address: Environmental Department
12600 NASA Road Las Cruces, New Mexico 88012

BUILDING SEWER:

✓ Connected to Sewer Lines or Plugged/Capped based on UPC Requirements

ON-SITE LIQUID WASTE SYSTEM TYPE:

- [X] Septic Tank
- [ ] Sec./Tert. Treatment Unit
- [ ] Holding Tank
- [ ] Seepage Pit
- [ ] Other:
- [ ] Cesspool

ABANDONMENT PROCEDURE:

✓ System Pumped
N/A Bottom of System Opened or Ruptured or Unit Collapsed
N/A System filled with Earth, Sand, Gravel, Concrete, or Other Approved Material
N/A Top Cover Removed or Collapsed
N/A System Filled to the Top of Sidewalls or above the Level of any Outlet Pipe
N/A System Filled Level with Top of Ground Surface

COMMENTS/VIOLATIONS:

Septic tank is located at Building 447. The septic tank will be removed in accordance with the WSTF Septic Tanks Removal Plan.

ABANDONMENT PERFORMED BY:

Company Name: Not yet contracted.

Address:

NMED ACTION TAKEN:

- [ ] Abandonment **Approved**
- [ ] Abandonment **Approved w/conditions** (See Comments/Violations)
- [ ] Abandonment **Not Approved** (See Comments/Violations)

FINAL APPROVAL:

- [ ] Granted
- [ ] Not Granted

NMED Inspector Date

OK - If Abandoned and meets Requirements	N/C - Not Compliant
N/I - Not Inspected	N/V - Not Verified
N/A - Not Applicable	

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
ON-SITE LIQUID WASTE SYSTEM ABANDONMENT

NMED Permit No.: DA 010359

System Owner's Name: NASA Johnson Space Center White Sands Test Facility

Address: Environmental Department
12600 NASA Road Las Cruces, New Mexico 88012

BUILDING SEWER:

✓ Connected to Sewer Lines or Plugged/Capped based on UPC Requirements

ON-SITE LIQUID WASTE SYSTEM TYPE:

- [X] Septic Tank
- [ ] Seepage Pit
- [ ] Sec./Tert. Treatment Unit
- [ ] Other:
- [ ] Holding Tank
- [ ] Cesspool

ABANDONMENT PROCEDURE:

✓ System Pumped
N/A Bottom of System Opened or Ruptured or Unit Collapsed
N/A System filled with Earth, Sand, Gravel, Concrete, or Other Approved Material
N/A Top Cover Removed or Collapsed
N/A System Filled to the Top of Sidewalls or above the Level of any Outlet Pipe
N/A System Filled Level with Top of Ground Surface

COMMENTS/VIOLATIONS:

Septic tank is located at Building 650. The septic tank will be removed in accordance with the WSTF Septic Tanks Removal Plan.

ABANDONMENT PERFORMED BY:

Company Name: Not yet contracted.

Address:

NMED ACTION TAKEN:

- [ ] Abandonment **Approved**
- [ ] Abandonment **Approved w/conditions** (See Comments/Violations)
- [ ] Abandonment **Not Approved** (See Comments/Violations)

FINAL APPROVAL:

- [ ] Granted
- [ ] Not Granted

NMED Inspector Date

OK - If Abandoned and meets Requirements	N/C - Not Compliant
N/I - Not Inspected	N/V - Not Verified
N/A - Not Applicable	

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
ON-SITE LIQUID WASTE SYSTEM ABANDONMENT

NMED Permit No.: LC 870401

System Owner's Name: NASA Johnson Space Center White Sands Test Facility

Address: Environmental Department
12600 NASA Road Las Cruces, New Mexico 88012

BUILDING SEWER:

✓ Connected to Sewer Lines or Plugged/Capped based on UPC Requirements

ON-SITE LIQUID WASTE SYSTEM TYPE:

☒ Septic Tank ☐ Sec./Tert. Treatment Unit ☐ Holding Tank
☐ Seepage Pit ☐ Other: ☐ Cesspool

ABANDONMENT PROCEDURE:

✓ System Pumped
N/A Bottom of System Opened or Ruptured or Unit Collapsed
N/A System filled with Earth, Sand, Gravel, Concrete, or Other Approved Material
N/A Top Cover Removed or Collapsed
N/A System Filled to the Top of Sidewalls or above the Level of any Outlet Pipe
N/A System Filled Level with Top of Ground Surface

COMMENTS/VIOLATIONS:

Septic tank is located at Buildings 802/803. The septic tank will be removed in accordance with the WSTF Septic Tanks Removal Plan.

ABANDONMENT PERFORMED BY:

Company Name: Not yet contracted.

Address:

NMED ACTION TAKEN:

☐ Abandonment **Approved**
☐ Abandonment **Approved w/conditions** (See Comments/Violations)
☐ Abandonment **Not Approved** (See Comments/Violations)

FINAL APPROVAL:

☐ Granted ☐ Not Granted

NMED Inspector Date

OK - If Abandoned and meets Requirements	N/C - Not Compliant
N/I - Not Inspected	N/V - Not Verified
N/A - Not Applicable	

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
ON-SITE LIQUID WASTE SYSTEM ABANDONMENT

NMED Permit No.: LC 890939

System Owner's Name: NASA Johnson Space Center White Sands Test Facility

Address: Environmental Department
12600 NASA Road Las Cruces, New Mexico 88012

BUILDING SEWER:

✓ Connected to Sewer Lines or Plugged/Capped based on UPC Requirements

ON-SITE LIQUID WASTE SYSTEM TYPE:

- [X] Septic Tank
- [ ] Seepage Pit
- [ ] Sec./Tert. Treatment Unit
- [ ] Other:
- [ ] Holding Tank
- [ ] Cesspool

ABANDONMENT PROCEDURE:

✓ System Pumped
N/A Bottom of System Opened or Ruptured or Unit Collapsed
N/A System filled with Earth, Sand, Gravel, Concrete, or Other Approved Material
N/A Top Cover Removed or Collapsed
N/A System Filled to the Top of Sidewalls or above the Level of any Outlet Pipe
N/A System Filled Level with Top of Ground Surface

COMMENTS/VIOLATIONS:

Septic tank is located at the Second Tracking and Data Relay Satellite System. The septic tank will be removed in accordance with the WSTF Septic Tanks Removal Plan.

ABANDONMENT PERFORMED BY:

Company Name: Not yet contracted.

Address:

NMED ACTION TAKEN:

- [ ] Abandonment **Approved**
- [ ] Abandonment **Approved w/conditions** (See Comments/Violations)
- [ ] Abandonment **Not Approved** (See Comments/Violations)

FINAL APPROVAL:

- [ ] Granted
- [ ] Not Granted

NMED Inspector Date

OK - If Abandoned and meets Requirements	N/C - Not Compliant
N/I - Not Inspected	N/V - Not Verified
N/A - Not Applicable	

Appendix B
WSTF Septic Tanks Investigation-Derived Waste Management Plan

National Aeronautics and
Space Administration

WSTF Septic Tanks Investigation-Derived Waste Management Plan

June 2013

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

Table of Contents

List of Acronyms

CFR	Code of Federal Regulations
COPC	Contaminate of Potential Concern
DOT	Department of Transportation
EPA	Environmental Protection Agency
HIS	Historical Information Summary
IDW	Investigation-derived waste
NASA	National Aeronautics and Space Administration
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
PPE	Personal protective equipment
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
SWMU	Solid Waste Management Unit
WSTF	White Sands Test Facility

1.0 Waste/Activity Description

The National Aeronautics and Space Administration (NASA) intends to remove and investigate the septic tank currently serving White Sands Test Facility (WSTF) Buildings 114 and 119. The tank is identified as solid waste management unit (SWMU) number 22 in the WSTF Hazardous Waste Permit (NMED, 2009). The Historical Information Summary (HIS) associated with this investigation (NASA, 2013[a]) determined that limited amounts of silver and possibly cyanide bearing waste streams were discharged to the septic tank associated with SWMU 22 prior to 1985. No evidence of discharge of listed hazardous wastes to SWMU 22 or any other WSTF septic tank was found during the HIS research process. This Investigation-Derived Waste (IDW) Management Plan addresses the IDW that will be generated from removal and investigation activities at SWMU 22.

Based on the information obtained from the WSTF Septic Tanks HIS, NASA does not anticipate that hazardous constituents have accumulated in the tank at concentrations that would exceed the 40 CFR Part 261.24 regulatory limits. The septage currently in the tank will be sampled to confirm that the waste does not exhibit characteristics of a hazardous waste, as described in 40 CFR Part 261.24. After receipt of favorable results from the confirmation septage sample, the tank will be pumped and properly disposed of by a qualified subcontractor septage pumper. The septic tank will be removed and disposed of in accordance with New Mexico solid waste rules (20.9.2-20.9.10 NMAC). The soil adjacent to the tank and in the leach field will be investigated for hazardous constituents, as described in the WSTF Septic Tanks Investigation Work Plan (IWP); (NASA, 2013[b]).

2.0 IDW Definitions

Environmental media is considered to meet the definition of a Resource Conservation and Recovery Act (RCRA) solid waste at the time that it becomes actively managed. The term “Active Management” is defined by the Environmental Protection Agency (EPA) as “physically disturbing the accumulated wastes within a management unit…” (EPA, 2005). Materials removed from SWMU 22 or areas adjacent to the septic tank and leach field that have come in contact with potentially hazardous constituents are subject to waste management requirements included in the New Mexico Solid Waste Rules (20.9.2 - 20.9.20 New Mexico Administrative Code [NMAC]) and where applicable with the New Mexico Hazardous Waste Regulations 20.4.1 NMAC, which incorporate the Code of Federal Regulations (CFR) 40 CFR Parts 260-268 (State of NM, 2012; US, 2012).

The determination that any given volume of contaminated media does not contain or no longer contains hazardous waste is called a “contained-in determination.” In the case of media that exhibit a characteristic of hazardous waste, the media are considered to contain hazardous waste as long as they exhibit a characteristic. Once the characteristic is eliminated, the media are no longer considered to contain hazardous waste. “Since this determination can be made through relatively straightforward analytical testing, no formal ‘contained-in’ determination by EPA or an authorized state is required” (EPA, 2013). Any other materials such as personal protective equipment (PPE) or sampling equipment when discarded as solid waste are also subject to these same rules and regulations. Samples of media that are destined for analysis or other testing are exempt from 40 CFR Parts 262-268 per 261.4(d) (US, 2012).

Various types of IDW are expected to be generated during and tank removal and investigation soil sampling. For the purpose of this IDW Management Plan, the types of IDW anticipated are identified as:

- Concrete septic tank.
- Septage in the SWMU 22 septic tank.
- Possible saturated native soils from beneath the tank and leach field.

- Unsaturated native soils from beneath the tank and leach field.
- Unsaturated, and possibly saturated, soils from the investigation drilling and sampling process.
- Decontamination water.
- Metal or PVC material (piping).
- Contact waste, including:
  - Sampling equipment.
  - Personal protective equipment (PPE).
  - Plastic sheeting.
  - Rags.
  - Other debris contaminated by soil or fluids.
  - Oils, greases, etc. typically associated with equipment maintenance.

Contact waste includes spent PPE, contaminated sampling supplies, plastic, and other material that has come into contact with contaminated media. More specifically, this material is debris contaminated with environmental media that could potentially contain hazardous constituents.

All wastes will be managed in accordance with federal, state, and local guidance where applicable, including the regulatory requirements referenced above, 49 CFR, the New Mexico Environment Department (NMED) Hazardous Waste Bureau, WSTF site-specific procedures, and the WSTF Hazardous Waste Permit.

3.0 Waste Disposition

The HIS determined that limited amounts of silver and possibly cyanide bearing waste streams were discharged to the septic tank associated with SWMU 22 prior to 1985. Additionally, no information was found that indicated listed hazardous wastes were discharged to the septic tank. Based on the information obtained from the HIS, NASA does not anticipate that hazardous constituents have accumulated in the tank and the environmental media at concentrations that would exceed the 40 CFR Part 261.24 regulatory limits.

Sampling and analysis of the septage present in the septic tank will be performed in association with WSTF Septic Tanks pre-investigation activities, as described in the WSTF Septic Tanks IWP. The data obtained from this sampling will provide a definitive determination as to whether any of the contaminants of potential concern (COPC) identified in the WSTF Septic Tanks IWP are currently present in the septage at concentrations that would exceed the 40 CFR Part 261.24 regulatory limits. NASA will submit a letter report summarizing the septage sample results to NMED within 30 days after processing the septage sample analytical results. In the event the septage analytical sample results indicate the presence of COPCs above regulatory levels, a revised plan for septage and tank disposal will be developed and included with the septage sampling results submittal to the NMED. If no hazardous constituents are present in the septage above regulatory levels, the septage and septic tank will disposed of in accordance the New Mexico solid waste rules.

NASA will collect representative samples of the subsurface soils adjacent to SWMU 22 during the investigation at SWMU 22, as described in the WSTF Septic Tanks IWP. Appropriate sampling methods will provide data to determine the regulatory status of the soil and presence of any COPC. NASA anticipates that these samples will confirm that the environmental media does not exhibit the characteristic of a hazardous waste per 40 CFR Part 261.24. Additionally, NASA anticipates these results will provide confirmation that the concentrations of any COPC detected do not exceed the New Mexico Soil Screening Levels (NMED, 2012). NASA will include a summary of this determination as part of the investigation report. In the event COPCs are detected above regulatory levels, NASA in conjunction with NMED will determine if any further corrective action is required.

Investigation activities will be conducted in a manner that minimizes the generation of waste. Waste streams that are determined to be non-hazardous solid waste will be recycled, reused, or disposed of as appropriate. All materials, equipment, or piping/fixtures associated with the septic tank at SWMU 22 will be decontaminated, as appropriate, and removed or abandoned in place. The leach field associated with the septic tank will be abandoned in place. All service piping abandoned in place (cut and capped) will be flushed with clean site water prior to abandonment.

4.0 Waste Management Procedures

Based on the information provided in the WSTF Septic Tanks HIS, NASA does not anticipate that hazardous waste or New Mexico Special Waste will be generated while performing removal and investigation activities at SWMU 22. Even so, NASA will initially manage the potentially contaminated environmental media or contaminated debris as hazardous waste prior to receipt of analytical data from samples collected during the investigation. NASA will contract with an accredited off-site analytical laboratory for a 30-day turnaround time for the investigation analytical results. The management of the waste will include the use of containers, which are compliant with U.S. Department of Transportation (DOT) requirements for hazardous waste. Immediately following containerization, each waste container will be individually labeled with a unique container identification number and with information regarding waste classification. The container identification number and contents will be recorded. The waste accumulation area will be managed in accordance with 40 CFR Part 262.34 accumulation time requirements that incorporate less than 90 day storage area(s), as required.

If analytical data provide confirmation that the waste is not contaminated above regulatory limits (does not exhibit the characteristic of hazardous waste per 40 CFR Part 261.24), as anticipated, the environmental media (soils, drill cuttings, and decontamination fluids) will be returned or placed in the septic tank investigation area as materials/media during site restoration. NASA will ensure that the environmental media has not been mixed with other debris, such as plastic or disposable PPE or any hazardous constituents (i.e. oil), prior to returning or placing it in the SWMU 22 investigation area.

A summary of the waste containerization strategy is as follows:

- Soils will be containerized in Department of Transportation (DOT)-compliant drums or bulk containers (roll-offs, Supersacks, or similar).
- Soils, cuttings, and returns generated during drilling and sampling will be containerized in DOT-compliant drums or bulk containers (roll-offs, Supersacks, or similar).
- Decontamination fluids (e.g., muddy water, etc.) containerized in DOT-compliant drums.
- Other wastes typically associated with equipment maintenance (e.g., grease, contaminated rags, oil, WD-40®[1], diesel, soil contaminated with hydraulic fluids, etc.) may also be generated and will be managed in accordance with 40 CFR Part 262.11 (US, 2012) incorporating the New Mexico Solid Waste Management Rules 29.9.2-20.9.20 NMAC (State of NM, 2012).

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

- Any inadvertent spills onto the soil (hydraulic leaks, refueling spills, etc.) are also considered IDW and will be containerized in DOT-compliant drums or bulk containers (roll-offs, Supersacks, or similar). All spills will be documented and evaluated for reportable quantity notifications per WSTF procedures. These wastes will be characterized and managed appropriately.
- Both liquid and solid decontamination IDW will be stored in appropriate containers, inventoried and labeled with the appropriate waste labels and placed in designated accumulation areas. WSTF Environmental personnel will coordinate with the project team to establish and document waste accumulation area(s).
- All fluids and solids will be containerized and the decontamination pad dismantled upon completion of site sampling and decontamination.

Fencing or other signs, barriers, and markings delineating work control areas will be put into place around the investigation site and decontamination area within the contaminate reduction zone to define zones of potential contamination and for overall site security. Only authorized personnel will be allowed entry to the investigation and decontamination areas.

5.0 Waste Disposal

For any IDW characterized as hazardous waste (40 CFR Part 261), Land Disposal Notifications (40 CFR Part 268), disposal facility profiles, and hazardous waste manifests (40 CFR Part 262) will be completed as required (US, 2012). Hazardous waste will be transported (49 CFR) for treatment and disposal at a permitted RCRA Treatment, Storage, and Disposal Facility (US, 2012). For any IDW that is determined to be a New Mexico Special Waste (20.9.2.7 NMAC), the IDW will be transported and disposed in accordance with 20.9.8 NMAC (State of NM, 2012). Any removed materials, equipment, or piping/fixtures, associated with SWMU 22 (e.g., concrete, etc.) will be evaluated for potential recycling or reuse. Remaining IDW not classified as hazardous waste or New Mexico Special Waste will be disposed of as a solid waste in accordance with New Mexico solid waste rules.

6.0 References

EPA. *Introduction to Generators (40 CFR Part 262).* Solid Waste and Emergency Response EPA 530-K-05-011, Environmental Protection Agency, Washington D.C. September 2005.

EPA. *RCRA Online (RO 14291), Management of Remediation Waste Under RCRA*. Accessed June 19, 2013. http://yosemite.epa.gov/osw/rcra.nsf/0c994248c239947e85256d090071175f/d9e61a0505db4b6885256817006e32b8!OpenDocument

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National Aeronautics and
Space Administration

WSTF Septic Tanks Historical Information Summary

June 2013

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 waste management practices for the National Aeronautics and Space Administration (NASA) White Sands Test Facility (WSTF) site septic tank systems. The summary will facilitate identification of any releases or potential releases of hazardous substances or hazardous waste to the environment. This information is designed to support the development of the WSTF Septic Tanks (Solid Waste Management Units [SWMU] 21 – 27) Investigation Work Plan (IWP; NASA, 2013[f]), required by the WSTF Hazardous Waste Permit issued by the New Mexico Environment Department (NMED, 2009).

Operations and waste management practices were not well documented at WSTF between 1963 and 1985. NASA has researched existing historical environmental records, reviewed site photographs and engineering drawings, and conducted interviews of both retired and active long-term site employees in order to determine the nature and timing of any releases or potential releases to the environment.

WSTF septic tank systems, the associated SWMU numbers as listed in the NASA WSTF Permit, and septic tank construction/operational periods include:

- Building 114 (SWMU 22): 1963 to present.
- Building 116 (Main Guard Gate; SWMU 21): 1966 to present.
- Building 117 (Forward Guard Gate): 2006 to present.
- 250 Area: site origin (1963/1964) to approximately 1970.
- Building 272 (SWMU 23; tanks A and B): tanks A and B used 1991 to present.
- 300 Area main septic (SWMU 24): 1963 to present.
- Building 320 (SWMU 25): 1993 to present.
- Building 364 (SWMU 26): 1991 to present.
- 400 Area main septic (SWMU 27): 1964 to present.
- Building 272 (Tank C): 2005 to present.
- Building 447: 1990 to present.
- Building T463: 1992 to 1994.
- Building 650: 2001 to present.
- Buildings 802/803: 1987 to present.
- Second TDRSS [Tracking and Data Relay Satellite System] Ground Terminal (STGT): 1989 to 1991.

Septic tank systems located at Building 117 (the Forward Guard Gate), the 250 Area, Building 272 (tank C), Building 447, Building T463, Building 650, Buildings 802/803, and the STGT do not have associated SWMU numbers listed in the Permit.

Results of the current evaluation indicate that historical releases or potential releases may have occurred to the Building 114 septic tank system, discharging silver and potentially cyanide. No other potential releases to any septic tank system at WSTF were identified.

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List of Acronyms

ADF-SW	Aerospace Data Facility-Southwest
amsl	Above mean sea level
AOC	Area of concern
bgs	Below ground surface
BLM	Bureau of Land Management
BOD	Biochemical oxygen demand
CFR	Code of Federal Regulations
CLC	City of Las Cruces
CLCWS	City of Las Cruces Wastewater System
COD	Chemical oxygen demand
DO	Dissolved oxygen
DoD	Department of Defense
DP	Discharge plan or permit
DTR-process	Silver Salt Diffusion Transfer Process
EPA	Environmental Protection Agency
ETU	Evaporation Treatment Unit
FSA	Fuel Storage Area
ft	Foot or feet
gal.	gallon(s)
gpd	gallons per day
GSA	General Services Administration
GWQB	Ground Water Quality Bureau
HIS	Historical information summary
HLA	Harding Lawson Associates
HWB	Hazardous Waste Bureau
HWMU	Hazardous waste management unit
HWTL	Hazardous waste transmission line
in.	Inch(es)
IWP	Investigation work plan
JER	Jornada Experimental Range
JSC	Johnson Space Center
JSTC	Johnny's Septic Tank Company
LWP	Liquid Waste Program
mi	Mile(s)
mpi	Minutes per inch
MSDS	Material Safety Data Sheet(s)
NASA	National Aeronautics and Space Administration
NMED	New Mexico Environment Department
NMEIB	New Mexico Environmental Improvement Board
NMEID	New Mexico Environmental Improvement Division
NMSLO	New Mexico State Land Office
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
SAM	San Andres Mountains
STGT	Second TDRSS Ground Terminal
SWMU	Solid waste management unit
TDRSS	Tracking and Data Relay Satellite System
UPC	Universal Plumbing Code
USTs	Underground storage tanks
VOC	Volatile organic compound

WIWPS	WSTF individual waste profile sheet(s)
WSC	White Sands Complex
WSMR	White Sands Missile Range
WSTF	White Sands Test Facility

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; New Mexico Environment Department [NMED], 2009, Section VII.H.1.c) requires the preparation and submittal of an historical information summary (HIS) for each solid waste management unit (SWMU) or area of concern (AOC) to be investigated. This HIS is required by the Permit to be submitted on or before June 30, 2013. The information gathered during preparation of the HIS will be used to aid the development of a unit-specific investigation work plan (IWP). The purpose of this HIS is to evaluate past site operations and waste management practices in order to identify known or potential releases of hazardous waste or hazardous substances to the environment from any of the NASA WSTF septic tank systems. Septic tank systems are located within the 100, 200, 300, 400, 600, and 800 Areas and the Second TDRSS [Tracking and Data Relay Satellite System] Ground Terminal (STGT).

1.2 Scope

Information compiled in this summary was obtained from review of historical documentation including reports, analytical results, correspondence, files, engineering drawings, permit applications, photographs and from interviews with current and former employees.

The observations and interpretation 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. In the state of New Mexico, permits for individual septic systems were not required prior to 1979, and there were no documentation, reporting, or monitoring requirements. For this HIS, NASA relied on a limited assortment of documents, correspondence, and the recollections of long-term employees to develop a conceptual understanding of early waste management practices related to the WSTF site septic systems. 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 (mi) northeast of Las Cruces, New Mexico and 65 mi 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 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 interagency 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 overview of lands used by NASA.

2.3 Land Use

All of the WSTF industrial areas are strictly for industrial use. Security and fire-fighting 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 south 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 (N_2O_4), 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, and any new construction must be approved by WSMR. 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, and 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 site is bordered on the west by a broad uniformly sloping alluvial pediment plain extending into the Jornada del Muerto Basin and the Doña Ana Mountains. The major alluvial fan systems originate from Bear Canyon to the northeast and Lohman 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. Numerous arroyos, which only flow during periods of heavy rainfall, dissect the alluvial fan deposits. Figure 2.3 provides a topographic map of WSTF and the surrounding areas.

3.0 Septic Tank System Areas Background

3.1 Location and Current Use of the Areas

3.1.1 100 Area

The 100 Area is located in Section 2 of T.21.S., R.3.E. Access to the 100 Area is via Apollo Boulevard, the main access through WSTF (Figure 3.1). The 100 Area provides administration and support facilities for WSTF. Services provided include printing and drafting services, computer maintenance, emergency and security services, food services, shipping and receiving services, and various maintenance and fabrication services. Descriptions of the facilities and SWMUs of this area are provided in Section 3.3.1.

The Forward Guard Gate is not physically located within the industrial 100 Area; however, the building number assigned to this area is Building 117, a 100 Area designation. For the purposes of this HIS, Building 117, the Forward Guard Gate, will be described as part of the 100 Area. The Building 117 septic tank is located in Section 14 of T.21.S., R.3.E.

3.1.2 200 Area

The 200 Area is located within Section 35 of T.20.S., R.3.E., and Section 2 of T.21.S., R.3.E., and access is via Apollo Boulevard, the main access through WSTF (Figure 3.2). 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, 2012([d]). Buildings, structures, and SWMUs located in the 200 Area are described in Section 3.3.2.

3.1.3 300 Area

The 300 Area is located in Section 36 of T.20.S., R.3.E. Access to the 300 Area is via Apollo Boulevard, the main access through WSTF (Figure 3.3). The 300 Area is part of the Propulsion Test Office. Testing within the 300 Area is currently being conducted on Peacekeeper 4th stage missiles. The 300 Area is also currently supporting Space Shuttle Transition and Retirement program activities. Buildings, structures, and SWMUs located in the 300 Area are described in Section 3.3.3.

3.1.4 400 Area

The 400 Area is located in Section 35 of T.20.S., R.3.E. Access to the 400 Area is via Road L that intersects with Apollo Boulevard, the main access through WSTF (Figure 3.4). The 400 Area is also part of the Propulsion Test Office. Testing within the 400 Area is currently supporting Commercial Crew Development testing, Air Force Minuteman activities, and Space Shuttle Transition and Retirement program activities. Buildings, structures, and SWMUs located in the 400 Area are described in Section 3.3.4.

3.1.5 600 Area

The 600 Area is located adjacent to and west of the 100 Area and extends approximately 4 mi to the west of the WSTF industrial areas. This area includes Sections 27 through 34, T.20.S., R.3.E. and Sections 3, 4, 5, 6, 9, and 10, T.21S., R.3.E. The 600 Area is currently used for support of WSTF water supply and monitoring and remediation systems. Buildings, structures, and SWMUs located in the 600 Area are described in Section 3.3.5. For the purposes of this HIS, only the septic tank system located in Section 5 of T.21.S., R.3.E. will be discussed in detail (Figure 3.5).

3.1.6 800 Area

The 800 Area is located adjacent to the 200 Area in Section 35 of T.20.S., R.3.E. (Figure 3.2). The 800 Area personnel currently perform fuel and oxidizer testing for various programs, oxygen flammability testing, multiple liquid and gaseous oxygen testing activities, and support long and short term stress rupture testing for pressure vessels. Buildings, structures, and SWMUs located in the 800 Area are described in Section 3.3.6.

3.1.7 STGT Area

The STGT facility is located within Sections 26 and 27 of T.20.S., R.3.E. Access to the facility is via NASA Road to the STGT Access Road (Figure 3.6). The STGT facility is part of the Space Network data communication system comprised of satellites in geosynchronous low earth orbit and ground terminals with high-gain microwave antennas that provide telecommunications, tracking and command services between low-Earth orbit spacecraft and customer control and data processing facilities 24 hours per day, 365 days per year (NASA, 2011[c]; NASA, 2013[d]). Buildings, structures, and SWMUs located at the STGT are described in Section 3.3.7.

3.2 Physical Setting at the Property

The surface and subsurface conditions for the WSTF site septic tanks are described within the WSTF Septic Tanks (SWMU 21-27) IWP, Section 3.0 (Current Site Conditions at SWMU 22; NASA, 2013[f]).

3.3 Description of Structures

WSTF contains 16 septic tanks, located in almost every industrial area at WSTF. Each area that contains a septic tank system will be described in this section.

3.3.1 100 Area

Buildings, structures, and SWMUs in the 100 Area are illustrated in Figure 3.1. This area contains administration and WSTF support buildings, including a fire department and medical clinic, a cafeteria, a fueling station for government vehicles, a gymnasium, an auditorium, heavy equipment facilities, vehicle maintenance facilities, warehouse facilities, communication facilities, storage buildings, and many types of maintenance and fabrication facilities. The warehouse and support buildings house all materials, supplies, and substances entering WSTF. Distribution of goods/substances to the appropriate industrial area is accomplished following receiving procedures at the warehouse. The 100 Area also contains buildings for WSTF security personnel and activities.

Most facilities are located on concrete or asphalt surfaces; however, some natural soil surfaces are present. There are both paved and unpaved service roads. Most buildings contain heating/cooling systems and utilities servicing the area, including electrical, gas, fiber optic, and water.

Permit Attachment 22 of the NASA WSTF Permit (NMED, 2009) identifies SWMUs at WSTF. SWMUs within the 100 Area include the 100 Area burn pit (SWMU 1), the 100 Area wastewater lagoon (SWMU 2), the 100 Area (historical) container storage area (SWMU 3), and two 100 Area septic tanks (SWMUs 21 [the tank located at Building 116, Main Guard Gate] and SWMU 22 [the tank located at Building 114]; Figure 3.1). There is one additional septic tank (Building 117) located at the Forward Guard Gate that is not identified as a SWMU in the NASA WSTF Permit.

There are two SWMUs located near the 100 Area that are not shown on Figure 3.1 due to the large distance of the SWMUs from the 100 Area buildings and structures. These SWMUs include a small arms firing range located near monitoring well WB-2 (SWMU 31) and the WSTF active firing range (SWMU 53).

3.3.2 200 Area

Buildings, structures, and SWMUs located within the 200 Area are illustrated in Figure 3.2. 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 3.2). 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. There is one septic tank located in this area. This septic tank was identified as a drainage source in the 200 Area HIS and an additional area of interest in the 200 Area IWP (NASA, 2012[a]). Shallow soil vapor sampling was conducted throughout the 200 Area as part of the 200 Area 2012 Phase I Investigation, including two locations adjacent to the 250 Area septic tank. Volatile organic compounds (VOCs) were identified throughout the 200 and 250 Areas; however, the 250 Area did not contain the higher VOC concentrations; therefore, the 250 Area septic tank vicinity was not identified as an Area of Interest for further soil boring investigations. Details are provided in the 200 Area Phase I Status Report (NASA, 2013[a]).

The 270/272 Area is located southeast of the 200 laboratory complex (Figure 3.2). 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 historical hazardous waste transmission line (SWMU 10), two septic tanks located adjacent to Building 272 (SWMU 23), and the 200 Area small arms firing range (SWMU 30). There is one additional septic tank located adjacent to Building 272 that is not listed as a SWMU in the Permit (NMED, 2009). This third Building 272 septic tank was installed after the NASA WSTF permit renewal application submittals in 2002 and 2004 (NASA, 2002; NASA, 2004[a]).

The 200 Area also contains two closed hazardous waste management units (HWMUs). The closed HWMUs consist of two separate sites that historically contained four hazardous waste underground storage tanks (USTs). The west closure consisted of two steel USTs for storing hazardous wastes derived from the clean room. The 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 of these USTs were excavated and removed, and the areas were closed as interim landfills in 1986. NMED approved the closures in 1989. A Phase I 200 Area vadose zone investigation was recently completed in the area, and results were provided in the 200 Area Phase I Status Report (NASA, 2013[a]). Previous vadose zone investigations conducted in the past are summarized in Section 2.4 of the 200 Area Closure IWP (NASA, 2012[a]).

The last active HWMU in the 200 Area, the Evaporation Treatment Unit (ETU), is in the process of closing (Figure 3.3). The ETU treated aqueous wastes by evaporation in accordance with the Permit (NMED, 2009), and consisted of two circular, flat-bottomed, open-top, carbon steel tanks lined with two 30-mil polyvinyl chloride (PVC) liners in each tank. Closure activities were initiated in July 2012 in accordance with the ETU Closure Plan. All ETU material was determined to be nonhazardous by NMED in No Longer Contained-In determinations dated October 16, 2012 (ETU solids; NMED, 2012[a]), November 2, 2012 (drain lines and debris NMED, 2012[b]), December 21, 2012 (ETU liquids; NMED, 2012[c]), and April 11, 2013 (ETU liners; NMED, 2013[b]). Liquid wastes were transported to the 400 Area discharge lagoon in accordance with discharge plan or permit (DP)-1170 and the discharge approval received February 4, 2013 (NMED, 2013[a]). The steel shells of the tanks were dismantled, and NASA intends to recycle the metal. A vadose zone investigation is currently in progress.

There was one additional UST located within the 200 Area, the Grumman tank, which was rediscovered in 1987, still filled to capacity with spent Freons. This tank was also excavated and removed, with site closure activities completed in 1988. The closure was approved by NMED as a clean closure in 1993 (NMED, 1993).

3.3.3 300 Area

Buildings, structures, and SWMUs located within the 300 Area are illustrated in Figure 3.3. The 300 Area was constructed to test various propulsion systems including those necessary to accommodate cold flow and hot firing static testing (NASA, 1996[a]). Test facilities and support buildings in this area include one ambient, dual-position (vertical and horizontal) firing test stand, one altitude simulation, dual-position (vertical and horizontal) firing test stand, one altitude simulation, horizontal-firing test stand, one ambient, horizontal-firing test stand, two below grade structures for instrumentation and control signal conditioning equipment, a test control center, a remote command building, shelters for equipment storage, and a condensing water pond (the 302 discharge pond). Test support systems include fuel and oxidizer storage, pressurizing, and handling.

Although most facilities are constructed on concrete surfaces, some natural soil surfaces are present. There are both paved and unpaved service roads, and an employee parking lot. The test control and office buildings have heating/cooling systems, septic systems, and potable water.

SWMUs located within the 300 Area include the 300 Area oxidizer burner (SWMU 11), the 300 Area main septic tank (SWMU 24), the Building 320 septic tank (SWMU 25), the Building 364 septic tank (SWMU 26), and the 302 condensing water discharge pond (SWMU 33). The 302 condensing water discharge pond is managed in accordance with DP-697.

There is one HWMU located within the 300 Area. This HWMU consisted of two concrete-lined surface impoundments and three reinforced concrete treatment tanks that historically contained dilute hydrazine-type propellants (monomethylhydrazine, hydrazine, unsymmetrical dimethylhydrazine, Aerozine 50) and oxidizer. This HWMU was closed as an interim landfill in 1989. An investigation of the HWMU was completed in October 2011. NASA submitted the Closure Investigation Report on August 30, 2011 (NASA, 2011[b]), and NMED approved the 300 Investigation Closure Report on October 13, 2011 (NMED, 2011[a]).

3.3.4 400 Area

Buildings, structures, and SWMUs located within the 400 Area are illustrated in Figure 3.4. Like the 300 Area, the 400 Area was also constructed to test various propulsion systems including those necessary to accommodate cold flow and hot firing static testing (NASA, 1996[a]). Test facilities and support buildings in this area include two altitude dual-position (vertical and horizontal) firing test stands, one ambient dual-position (vertical and horizontal) firing test stand, and two altitude horizontal-firing test stands (one capable of firing solid propellant engines), a test control building, and several preparation buildings. The altitude simulation test stands use either boilers to run vacuum pumps, or three alcohol/liquid oxygen combustion rocket engines to run a water steam generator to create a vacuum to simulate high altitude conditions. Test support systems include pressurization, storage, and handling of large amounts of alcohol, liquid oxygen, nitrogen, oxidizer, hypergolic propellants, diesel generators, and a pretreatment boiler water system with a discharge pond.

Although most facilities are constructed on concrete surfaces, some natural soil surfaces are present. There are both paved and unpaved service roads, and an employee parking lot. The test control and office buildings have heating/cooling systems, septic systems, and potable water.

SWMUs located within the 400 Area include the 400 Area oxidizer burner (SWMU 12), the 400 Area historical aspirator discharge pipe (SWMU 13), the 400 Area main septic tank (SWMU 27), and the 400 Area boiler water discharge (salt) pond (SWMU 48) with four cells. The 400 Area boiler water discharge pond is managed in accordance with DP-1170. Two additional septic tanks (for Buildings 447 and T463) not identified as SWMUs in the NASA WSTF Permit are also present in the 400 Area.

There is one HWMU located within the 400 Area, the 400 Area impoundments and treatment tanks. This unit was similar to the HWMU utilized in the 300 Area and historically contained dilute hydrazine-type propellants (monomethylhydrazine, hydrazine, unsymmetrical dimethylhydrazine, Aerozine 50), oxidizer, and referee propellants (Freon 113 and Freon 11). The HWMU was closed as an interim landfill in 1989, and the 400 Area Closure IWP (NASA, 2011[a]) was approved by NMED in November 2011 (NMED, 2011[b]).

3.3.5 600 Area

Since a portion of the 600 Area is located directly adjacent to the 100 Area, buildings, structures, and SWMUs in that area will be illustrated with the 100 Area (Figure 3.1). These structures include buildings for chlorination and transfer of WSTF site water and groundwater assessment support buildings containing generators, gas cylinders, tools, and equipment necessary for performing groundwater assessment activities.

Other buildings and structures located within the 600 Area are illustrated in Figure 3.5, and include WSTF water supply production wells (J and K), piezometers, exploration wells, groundwater monitoring wells, groundwater extraction and injection wells and associated buildings, and two groundwater treatment facilities. The septic tank system in this area is located adjacent to the Plume-Front Remediation Treatment Building (650).

SWMUs located within the 600 Area include the terminus of the historical 200 Area hazardous waste transmission line (HWTL; SWMU 10), the 600 Area burn pit (SWMU 15), the 600 Area overflow wastewater lagoon (SWMU 34; Figure 3.1), the BLM or 600 Area off-site soil pile (SWMU 16), and the jet propellant fuel remote test areas (JP-4 and JP-5; SWMU 14), located near monitoring well JP-3 (Figure 3.5).

In addition to SWMUs, there is also one HWMU located in the 600 Area (Figure 3.1) that historically contained 200 Area laboratory hazardous wastes within a two-celled, lined surface impoundment. This HWMU was closed as an interim landfill in 1989. An HWMU investigation was completed in May 2011 with NMED approval of the 600 Area Closure Investigation Report in June 2011.

3.3.6 800 Area

Buildings, structures, and SWMUs located in the 800 Area are illustrated in Figure 3.2. This 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 a below grade storage tank (SWMU 19) for temporary storage of diluted and residual testing fuels and an oxidizer burner (SWMU 20). The area also contains a septic tank for Buildings 802 and 803.

3.3.7 STGT Area

The STGT is part of the TDRSS ground terminal system. The STGT area and SWMUs are illustrated in Figure 3.6. Buildings consist of a main operations building, a power plant, a vehicle maintenance building, a security guard building, and various storage and support buildings. Structures include two 15,000-gallon (gal.) capacity fuel USTs, a 300,000-gal. capacity potable water tank, and large antennas for satellite communications.

Facilities are located on concrete or asphalt. Utilities received from the main WSTF industrial areas consist of electrical, communications (fiber optic), gas, and water. The power plant contains heating and cooling systems. There are two SWMUs located within the STGT Area, the STGT small arms firing range (SWMU 29) and the STGT fuel USTs (SWMU 52). There is also an AOC located within the STGT area. The STGT wastewater lagoon is listed in the Permit as AOC 51 and is currently managed in accordance with DP-584. There is also a septic tank located within the STGT area that has not been identified as a SWMU in the NASA WSTF Permit (NMED, 2009).

3.4 Current Uses of Adjoining Properties

Figure 3.7 is a map showing the WSTF industrial areas and STGT. The locations of adjoining properties are discussed below in relation to the nearest area that contains a septic tank system.

3.4.1 500 Area

The 500 Area contains two distinct areas that are not located directly adjacent to one another. The 500 Area cryogenic storage area is located between the 800 and 300 Areas along Apollo Boulevard (Figure 3.7). This area is used for storing large quantities of gases used at WSTF, including nitrogen and oxygen. There are no SWMUs or AOCs associated with this area.

The 500 fuel and oxidizer storage area is located between the 300 and 700 Areas, southeast of the STGT Area (Figure 3.7). This area was designed to store fuel and oxidizer for use at WSTF. Buildings and structures include small control buildings, shelters, piping, breathing air generation equipment, and the permitted Fuel Treatment Unit, where fuel wastes are diluted and stored until shipment off-site for disposal can be arranged. There is one SWMU located in the area, the 500 Fuel Storage Area (FSA; SWMU 47). A preliminary investigation consisting of three soil sampling events was completed for the 500 FSA (SWMU 47) in July and December 2000 and May 2001. NASA identified the FSA as a SWMU in March 2000 (NASA, 2000). Results of the preliminary investigation were submitted to NMED within the RCRA Permit Renewal Application in August 2002 (NASA, 2002) and the revised permit renewal package in May 2004 (NASA, 2004[a]). The 500 FSA HIS also summarized the results of the preliminary investigation (NASA, 2011[a]).

3.4.2 700 Area

The 700 Area is located north of the 400 Area and southeast of the STGT Area (Figure 3.7). This area consists of a remote testing area and the closed WSTF landfill. Both areas are SWMUs included in the Permit (NMED, 2009). The 700 Area high energy blast facility has been designated at SWMU 18, and the 700 Area landfill has been designated at SWMU 49.

4.0 Historical Records Review

4.1 Record Sources

Reasonably ascertainable and practically reviewable records relevant to WSTF septic tank system history, operations, and environmental conditions were selected and reviewed dating back to the construction of WSTF in 1963. 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:
    - DPs and correspondence.
    - Internal WSTF documents (correspondence, environmental impact statements, analytical data, memoranda, reports, discrepancy reports, and test preparation sheets, liquid waste system permits and application forms, e-mail communications, and maintenance records).
- 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 septic tanks and systems were reviewed.
- NASA Photograph Archives – Located on-site in the WSTF Photography Laboratory; negative logs were reviewed and pertinent photographs were obtained for review. Some early photographs of WSTF (originally obtained from JSC) from 1963 through 1965 were reviewed.
- Historical liquid waste regulations – obtained from the NMED website.

4.2 Interviews

In addition to a historical records review, 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 Regulatory History

Regulatory oversight for septic tanks in New Mexico falls under the jurisdiction of NMED. There are many departments within NMED with regulations that are pertinent to septic tanks. The NMED Liquid Waste Program (LWP) oversees liquid waste with discharges under 2,000 gallons per day (gpd). The NMED Hazardous Waste Bureau (HWB) provides oversight for any wastewater lagoon or septic tank system that has been identified as a HWMU, SWMU, or AOC (identified in the NASA WSTF Permit; NMED, 2009), and the NMED Ground Water Quality Bureau (GWQB) oversees discharges requiring a DP, liquid waste with discharges over 2,000 gpd, or liquid waste discharges with any amount of industrial wastes (New Mexico Environmental Improvement Division [NMEID], 1985[a]). For the purposes of this HIS, a brief history of regulations under the LWP, the NASA WSTF Permit, and DP-392 will be discussed. The historical background for connecting the WSTF wastewater systems to the City of Las Cruces Wastewater System (CLCWS) will also be discussed.

5.1 Liquid Waste Program

Prior to 1973, liquid waste in New Mexico was regulated by the New Mexico Department of Health, with regulations published in 1937 and 1959. The New Mexico Environmental Improvement Board (NMEIB) began oversight of liquid waste regulations in 1973, and the current NMED regulates liquid waste under the LWP.

5.1.1 1937 Regulations

In June 1937, the State of New Mexico State Board of Public Health adopted "Regulations Governing Water Supplies and Sewage Disposal" and "Regulations Prohibiting Unsanitary Toilets in Certain Places" based on the Laws of 1937, Chapter 39, Sections 3 and 14. These regulations contained a definition of a septic tank and made it unlawful for any entity to maintain or install a waste disposal system with insanitary waste, as defined as *"exposed to the approach of flies or other insects or of animals; or one which permits the contents to overflow upon the open ground or be carried into any well…,"* within 500 ft of any human habitation, excluding private residences. The regulations also contained a prohibition to discharge any substance *"offensive, injurious or dangerous to health"* into any waters or ditches *"intended to be used for human consumption or for domestic purposes."* The only permitting requirement listed in the regulations was a requirement for a permit from the State Commissioner of Health for any waste to overflow on the land or discharge to any waters (NM, 1937[a]; NM, 1937[b]). Since NASA WSTF septic tanks were not designed to overflow or discharge to arroyos or water, a permit was not required under these regulations.

5.1.2 1959 Regulations

In September 1959, the New Mexico State Board of Public Health adopted the regulations, "Policy for Individual Water Supplies and Sewage Disposal Systems." This document established minimum lot size requirements for *"individual water and/or sewage installations,"* and specifically referred to subdivisions and houses. Even though these regulations appear to be designed for subdivisions and house waste disposal, the lot size requirements would still be pertinent for NASA WSTF septic tank installations. A lot size of *"one-half acre (21,780 sq. ft.), or larger"* was required for *"a private water supply and a private sewage disposal system"* (NM, 1959). All septic tank systems at WSTF are located at distances greater than ½ acre from one another. The regulations also provided minimum requirements for domestic septic tank size, absorption area requirements for private residences, and minimum set back distance requirements. Minimum set back distance requirements included 5 ft from buildings and structures, 10 ft from water lines, 50 ft (septic tank) and 100 ft (leach field) from water supply wells, and 10 ft (septic tank) and 25 ft (leach field) from streams (NM, 1959).

5.1.3 1973 Regulations

In September 1973, the NMEIB published the "Liquid Waste Disposal Regulations." These regulations included many definitions and refined lot size and set back distance requirements. An individual liquid waste disposal system was defined as *"a disposal system which receives 2,000 gallons or less of liquid waste per day and includes but is not limited to, septic tank systems, aerobic disposal systems, evapotranspiration systems and spray irrigation treatment systems,"* and within all regulation parts, the term *"individual liquid waste disposal system"* is listed. This means that these regulations applied to systems receiving 2,000 gpd or less of wastes; however, the regulations did not state this clearly. For the first time, these regulations also required registration with NMEID for the installation or modification of any existing liquid waste disposal system (NMEID, 1973).

5.1.4 1979 Regulations

In August 1979, the NMEIB published an update of the Liquid Waste Disposal Regulations that superseded the Liquid Waste Disposal Regulations from 1973 and the Sewage Disposal Regulations from 1937. For the first time, the scope of the regulations was clearly defined. *"The Liquid Waste Disposal Regulations shall apply to disposal systems which receive and treat 2,000 gallons or less of liquid waste per day."* Also for the first time, permits for liquid waste disposal systems were required. *"No person shall install or have installed a new liquid waste system or modify or have modified an existing liquid waste system, unless he obtains a permit issued by the Division prior to such installation or modification."* Minimum absorption field areas for soil characteristics, minimum lot sizes, minimum percolation rate, and minimum set back distance requirements were also specified (NMEIB, 1979).

5.1.5 1980/1981 Amendments

Amendments to the regulations were published in February 1980 and September 1981. These amendments revised septic tank absorption field areas for soil characteristics, minimum lot sizes, minimum percolation rates, and seasonal ground water table regulations and repealed the 1937 and 1973 regulations (NMEIB, 1980).

5.1.6 1985 Regulations

The liquid waste regulations were revised in October 1985. These regulations superseded the 1979 regulations. Changes included revised minimum absorption field requirements, design flow rates, and minimum set back distance requirements (NMEIB, 1985). A provision of these regulations and all subsequent regulations was that all liquid waste systems installed prior to the effective date of the current regulations shall meet the requirements of the regulations in effect at the time of their initial installation or the current regulations. In a 1985 internal NMEID memorandum to clarify when the Liquid Waste Disposal Regulations apply and when the Water Quality Control Commission Regulations apply, it was stated,

"The Liquid Waste Disposal Regulations apply only to domestic type wastes. If there will be <u>any industrial discharge</u> at all entering the sewerage system, the facility will be subject to the WQCC Regulations…Situations involving several completely separate sewerage systems, each of which receive 2,000 gallons or less of domestic type effluent per day, are exempt from the requirements of WQCC Regulations pursuant to Section 3-105.B of those regulations…Situations involving sewerage systems receiving more than 2,000 gallons of domestic type effluent per day, or which receives any amount of effluent other than the domestic type, are not exempt from the requirements of WQCC Regulations. This type of situation does not fall within the ambit of the Liquid Waste Disposal Regulations" (NMEID, 1985[a]).

5.1.7 1990 Regulations

The regulations were again revised in February 1990 to include set back distance requirements for potable water lines. For the first time, the scope was specified in the regulations as not including discharges that require a National Pollutant Discharge Elimination System Permit. Also for the first time, the regulations specified chemicals and substances that were prohibited. *"No person shall introduce motor oil, gasoline, paint varnish, solvents, pesticides, fertilizer, or other materials of a composition or concentration not generally associated with toilet flushing, food preparation, laundry and personal hygiene to a liquid waste system."* And *"No person shall introduce any chemical defined by the New Mexico Water Quality Control Commission as a toxic pollutant into a liquid waste system."* Minimum lot sizes were also revised (NMEIB, 1990).

5.1.8 1995 Regulations

In the November 1995 revision of the liquid waste disposal regulations, definitions of clearance were refined (to include bedrock or other limiting layers as opposed to including only the seasonal high ground water table), limiting layer (to include a minimum of 1 minute per inch [mpi] and a maximum percolation rate of 120 mpi as opposed to only minimum rates). These regulations superseded the 1990 regulations (NMEIB, 1995).

5.1.9 1997 Regulations

In the October 1997 regulations, it was stated for the first time that these regulations do not apply to discharges that require a DP. These regulations repeal the 1985 regulations. For the first time, a peak flow safety factor was specified (1.5) for designed flow rates to account for peak flow. Minimum percolation rate was revised to 5 mpi from 1 mpi. These regulations also included detailed requirements for system design and abandoning liquid waste systems (NMEIB, 1997).

5.1.10 2004 Amendments

The liquid waste regulations were amended in 2004. Changes included stating that construction, modification, or transport of a dwelling onto a lot which contains an on-site liquid waste system is prohibited without a permit. Graywater discharge standards were also included. This amendment required that *"All disposal systems that utilize subsurface discharge and soil absorption shall be designed so that additional seepage pits, drain fields or other subsurface absorption areas equivalent to at least 100% of the required original disposal system, may be installed if the original system cannot absorb all the liquid waste"* (NMEIB, 2004).

5.1.11 2005 Regulations

The regulations were revised in 2005 (NMEIB, 2005), with amendments in 2007 (NMEIB, 2007) and 2011 (NMEIB, 2011). In the 2005 regulations it was stated, *"All residential and commercial units utilizing an on-site liquid waste system shall connect to a public sewer if required by the local authority having jurisdiction."* An unobstructed area was required for the potential 100% replacement absorption area and detailed descriptions for septic tank design and construction were included. The regulations contained an expanded list of liquid waste design flow rates. Minimum set back and clearance requirements and tank abandonment requirements were also revised. Abandonment procedures included plugging or capping lines within 5 ft of the property line, pumping and properly disposing of wastes, rupturing the bottom or collapsing the tanks, and filling the tanks with *"earth, sand, gravel, concrete or other approved material."* When connecting to a public sewer, all tanks had to be filled and abandoned within 30 days from the time of the connection. Unpermitted systems installed prior to February 1, 2002 could be issued certificates of registration if the system is inspected, functions properly, and a permit fee is paid. Systems may be permitted if the system was exposed and inspected, the system met all requirements, and a permit fee and administrative penalty were paid. Permitting requirements included, *"No person shall install or have installed a new on-site liquid waste system or modify or have modified an existing on-site liquid waste system, unless that person obtains a permit issued by the department prior to construction of such installation or modification. Failure to obtain the required permit may result in the initiation of enforcement actions by the department"* (NMEIB, 2005).

5.1.12 2007 Amendments

In the 2007 amendments, the subsurface unobstructed replacement reserve area was altered from 100% to 50% of the required original disposal system. These regulations included requirements for inspection, withstanding traffic crossing the unit, and detailed tank and disposal field design. Alternative systems were discussed (cluster systems, composting and incinerating toilets, irrigation/reuse systems, mound and elevated systems, and low pressure dosed disposal systems). Monitoring requirements, including sampling for biochemical oxygen demand (BOD), chemical oxygen demand (COD), total nitrogen, and fecal coliform were required by some liquid waste permits to achieve secondary or tertiary treatment levels. Where it was required that standards be met, it was stated, *"If the 6-sample rolling average exceeds the treatment standards specified in 20.7.602 and 603 NMAC, the treatment system shall be subject to review and re-evaluation with regard to operation and maintenance"* (NMEIB, 2007).

5.1.13 2011 Amendments

The regulations amended in 2011 contained requirements for inspection including testing to verify watertight construction, water pressure testing, vacuum testing, and flow testing. Minor modifications to the set back and clearance requirements were also initiated. Abandonment requirements were unchanged from the 2007 amendments (NMEIB, 2011). Regarding unpermitted systems, it was stated in the regulations:

"Unpermitted conventional systems installed prior to February 1, 2002 may be issued a certificate of registration for continued operation if:
(1) the treatment unit is pumped by a septage pumper hired by the system owner and inspected by the department;
(2) the liquid waste system meets the requirements in effect at the time of the initial installation, based on a non-intrusive inspection;
(3) the disposal system appears to be functioning properly; and
(4) the appropriate permit fee is paid for the system installed.

K. Unpermitted conventional systems installed on or after February 1, 2002 may be permitted if:
(1) the treatment unit and the disposal system are adequately exposed to allow full inspection by the department to determine all relevant aspects of construction and materials, including, but not limited to: soil type; pipe size, type and material; proper placement of aggregate and cover, and proper trench size, slope and spacing;
(2) the on-site liquid waste system is determined, upon inspection by the department, to meet all requirements of 20.7.3 NMAC; and
(3) the appropriate permit fee is paid; and
(4) at the discretion of the department, an administrative penalty is paid in accordance with Environmental Improvement Act, Chapter 74, Article 1 NMSA 1978" (NMEIB, 2011).

The 2011 regulation amendments also included design and construction requirements for all systems, design and treatment standards for secondary and tertiary treatment systems, disinfection treatment standards, minimum required treatment levels based on soil types, design and construction requirements for conventional disposal fields, design and construction requirements for seepage pits, requirements for privies, and requirements for cluster systems, composting and incinerating toilets, irrigation/reuse systems, evapotranspiration systems, mound and elevated systems, low pressure dosed disposal systems, holding tanks, and graywater systems. Monitoring, operation, and maintenance requirements were also discussed (NMEIB, 2011).

5.2 NASA WSTF Permit

The NASA WSTF Permit was issued by the NMED HWB for NASA WSTF on November 3, 2009. This Permit contained areas at WSTF identified as SWMUs. As defined in the Permit, a SWMU *"means any discernable unit or area at the Facility at which solid waste has been placed at any time, and from which* *the NMED determines there may be a risk of a release of hazardous waste or constituents, irrespective of whether the unit was intended for the management of solid waste. Placement of solid waste includes, but is not limited to, any unit or area at which solid waste has been routinely and systematically placed"* (NMED, 2009)

The Permit requires submittals of IWPs for each SWMU (Section VII.H.1.a; NMED, 2009). If approved by NMED, NASA can combine investigations of multiple SWMUs and AOCs. This HIS will accompany the IWP for septic tanks at WSTF (NASA, 2013[f]). Septic tanks that have been identified as SWMUs at WSTF are Building 116 (Main Guard Gate) identified as SWMU 21, Building 114 identified as SWMU 22, Building 272 septic tanks A and B identified as SWMU 23, the 300 Area Main septic tank identified as SWMU 24, Building 320 identified as SWMU 25, Building 364 identified as SWMU 26, and the 400 Area Main septic tank identified as SWMU 27.

5.3 Other Permitting Issues

In September 1996, NMED GWQB personnel requested that NASA provide daily flow estimates into the 300 and 400 Area main septic tank systems to determine if these systems equaled or exceeded 2,000 gpd. If so, these septic systems would require additional permitting through the GWQB (NASA, 1996[c]). The estimated flow rates to the 300 and 400 Area main septic tank were provided to NMED on October 10, 1996. The estimates were calculated based on the 1994 Universal Plumbing Code (UPC) criteria for office complexes of 20 gpd per employee, and were both less than 2,000 gpd (NASA, 1996[e]). Sections 7.7.4 and 7.10.4 provide details of this calculation.

The DP-584 renewal and modification approval on May 2, 1997 contained a condition of approval that stated, *"In addition to the contingency plan outlined below in Specific Requirement No. 2, in situations where a spill or contamination has occurred NASA WSTF STGT may divert sewage to the septic tank leachfield system for a period not to exceed 14 days. The reason for this condition if* [sic] *to comply with WQCC Regulation 3107.A.11…In the event that a spill or contamination occurs from the lagoon, NASA WSTF STGT will divert the sewage to the unused septic tank leachfield"* (NMED, 1997[b]). This condition was not included in subsequent DP-584 renewals, and the contingency was never used at STGT.

On September 5, 2003, NASA provided information about WSTF septic tank systems and requested a regulatory determination regarding primacy between federal regulations of a Class V injection well and the state regulations. It is identified in the federal regulations that a Class V permit may be required in areas that service more than 20 employees; however, in the state standard, permits are required only if a septic system discharges 2,000 gpd or more to the subsurface. At WSTF, there are no septic systems that discharge 2,000 gpd; however, in several locations, a septic system is utilized by more than 20 employees (NASA, 2003). In response to this request, NMED stated,

"New Mexico has primacy over the UIC program within the State. Therefore, the Water Quality Control Commission (WQCC) definition of a Class V well is the applicable regulation [Section 20.6.2.5002.B(5), "…greater than 2000 gpd…"]. For permitting purposes, the 'sewerage system' [Section 20.6.2.7.QQ NMAC] for the test facility shall include the sewage lagoons and conveyance sewers, and the septic tank leachfield systems historically permitted by the NMED Field Operations Division. The GWQB will address the addition of the septic tank leachfield systems to DP-392 upon renewal of the permit" (NMED, 2003).

5.4 Discharge Plan or Permit-392

This section comprises a brief history of DP-392, including a description of the history of WSTF septic tanks in relation to DP-392. The first DP requested at WSTF was required in order to construct and utilize an overflow wastewater lagoon in the 600 Area. This lagoon was necessary due to the full capacity condition of both the 100 and 200 Area wastewater lagoons. NASA applied for a DP for the northwest cell of the 600 Area overflow wastewater lagoon at the request of NMED on July 9, 1985 (NASA, 1985[b]). NMED approved DP-392 on October 1, 1985 (NMEID, 1985[b]). Construction and increased wastewater flow from TDRSS and the Aerospace Data Facility-Southwest (ADF-SW) resulted in continued wastewater capacity issues with the WSTF 100 and 600 overflow lagoons. NASA applied for a DP modification request to construct and include a southeast cell of the 600 Area overflow wastewater lagoon under DP-392 on March 2, 1990 (NASA, 1990[a]). NMED approved the modification on May 17, 1990 (NMEID, 1990). As required, the renewal application of DP-392 was submitted to NMED on February 28, 1995 (NASA, 1995). During the DP review process, NMED requested that NASA provide information to include the 100 and 200 Area wastewater lagoons under DP-392. NMED approved the DP-392 modification and renewal on January 21, 1997 (NMED, 1997[a]). This DP now included all the WSTF wastewater lagoons (100, 200, and 600 Area). Another DP-392 renewal was approved on May 24, 2002 (NMED, 2002). The Wastewater Lagoon Areas HIS (100, 200, 600 Areas and STGT) provides a detailed summary of DP-392 history (NASA, 2012[e]).

On September 2, 2004, NASA contacted the NMED GWQB to inquire regarding the permitting process for a proposed new septic tank (at Building 272). NMED personnel requested that any new septic tank at WSTF be linked to DP-392, which included the 100, 200, and 600 Area wastewater lagoons at that time. An amendment to DP-392 would be required, and could be requested in letter form. NMED personnel also requested that NASA include all other NASA WSTF septic tanks under DP-392 upon the next permit renewal (NASA, 2004[b]). On March 29, 2006, NASA requested an additional septic tank (the Building 117, Forward Guard Gate) be added as a modification to DP-392 (NASA, 2006[a]). In response, NMED GWQB personnel contacted NASA on May 3, 2006 to request that NASA submit an early DP-392 renewal and modification application and include all WSTF septic tanks within the application (NASA, 2006[b]). NASA submitted the DP-392 renewal and modification request to the NMED GWQB on November 20, 2006. This application included information regarding the following WSTF septic tanks: Building 114, Building 116 (Main Guard Gate), Building 117 (Forward Guard Gate), Building 272 (tanks A, B, and C), the 300 Area main tank, Building 320, Building 364, the 400 Area main tank, Building 447, Building T463, Buildings 802/803, and Building 650 (NASA, 2006[d]).

The DP-392 at that time was due to expire on May 24, 2007; however, NMED GWQB personnel stated that since NASA submitted a timely renewal request, NASA could continue to operate the 100, 200, and 600 Area wastewater lagoons under the permit (NASA, 2010[b]). To date, the NMED GWQB has not acted on the November 20, 2006 DP-392 permit renewal and modification application, awaiting NASA’s evaluation and resolution of the inadequate capacity issues of WSTF wastewater lagoons and the potential WSTF connection to the CLCWS. In an e-mail communication between NASA WSTF personnel and NMED, NMED stated that the WSTF septic tanks are considered to be permitted under DP-392, even though the 2006 DP renewal and modification application was not officially acted upon by NMED. NMED also stated that a permit modification was not necessary to close the wastewater lagoons but retain some of the septic tank systems. NMED stated that NASA should discuss the issue with the NMED GWQB after closure of the sewage lagoons is completed (NASA, 2012[c]).

5.5 City of Las Cruces Wastewater System Project

The justification for the CLCWS project was explained in an Environmental Assessment Document in April 2010, *“On-site wastewater treatment facilities include clay-lined or synthetically lined evaporation* *lagoons, evaporation tanks, septic systems and leaching fields, and evaporation ponds. The existing wastewater treatment systems have raised concerns due to periodic overload conditions occurring in the sewage lagoons during low evaporation periods requiring offloading to other lagoon sites. In addition, the environmental concerns and permitting requirements for providing on-site wastewater treatment have caused NASA to review potential wastewater treatment alternatives that would upgrade the current system"* (NASA, 2010[a]). Refer to the Wastewater Lagoon Areas HIS (100, 200, 600 Areas and STGT) for details of wastewater lagoon history and wastewater management (NASA, 2012[e]). In late 2006 to early 2007, NASA began evaluations to implement a permanent solution to the wastewater lagoon capacity issue. A trade study was conducted in January 2008, and details of the study were provided in the Environmental Assessment Document in April 2010. It was stated, *"The trade study evaluated the existing WSTF wastewater quality, defined the area service loads, assessed disposal options (surface discharge, irrigation, evaporation lagoons, ground water injection), considered feasible treatment options (off site connection to CLC* [the City of Las Cruces]*, sequencing batch reactor, oxic/anoxic, or package plant) and completed a cost/benefit and advantage/disadvantage analysis for determination of the recommended alternative."* It was recommended that NASA connect the WSTF wastewater system to the CLCWS (NASA, 2010[a]).

In October 2008, NASA also began evaluating the potential closure of the WSTF Evaporation Tank Unit (ETU). Some wastes that were discharged to the ETU could be discharged to the CLCWS (NASA, 2008[b]). Connection to the CLCWS would involve constructing wastewater lines from existing industrial and sewer wastewater generation areas west along the WSTF well road to Holman Road. The CLC would construct additional lines from their service area east to Holman Road. This project would result in closure of the ETU, all WSTF wastewater lagoons (100, 200, 600 Area) managed under DP-392, the STGT wastewater lagoon managed under DP-584, and most of the WSTF site septic tanks.

NASA submitted a letter in 2010, informing NMED of NASA's plans to upgrade the WSTF wastewater system in order to connect to the CLCWS. A record of this submittal could not be located. NMED responded on June 18, 2010. *"The benefit of this proposed action will be to eliminate domestic wastewater discharges that rely, to some extent, on discharge of effluent to the subsurface and replace such disposal with treatment that achieves nitrogen reduction prior to discharge of the effluent. These actions promise to reduce the potential for contamination of ground water from discharges of domestic wastewater at the NASA WSTF"* (NMED, 2010).

NASA submitted a City of Las Cruces Industrial Waste Permit Application in May 2012. This document included industrial waste questionnaires for WSTF, White Sands Ground Terminal (including TDRSS), STGT, and ADF-SW personnel to complete regarding wastes/chemicals to be potentially discharged to the CLCWS. Discharge locations and process wastes were also identified, and summaries of wastewater analytical data identifying pollutants of concern were provided in the application. The submittal also included a map of the project wastewater line within WSTF and to the City of Las Cruces lift station located at Holman Road and Blue Topaz Ave. (NASA, 2012[b]). This wastewater line is currently under construction at WSTF, with a planned completion date of July 31, 2013.

Wastewater currently discharged to the wastewater lagoons and septic tanks will continue discharging to these areas until final connections to the CLCWS are completed. Waste discharges to the ETU ceased on December 9, 2012 (NASA, 2012[f]). Some waste streams that were formerly discharged to the ETUs will be discharged to the CLCWS, in accordance with all federal, state, and local regulations. In the interim, before the WSTF connections to the CLCWS are fully operational, these wastes are being disposed of as follows: neutralization and discharge to the current wastewater lagoons, containerization awaiting final connection to the CLCWS, or containerization and transport off-site for disposal (Appendix A).

6.0 Operational History

6.1 Pre-WSTF History

From the early 1800s to approximately 1935, the Organ Mountains and the SAM were mined for gold, silver, zinc, copper, and lead. There were several established mines located in the SAM and numerous prospect mines. The nearest established mine to WSTF was the Smith Mine located approximately 1 mi southeast of WSTF within the Lohman Canyon area. The Smith mine produced approximately $30,000 of silver ore during its operation. Deposits of galena (lead sulfide) and barite ($BaSO_4$) were also mined just north of the eastern mouth of Bear Canyon.

Lands now occupied by WSTF were historically open-range grazing lands. The ruins of an historic ranch house (Gardner Ranch, dates of operation unknown) is located just east of the current 200 Area laboratory facilities, and Love Ranch (believed to be in operation from the early 1900s until the 1950s) is located approximately 2.5 mi northeast of the 200 Area. These properties were acquired by the federal government and became part of WSMR.

6.2 Inception of WSTF

NASA Headquarters announced selection of a testing site in south-central New Mexico on July 6, 1962. The site was chosen for the isolated location and topography, which minimize the inherent hazards of aerospace propulsion testing to the general population. From the date of the official announcement until January 1965, the site was known as the Propulsion Systems Development facility. From January to June 1965, the official designation was White Sands Operations. On June 16, 1965, the official name of the installation was changed to White Sands Test Facility.

Site planning activities began in August 1962. Exploratory drilling to locate a water supply source began in December 1962, and drilling of water supply wells was completed in May 1963. Development of the site location began in May 1963 with construction of the access road (NASA Road) from U.S. Highway 70. The access road was completed in October 1963 (NASA, 1980; NASA, 1984[b]). The first increment of the 300 Propulsion Test Area was completed in January 1964, and the first permanent personnel began working at WSTF in April 1964. The second increment of the 300 Propulsion Test Area was completed by June 1964, followed by the 200 Area Preparation Buildings (200 and 201 in December 1964 and 203 in March 1965) and the 400 Propulsion Test Area, in November 1965. The 100 Area was constructed to be the project control area. Building 100 was completed in March 1964, followed by Building 101 in January 1965. Other support buildings (such as the cafeteria and warehouse) were also constructed during 1964 and 1965. The 800 Area was completed between January 1974 and December 1979 (NASA, 1984[b]). The 200 Area LabCon Facility addition to Building 200 was constructed from 1989 to 1990. The 250 and 270 testing areas were completed between 1987 and 1991 (NASA, 1994).

Locations for the specific areas of WSTF were chosen in order to prevent potential hazards in each area from impacting any other areas. Hazardous test and storage areas were located downwind from administration areas, the 300 and 400 propulsion areas were positioned so that they were not in line with respect to the prevailing wind direction, and the 200 Area was located far enough from the 300 and 400 propulsion areas for sufficient acoustic attenuation, blast pressure decay, and adequate reduction of fragment impingement hazards, but close enough for easy transport of test articles to and from the test areas (NASA, 1980). The land use buffer zone surrounding WSTF was designed to ensure a safe distance for diffusion of vapors or other hazards to avoid impacts to off-site inhabitants, livestock, and agriculture.

7.0 Sanitary Sewer Connections

The WSTF water supply is considered to be *"private"* and *"off-site"* by NMED because the water supply wells for WSTF (wells J and K) supply only WSTF (and NASA WSTF tenants, White Sands Complex [WSC] and ADF-SW) and are located over 100 ft from the lot of any septic tank (Figure 3.5). WSTF was designed as a hazardous testing facility with separate disposal systems for hazardous waste and non-hazardous wastewater. The WSTF sanitary sewer system was constructed to discharge non-hazardous wastewater to wastewater lagoons, septic tank systems, or rarely to grade. In areas that contained the majority of employees, e.g., the WSTF 100 and 200 Areas and STGT, wastewater lagoons were designed for disposal. Septic tank systems were designed for use at WSTF for a variety of reasons, including: use prior to wastewater lagoon completion, e.g., Building 114 and STGT; in areas where fewer employees worked on a daily basis, e.g., the 300 and 400 Areas; in remote areas, e.g. Building 116, the Main Guard Gate; and areas where the elevation of the buildings were below the elevation of the nearest wastewater lagoon, e.g., Buildings 802/803. Rarely, sanitary sewer lines discharged non-hazardous waste to grade, e.g., Building 153.

This HIS will focus on septic tank systems at WSTF. Table 7.1 provides a summary of septic tank information, including dates of use, tank and leach field characteristics, maintenance, malfunctions, and discharged hazardous substances. Historical photographs of the septic tank systems areas are included in Appendix B. As-built diagrams or drawings of each septic tank, where available, are included in Appendix C. The Wastewater Lagoon Areas HIS (NASA, 2012[e]) includes detailed history and descriptions of the WSTF wastewater lagoons.

7.1 Abandoned Connections or Discharges to Grade

There are several abandoned sewer connections or discharge pipes to grade within the 100 Area. These are summarized below.

7.1.1 Abandoned 100 Area Trailers Connection

According to long-term WSTF personnel, the sewer line located to the east of the newly constructed Building 149 in Figure 7.1 was historically connected to approximately 11 or 12 temporary trailers used for offices when the site was under construction in January 1964 to early to mid-1965. There were four trailers attached together in this complex that reportedly contained bathrooms and water fountains for the offices. There were also several duplex trailers that contained no sewer connections, and which consisted of offices for copying, printing, and drafting activities (Appendix A). The sewer line connected to the trailers (east of Building 149) discharged into the 100 Area wastewater lagoon and was capped and abandoned in place after the completion of Building 101. The trailers were shipped off site, relocated for other uses at WSTF, or utilized by the WSTF Fire Department for fire-fighting training.

7.1.2 Building 153 Discharge to Grade

Figure 7.1 shows the sanitary sewer system in the 100 Area. There are two abandoned lines (shown in purple). The line to the south of the figure was historically connected to a shower located within Building 153. A brief description of this line was provided in NASA's response to the NMED Approval with Modifications Wastewater Lagoon Areas HIS and Closure IWP (NASA, 2013[b]). While research was conducted for this HIS, additional long-term (including retired) WSTF personnel were questioned regarding this line for additional details. One employee stated that this building (153) was used as a gymnasium for NASA employees from 1964 to approximately 1973. The gymnasium had contained exercise equipment, and the shower was used by personnel for personal cleaning following exercising.

The shower effluent drained to grade and would have included soaps and shampoos. This line was capped and abandoned in place.

7.1.3 Building 116 Drain to Grade

There is another pipe that drained to grade in the 100 Area, but is not part of the sanitary sewer piping (Figure 7.1). From a WSTF drawing of the 100 Area, this pipe is constructed of 4-inch (in.) clay and connected to a grate drain in a paved parking area located to the north of Building 116, the Main Guard Gate (Figure 7.1; Appendix C). The pipe extends 45 ft southeast under Apollo Boulevard and discharges to grade over soil just to the east of the boulevard. A photograph of the area in 1976 shows the location of the drain to grade (Appendix B).

A long-term WSTF security employee stated that this area (and drain) was historically used for washing dust/dirt from vehicles. Effluent would have contained water, soil, and commercially available vehicle soaps or dish-washing soaps. This practice ceased approximately in 2009 or 2010. Current WSTF personnel stated that the pipe has not been capped and remains open; however, there are currently no processes that discharge any wastes to this drain or pipe (Appendix A).

All vehicles are currently washed by General Services Administration (GSA) personnel at Building 151. There are no known drains to grade located near Building 151.

7.2 Building 114 Septic Tank System

Building 114 is located within the WSTF 100 Area to the north (Figure 3.1) and was constructed in 1963, prior to the completion of the 100 Area wastewater lagoon and other 100 Area buildings. The building was initially used as a *"shop"* and *"general purpose building."* It is currently used for storage (NASA, 1994). A long-term WSTF employee stated that the building was used as the WSTF *"print shop"* or reproduction facility from 1963 to the mid-1980s, when the reproduction shop was relocated to Building 101. The exact year the reproduction facility moved to Building 101 could not be determined; however, a long-term WSTF employee stated that Building 114 was already being used for storage in March 1989, when the employee began working at WSTF (Appendix A). According to long-term WSTF personnel, Building 119 was installed in the mid-1990s (1995 to 1996) and was initially used to support a weather satellite that mapped ocean currents and temperature. The WSTF radio and communications group began using the building approximately in 1997 (Appendix A). Buildings 114 and 119 are serviced by the Building 114 septic tank system (Figure 7.1). Appendix B provides historical photographs of the Building 114 septic tank area, and Table 7.1 provides septic tank summary information.

7.2.1 Permit Status (Building 114 Septic System)

The Building 114 septic tank system is not permitted. Since this septic tank system was installed in 1963, there was no requirement for septic tank permits from NMEID at that time. Refer to Section 5.0 for a description of historical regulations. This septic tank was assigned as SWMU 22 in the NASA WSTF Permit (NMED, 2009).

7.2.2 Description (Building 114 Septic System)

Appendix B contains photographs of the Building 114 septic tank area showing Building 119 as well. Due to its age, there are not many documents describing the Building 114 septic tank system. The tank has been reported as a 1,200-gal. capacity unit that was installed as part of the original WSTF building construction (NASA, 1996[b]). The only reference to the type of leach field associated with this system is stated in the NASA WSTF Facilities Master Plan, *"Building 114, constructed before the sewage system,* *is serviced by a septic tank and tile drain field"* (NASA, 1994). This tank is shown on three historical WSTF drawings, one site-wide (drawing number 019-41800), and two drawings depicting Building 119 (drawing numbers 119-C-01 and 5175). None of the WSTF drawings show the leach field or contain quantitative data regarding the septic tank or system, e.g., setbacks, number, length, or width of leach field lines.

7.2.3 Discharge Sources (Building 114 Septic System)

According to long-term WSTF personnel, the Building 114 septic tank was installed in 1963, originally to service Building 114 (NASA, 1994) and a temporary trailer located adjacent to Building 118. This temporary trailer contained a bathroom with commodes and sinks and was used by the WSTF Fire Department until approximately July 1964, when the original Fire Department building was completed (Building 112, which is now used by facilities personnel as offices; Appendix A. The current Fire Department Building [104] was constructed in 1992; NASA, 1994). The temporary trailer located adjacent to Building 118 was removed to the 100 main burn pit area and was used for fire-fighting training. Building 119 was constructed in the mid-1990s and connected to the Building 114 sanitary sewer lines that led to the septic system, and not connected to the septic tank directly (Figure 7.1; Appendix A).

7.2.4 Discharge Volume (Building 114 Septic System)

Discharge volumes for active WSTF septic tank systems were calculated and submitted to NMED in an application to renew DP-392 in 2006, *"All septic tank maximum discharge volumes (4,780 gpd total) were calculated based on the design flows of the septic system. These design flows were based on fixture units within the tank."* For the Building 114 septic tank, the design flow rate reported to NMED was 600 gpd (NASA, 2006[d]). Three employees currently work in Building 119 and discharge wastes to the Building 114 septic tank system.

7.2.5 Operational History (Building 114 Septic System)

Long-term WSTF employees interviewed stated that historically, the Building 114 septic tank performed adequately as designed until there was a back-up of the system in 2007. Refer to Section 9.2.1 for a discussion of this incident.

Pumping history for the Building 114 septic tank is unclear. In a letter describing WSTF septic systems provided to NMED in 1996, it was stated, *"All WSTF septic tanks…were pumped out in 1994 and will continue to be pumped out every other year."* The table provided included Building 114 as a WSTF septic tank, indicating that this tank was pumped out in 1994. Then, the DP-392 renewal and modification application in 2006 provided a table that listed the last pumping date for Building 114 as 1994 (NASA, 2006[d]). However, a long-term employee supervising septic tanks at WSTF (1987-2009) stated that the exact location of the Building 114 septic tank was not known to current employees until the septic tank system malfunctioned in 2007. The employee believed the Building 114 septic tank had been pumped at the time of the malfunction in 2007 (Appendix A). Another long-term WSTF employee stated that the Building 114 septic tank had not been pumped until 2012. Refer to Section 9.2.1 for additional discussions of this issue.

In October 2008, the Building 114 septic tank was excavated and manholes were installed in order to facilitate annual inspections, which have been conducted by WSTF personnel since December 2009 (NASA, 2013[e]), and in November 2012, the Building 114 septic tank was pumped out (NASA, 2013[e]; NASA, 2012[g]). Johnny's Septic Tank Company (JSTC) performed the service and disposed of the effluent in accordance with applicable liquid waste disposal laws.

7.3 Building 116 Main Guard Gate Septic Tank System

Building 116, designated as the Main Guard Gate, is located within the WSTF 100 Area to the south (Figure 3.1) and was constructed in 1964 for use as a security guard station to control WSTF site access (NASA, 1994). Long-term WSTF personnel stated that the small building originally contained no sewer access. A temporary trailer, T164, was installed in this area, reportedly in 1966. This building was serviced by the Building 116 septic tank (Figure 7.1). Section 7.3.3 includes a description of the discharge sources for this system. Appendix B contains historical photographs of the Building 116 (Main Guard Gate) and septic tank area, and Table 7.1 provides septic tank summary information.

7.3.1 Permit Status (Building 116 Septic System)

The Building 116 (Main Guard Gate) septic tank system was not permitted. Since this septic tank system was installed in 1966, there was no requirement in the liquid waste disposal regulations for septic tank permits at that time. Section 5.0 contains a description of historical regulations. This septic tank has been assigned as SWMU 21 in the NASA WSTF Permit (NMED, 2009).

7.3.2 Description (Building 116 Septic System)

No WSTF drawings depicting the Building 116 (Main Guard Gate) septic tank system could be located. However, several documents provide information regarding this system. The septic tank has been reported as a 500-gal. capacity unit that was installed as part of the original WSTF building construction (NASA, 1996[b]) with a leach field area of 1,250 ft^2 (NASA, 2006[d]). Details of the leach field and septic tank system construction are unknown due to lack of records; however, the general direction of the leach field flow can be determined by increased vegetation growth using historical photographs (Appendix B).

7.3.3 Discharge Sources (Building 116 Septic System)

Long-term WSTF personnel stated that the Building 116 (Main Guard Gate) septic tank originally serviced a bathroom located within a temporary building (a trailer titled T164) that was installed just northeast of Building 116. Appendix B contains historical photographs showing this trailer. According to long-term WSTF personnel, in 1999, this temporary trailer was removed, reportedly due to a concern regarding asbestos located within the trailer, and an addition was constructed to Building 116 that included bathroom facilities. The sewer line was excavated, and the Building 116 sewer lines were connected to the temporary trailer sewer line and not the actual septic tank.

7.3.4 Discharge Volume (Building 116 Septic System)

Discharge volumes for active WSTF septic tank systems were calculated and submitted to NMED in an application to renew DP-392 in 2006. For the Building 116 (Main Guard Gate) septic tank, the design flow reported to NMED was 200 gpd (NASA, 2006[d]).

7.3.5 Operational History (Building 116 Septic System)

The Building 116 septic tank was reportedly installed in 1966 (NASA, 2006[d]). Long-term WSTF employees interviewed stated that historically, the Building 116 (Main Guard Gate) septic tank performed adequately as designed. There have never been any reported malfunctions, overflows, or back-ups of the system, and no regular maintenance was performed. WSTF documentation, long-term employees, and undisturbed large vegetation indicate that this septic tank has likely never been pumped out, and the exact location of the tank is not known to current WSTF employees.

From a May 1993 purchase order, the Building 116 (Main Guard Gate) septic tank was scheduled to be pumped out (NASA, 1993[a]); however, in a document submitted to NMED in 1996, it was stated, *"All WSTF septic tanks (except for the guard shack which we are trying to find) were pumped out in 1994 and will continue to be pumped out every other year"* (NASA, 1996[b]). No other documentation was located that discussed pumping out the Building 116 (Main Guard Gate) septic tank. This septic tank has reportedly been inspected annually by WSTF personnel since 2009 (NASA, 2013[e]); however this information may be a result of an error in the database system.

Building 116, and therefore the septic tank system as well, is currently inactive. WSTF security ceased using the building as a security guard station in 2011. According to current WSTF personnel, Building 116 is currently scheduled for demolition in NASA fiscal year 2014 if no use for the building is determined (NASA, 2013[c]).

7.4 Building 117 Forward Guard Gate Septic Tank System

Building 117, or the Forward Guard Gate, is located along NASA Road, south of the WSTF 100 Area (Figure 3.1) and was constructed in 2006 as an added security measure to control access to all WSTF site areas. The original WSTF site, when constructed, consisted of the 100 through 600 Areas. The original security guard site, Building 116, was adequate to control site access at that time; however, with the addition of the increased development of the 600 Area (e.g., monitoring wells, remediation systems), and satellite areas (TDRSS, STGT, ADF-SW), the original security station (Building 116) was no longer adequate to control site access. Building 117 is serviced by a septic tank system (Figure 7.1). Appendix B provides an historical photograph of the Building 117 septic tank area, and Table 7.1 provides septic tank summary information.

7.4.1 Permit Status (Building 117 Septic System)

The Building 117 (Forward Guard Gate) septic tank was installed in 2006 at WSTF, but was not permitted with the NMED LWP as the majority of the WSTF site septic tank systems were. An amendment request was sent to NMED March 29, 2006 to add this septic tank to DP-392 (NASA, 2006[a]). NASA received permission from NMED GWQB to construct and temporarily use the Building 117 (Forward Guard Gate) septic tank system on May 12, 2006. The temporary permission to use the septic tank extended for 120 days from the date of the letter. NMED stated, *"This approval is contingent…upon the following condition: Submit an application to renew and modify DP-392 to include all septic tank leachfields located at the 100, 200, and 600 Areas into the Discharge Permit"* (NMED, 2006). Section 5.0 describes historical regulations and Section 5.4 includes DP-392 history regarding WSTF site septic tank systems. The Building 117 septic tank has not been assigned a SWMU number in the NASA WSTF Permit.

7.4.2 Description (Building 117 Septic System)

The proposed Building 117 (Forward Guard Gate) septic tank system was described in the application submitted to NMED. The leach field was to encompass 231.6 ft^2 with three 45-ft trenches with widths of 3 ft. Figure 7.1 shows this septic tank and leach field. In the septic tank application, it was stated that the trenches contain high-capacity gravelless infiltrators *("12 quik 4s")*, with the depth from the ground surface to the bottom of the absorption area being approximately 4 ft. The septic tank for this building has a capacity of approximately 900 gal. The estimated depth to the water table was estimated to be greater than 100 ft below ground surface (bgs), and the soil type was listed as sandy loam (NASA, 2006[a]). The as-built diagram completed by JSTC personnel is provided in Appendix C, and contains specific information regarding the Building 117 septic tank system as it was installed. The septic tank depth is 30 in., risers are 30 in., and there appears to be one leach field trench, instead of the three that were proposed.

The effluent line from the building to the septic tank is approximately 55 ft in length, and the effluent line from the septic tank to the leach field is approximately 5 ft in length.

7.4.3 Discharge Sources (Building 117 Septic System)

The Building 117 (Forward Guard Gate) septic tank was installed to service a bathroom with a sink and a HVAC condensate drain located within the guard building (NASA, 2005[b]). A remote waste disposal system was chosen due to the large distance (over 1 mi) between this building and the closest wastewater lagoon (within the 100 Area; Figure 3.1).

7.4.4 Discharge Volume (Building 117 Septic System)

The system was designed for use by four security guard employees. At 20 gpd per employee, that is a total design flow rate of 80 gpd.

7.4.5 Operational History (Building 117 Septic System)

In an internal document in 2005, both a conventional septic tank system and a waste holding tank were considered for use at Building 117, the Forward Guard Gate (NASA, 2005[b]). NASA chose to install a septic tank system, which was completed by JSTC on April 17, 2006. This septic tank system has functioned as designed. The Building 117 septic tank has not been pumped out to date, but has been inspected yearly by WSTF personnel since 2009 (NASA, 2013[e]). This is the only WSTF site septic tank that is currently scheduled to be retained by NASA. All other septic tanks are scheduled for removal at this time.

7.5 250 Area Septic Tank System

The 250 Area is located within the WSTF 200 Area across Apollo Boulevard and to the west of the main 200 Area Laboratories Complex (Figure 3.2). According to long-term WSTF personnel, the 250 Area was used initially as a temporary building complex while the 200 Area was under construction (Appendix A). These temporary trailers were connected to a septic tank system, referred to in this HIS as the 250 Area septic tank, which was located across Apollo Boulevard from the South Highbay. Figure 7.2 shows the 200 and 800 Area sanitary sewer systems. Appendix B contains historical photographs of the 250 Area showing changes in building configurations and septic tank use through time and Table 7.1 provides septic tank summary information.

7.5.1 Permit Status (250 Area Septic System)

The 250 Area septic tank system was not permitted. Since this septic tank system was installed in 1963/1964, there were no liquid waste disposal requirements for septic tank permits from NMEID at that time. Section 5.0 describes historical regulations. This septic tank has not been assigned a SWMU number in the NASA WSTF Permit (NMED, 2009).

7.5.2 Description (250 Area Septic System)

A WSTF drawing was located that shows some details for the 250 Area septic tank (Appendix C). This drawing shows that the septic tank was 8 ft wide, 8 ft tall, and 5 ft 6-in. deep, resulting in an approximate tank capacity of 2,600 gal. The tank appears to have been constructed of 2-in. thick redwood. The effluent pipe from the temporary trailers to the septic tank was annotated as *"4" cast iron pipe."* The effluent pipe from the septic tank to the leach field was 4 ft of 4-in. cast iron pipe. The leach field piping was annotated as, *"4'-0" joints of 4"0 perforated orangeberg drain pipe."* According to a real estate article written in

2008, Orangeburg pipe was manufactured by a company in Orangeburg, NY, where the name was derived. This kind of pipe was composed of bituminized fiber, or made of cellulose fibers impregnated with hot coal pitch and treated under pressure with a water-resistant adhesive. Orangeburg pipe degrades with age, with an approximate lifespan of 50-60 years (Property Blotter, 2008). Redwood septic tanks have a lifespan of 15-45 years (Kahn, 2007); therefore, it is likely that the 250 Area septic tank and leach field lines have degraded, and may no longer be present.

7.5.3 Discharge Sources (250 Area Septic System)

On the WSTF drawing (Appendix C) for the 250 Area septic tank, the discharge line to the tank was annotated, *"to trailers 250."* This is consistent with information obtained from interviews of long-term WSTF personnel stating that there were many trailers historically located in the 250 Area that were connected to the septic system. These trailers were offices and contained bathrooms with commodes and sinks that discharged to the 250 Area septic tank (Appendix A). There was also a small building (251). This building is listed as a *"Battery Bldg. – Test Prep Area"* in a 1971 WSTF Environmental Impact Statement (NASA, 1971). According to long-term WSTF employees, this building was used for *"ready supplies and hardware"* and did not contain any sewer access (Appendix A).

7.5.4 Discharge Volume (250 Area Septic System)

No documents could be located that provide information regarding the volume of wastes discharged to this septic system. The number of employee that historically worked in this area is also unknown. Long-term WSTF personnel could not provide estimates for the number of employees or the discharge rate for this septic tank.

7.5.5 Operational History (250 Area Septic System)

Long-term WSTF personnel stated that temporary trailers were initially installed in the 250 Area, attached together for use as offices, for various contractor companies at WSTF to use prior to the completion of the 200 Area main Laboratories Complex (Appendix A). Appendix B contains photographs of the 200/250 Areas in 1964, showing Building 201 and the South Highbay under construction as well as the trailers. The 250 Area continued to contain temporary office trailers through the Apollo Program at WSTF, from 1963/1964 to approximately 1970 (Appendix B), when the Apollo Program ceased testing at WSTF. Long-term WSTF employees stated that the office trailers installed in the 250 Area discharged to the 250 Area septic tank (Appendix A; Figure 7.2), and these offices were used by the Grumman Corporation, which was the contractor that tested the Lunar Excursion Module, and the Zia Company, which was the contractor that maintained WSTF facility functions during the time of Apollo Program testing at WSTF. It was stated in the draft RFI that for the Apollo Program, *"tests were performed on ascent and descent test articles from 1965 through late 1970"* (NASA, 1996[a]). From historical photographs, the 250 Area septic tank was active from 1964 through 1969. There are no photographs taken of the WSTF 250 Area in 1970; however, by May 1971 all the temporary trailers had been removed and the vegetation downslope of the septic tank had decreased significantly, indicating that the septic tank was no longer active (Appendix B).

A photograph in June 1977 shows a hollow with a shadow, indicating there is a depression at the site for the 250 Area septic tank (Appendix B). It is unknown why the 1977 photograph shows a pit at the location of the 250 Area septic tank; it could indicate that this tank was excavated or the soil collapsed above the tank. A long-term WSTF employee stated that the tank may have been removed in the mid-1980s; however, another employee inspected the 250 Area septic tank site and stated that there was currently no depression or pit. The employee believed that the septic tank is still present underground. He continued by stating that when USTs are removed at WSTF, any surrounding yellow bollards are removed as well (Appendix A). (The location of the 250 Area septic tank is still marked by yellow bollards currently). As a result, even though the tank may have been excavated or had some soil collapse in 1977, it is believed that the tank is still present underground.

7.6 Building 272 Septic Tank Systems

Building 272 is located in the 270 Area, to the southeast of the 200 Area main Laboratories Complex (Figure 3.2), and is a test facility that assesses hazards of space systems by simulating meteoroid and orbital debris impacts at velocities above 25,000 ft per second. The facility was constructed in 1991 encompassing an area of 150 ft by 50 ft. In 2005, an office addition was constructed. There are three septic tanks located at Building 272, titled A, B, and C (Figure 7.2). Appendix B provides historical photographs of the Building 272 septic tank area, and Table 7.1 provides septic tank summary information.

7.6.1 Permit Status (Building 272 Septic Systems)

NASA submitted an application to the NMED LWP to obtain a permit for the first Building 272 septic tank system (that includes tanks A and B) on November 21, 1991. NMED LWP approved the application on December 10, 1991 and assigned the septic system a permit number of LC 910939. This first septic tank system has been assigned as SWMU 23 in the NASA WSTF Permit (NMED, 2009).

The septic tank system that includes tank C has not been permitted through the NMED LWP. This septic tank was installed in 2005 at WSTF and was permitted as an amendment request to DP-392, submitted to NMED March 21, 2005 (NASA, 2005[a]). No documentation for NMED approval was located. Section 5.0 includes a description of historical regulations and Section 5.4 describes DP-392 history regarding WSTF site septic tank systems.

7.6.2 Description (Building 272 Septic Systems)

The first Building 272 septic tank system was installed to the north of Building 272 and consists of two 1,200-gal. capacity tanks (A and B) in series, with a leach field of 600 ft^2 (Figure 7.2). The leach field was designed to comprise four trenches 3 ft wide and 50 ft long each, installed with 1 ft of gravel below the drain pipes. For this septic system, the percolation rate was not provided; however, the soil type listed was clay with considerable sand or gravel. The estimated depth to the water table was 140 ft bgs (NASA, 1991[i]). Based on a WSTF drawing of the Building 272 Area, the influent pipe to the septic tank is 4-in. PVC and approximately 140 ft in length to tank A (that services the bathroom). Another 4-in. *"drain line"* from the main building (Highbay Gun Room) appears to connect with the 4-in. effluent line. The as-built diagram (Appendix C) shows that the Building 272 septic tanks system (A and B) is installed to a depth of 48 in. with a leach field depth of 30 to 60 in. The installed leach field comprises two trenches 3 ft wide with lengths of 77 ft and 90 ft with a 33 ft separation between the trenches. The effluent pipe from the septic tanks to the leach field is approximately 15 ft long. Each septic tank (both A and B) contains two access points.

The second septic tank system in the 272 Area was installed on the west side of Building 272 and consists of one 900-gal. capacity septic tank (C), with a 480 ft^2 leach field area (Figure 7.2). The leach field was designed to comprise one trench 3 ft wide and 100 ft long with 16 high capacity gravelless infiltrators. Since bedrock in the 272 Area is located very close to the surface, a percolation study was included with the permit application. The average percolation rate was 25 mpi, the soil type was listed as sandy loam, and the depth to the seasonal high water table was listed as greater than 20 ft (NASA, 2005[a]). From a WSTF diagram showing the Building 272 Area, the effluent pipe from the building to septic tank C is 4-in. PVC and approximately 40 ft in length with a 2-in. PVC *"drain line"* also attached from the south of the new building extension. The effluent pipe from septic tank C to the leach field is approximately 15 ft in length. The as-built diagram (Appendix C) shows that the Building 272 septic tank C contains two tank access points and was installed to a depth of 12 in. The leach field consists of two 50-ft trenches, 3 ft wide, and separated by 8 ft and is installed to a depth of 3 ½ ft. The effluent pipe from the septic tank to the leach field is approximately 10 ft in length.

7.6.3 Discharge Sources (Building 272 Septic Systems)

A list of current WSTF sewer connections was collected and reported in the CLCWS permit application. For Building 272, within the Highbay Gun Room, there are four floor drains (for discharging cooling water), a bathroom (with a shower), and a utility room with a sink and a washing machine. The office extension contains a bathroom with a floor drain, a break room with a sink, and a utility room with a floor drain (NASA, 2012[b]).

7.6.4 Discharge Volume (Building 272 Septic Systems)

The first Building 272 septic tank system (tanks A and B) was designed for eight employees using a calculation based on area served and the number of employees, resulting in an estimated 600 gpd for each septic tank (A and B). The second Building 272 septic tank (C) system was designed for 10 employees at 20 gpd per employee for a total of 200 gpd. The total combined design flow rate for all systems at Building 272 is 1,400 gpd.

7.6.5 Operational History (Building 272 Septic Systems)

Septic tanks A and B were installed together on December 19, 1991 by JSTC. These two septic tanks were designed to work in series. From a letter to NMED in November 1991, it was stated, *"The second tank* [B] *receives cooling water and is in series to the first tank* [A], *which catches the sewage from the building's bathroom…The second tank allows the discharge water to be more evenly distributed into the leach field"* (NASA, 1991[j]).

Septic tank C in the 272 Area was installed on April 15, 2005 by JSTC. All Building 272 septic tanks have functioned adequately as designed with no reported malfunctions. In May 1993, Southwest Septic Transport pumped out several WSTF septic tanks, including the Building 272 septic tanks A and B (NASA, 1993[a]). These two tanks were reportedly pumped out again in 1994, according to septic tank summary information submitted to NMED in 1996 (NASA, 1996[b]) and the DP-392 renewal and modification application submitted to NMED in 2006 (NASA, 2006[d]). The Building 272 tank C has not been pumped out to date. All Building 272 septic tanks have been reportedly inspected yearly by WSTF personnel since 2009 (NASA, 2013[e]).

7.7 300 Area Main Septic Tank System

The 300 Area main septic tank system was installed as part of the original WSTF site construction and services Building 300, which is located within the WSTF 300 Area (Figure 3.3). Building 300 is titled the *"Test Control Center"* also called the Block House. It was constructed in 1963 and contains offices and equipment for conducting and monitoring propulsion testing. Figure 7.3 shows the three 300 Area septic tank systems and sewer lines, including the 300 Area main septic tank system. Appendix B provides historical photographs of the 300 main septic tank area, and Table 7.1 provides septic tank summary information.

7.7.1 Permit Status (300 Area Main Septic System)

The 300 Area main septic tank system is not permitted. Since this septic tank system was installed in 1963, there was no liquid waste requirement for septic tank permits from NMEID at that time. Section 5.0 describes historical regulations. This septic tank has been assigned as SWMU 24 in the NASA WSTF Permit (NMED, 2009).

7.7.2 Description (300 Area Main Septic System)

The 300 Area main septic tank system is located to the south of Building 300, adjacent to the main parking area (Figure 3.3). Descriptions of this system were provided in several documents. From a 1967 document discussing WSTF wastes and waste management practices, it was stated, *"The sanitary wastes are disposed to a 5,800 gallon septic tank via an eight-inch gravity sanitary sewer. The septic tank siphons discharge effluents alternately to two adjacent leaching fields. Septic tank has 20 percent capacity volume for sludge buildup and percolation value of four minutes per inch for leaching fields"* (NASA, 1967). Based on a WSTF as-built drawing of the 300 Area main septic tank system (Appendix C), the two leach fields consist of a total of twelve tile trenches approximately 100 ft in length, with 10 ft separating each trench. Each leach field contains a distribution box located approximately 30 ft from the septic tank, one to the north, and one to the south of the septic tank. The effluent line from the septic tank to each distribution line has a diameter of 4 in. There are four "tile field markers" at the ground surface that mark the extent of the leach fields. These markers are located approximately 10 ft past the extent of the leach fields. The leach field area was reported to NMED as 11,000 ft^2, in the 2006 DP-392 permit renewal and modification application (NASA, 2006[d]).

7.7.3 Discharge Sources (300 Area Main Septic System)

A list of current WSTF sewer connections was collected and reported in the CLCWS permit application. The only sewer connection to the 300 Area main septic tank system is to Building 300, the Block House (Figure 7.3). Within Building 300, there are two bathrooms with commodes, sinks, and floor drains, a janitorial closet with a sink and a floor drain, and a kitchen area, or break room, with a sink (NASA, 2012[b]).

7.7.4 Discharge Volume (300 Area Main Septic System)

The discharge volume to the 300 Area main septic tank system was calculated and submitted to NMED in a letter at the request of NMED GWQB personnel. *"Table 1 contains estimates of the 300 and 400 Area…septic tank daily flow rates as you requested. The estimates are based on the number of personnel in each area that use the facilities serviced by the septic tank units and the 1994 universal plumbing code (UPC) flow criteria for office complexes (20 gallons per day (GPD) per employee…."* The 300 Area main septic tank was used by 34 employees at the time, for a daily flow rate of 680 gpd (NASA, 1996[e]).

7.7.5 Operational History (300 Area Main Septic System)

The 300 Area main septic tank was constructed as part of the original site construction in the 300 Area. This system functioned as designed with no documented repairs needed. The only malfunction identified for the 300 Area main septic tank was a one-time foul odor in 2009. Refer to Section 9.2.3 for a description. Historical maintenance practices for the 300 and 400 Area main septic tank systems were described in a 1967 document, *"The tanks are inspected and the sludge removed as required…Sludge from septic tanks is carried to the lagoons for disposal"* (NASA, 1967). This statement is referring to transporting any sludge from the 300 and 400 Area septic tanks to either the 100 or 200 Area wastewater lagoons for disposal. According to long-term WSTF personnel, this practice of disposing of sludge from the 300 and 400 Area main septic tanks to the wastewater lagoons had ceased by the mid-1980s, when the practice of contracting outside liquid waste disposal contractors, such as JSTC, to pump out WSTF septic tanks was commenced (Appendix A). No records could be located for transporting WSTF septic tank fluid or sludge to either the 100 or 200 Area wastewater lagoons.

A long-term WSTF employee stated that most WSTF septic tanks were pumped out annually from 1991 to 2009 as needed [the employee departed WSTF in 2009]; however, another long-term WSTF employee stated that WSTF septic tanks have not been maintained on a specific schedule (Appendix A). A few documents discussing maintenance of WSTF septic tanks were located. The first document was a purchase order in May 1993 for Southwest Septic Transport to pump out several WSTF septic tanks, including the 300 Area main septic tank (NASA, 1993[a]). This tank was reportedly pumped out again in 1994 (NASA, 1996[b]) and 2005 (NASA, 2006[d]). The last document was a work order in November 2012 for the 300 Area main septic tank to be pumped (NASA, 2012[g]). This septic tank has reportedly been inspected annually by WSTF personnel since 2009 (NASA, 2013[e]).

7.8 Building 320 Septic Tank System

Building 320 is located in the WSTF 300 Area towards the west (Figure 3.3). This building was constructed in 1964 as part of the original site construction. The initial use of Building 320 was *"test support"* (NASA, 1994) and a maintenance shop (Appendix A). This building was not initially constructed with bathroom facilities; however, in 1993, a bathroom was constructed that discharged to a septic tank Figure 7.3. Appendix B provides historical photographs of the Building 320 septic tank area, and Table 7.1 provides septic tank summary information.

7.8.1 Permit Status (Building 320 Septic System)

An application was submitted to NMED to permit the Building 320 septic tank system on August 6, 1993. NMED approved the application on August 9, 1993, and assigned the system a permit number of LC 930858 (NASA, 1993[b]). The original permit application had been submitted by Lockheed (a WSTF contractor). This septic tank has been assigned as SWMU 25 in the NASA WSTF Permit (NMED, 2009).

7.8.2 Description (Building 320 Septic System)

The Building 320 septic tank system consists of a 1,200-gal. capacity septic tank, with a leach field of 360 ft^2 (Figure 7.3). The leach field was designed to comprise three trenches 3 ft wide and 40 ft long each, installed with 1 ft of gravel below the drain pipes. For this septic system, the percolation rate was not provided; however, the soil type listed was fine sand. The estimated depth to the water table was 20 ft bgs (NASA, 1993[b]). The as-built diagram (Appendix C) shows that the Building 320 septic tank is installed to a depth of 12 in. with a leach field depth of 24 to 36 in in *"loamy"* soil. The installed leach field comprises three trenches 3 ft wide with lengths of 40 ft, 30 ft, and 30 ft with a 10 ft separation between the trenches. The effluent pipe from the septic tanks to the leach field is approximately 5 ft long. The septic tank contains two access points and is located approximately 26 ft from Building 316. The actual septic tank system installed faces east (in front of Buildings 316A and 317A), whereas the designed septic tank system faced west (away from Buildings 316A and 317A).

7.8.3 Discharge Sources (Building 320 Septic System)

Building 320 contains a bathroom with a floor drain, a sink, and a shower that discharge into the Building 320 septic tank system.

7.8.4 Discharge Volume (Building 320 Septic System)

The Building 320 septic tank system was designed to service 10 employees at 20 gal. per employee for a total of 200 gpd.

7.8.5 Operational History (Building 320 Septic System)

The Building 320 septic tank system was installed by JSTC in August 1993. According to long-term WSTF personnel (Appendix A), the septic system performed adequately as designed, except for one malfunction, requiring a repair of the leach line. Refer to Section 9.2.4 for a description.

A long-term WSTF employee stated that most WSTF septic tanks were pumped out annually from 1991 to 2009 as needed [the employee departed WSTF in 2009; Appendix A]; however, another long-term WSTF employee stated that WSTF septic tanks have not been maintained on a specific schedule through history (Appendix A). Two documents discussing maintenance of the Building 320 septic tank were located. The first was the DP-392 renewal and modification application in 2006. In this document, there was a table provided that listed the last pumping date for Building 320 as 1994 (NASA, 2006[d]). Then, from a November 2012 WSTF work order, three WSTF septic tanks were pumped out, including the Building 320 septic tank (NASA, 2012[g]; NASA, 2013[e]). Inspections have been reportedly conducted annually since March 2009 (NASA, 2013[e]).

7.9 Building 364 Septic Tank System

Building 364 is located within the 300 Area at WSTF to the southeast (Figure 3.3) and was constructed in 1992 for use as an *"Engineering Building,"* or office building (NASA, 1994). The term engineering building was historically used to describe office buildings. A septic tank system services Building 364 (Figure 7.3). Appendix B provides historical photographs of the Building 364 septic tank area, and Table 7.1 provides septic tank summary information.

7.9.1 Permit Status (Building 364 Septic System)

NASA submitted an application to NMED in order to obtain a permit for the Building 364 septic tank system on November 26, 1991. NMED approved the application on December 2, 1991 and assigned the system a permit number of LC 910918 (NASA, 1989). This septic tank has been assigned as SWMU 26 in the NASA WSTF Permit (NMED, 2009).

7.9.2 Description (Building 364 Septic System)

The Building 364 septic tank system consists of a 1,200-gal. capacity tank with a leach field of 180 ft^2 (Figure 7.3). The leach field was designed to consist of three trenches 3 ft wide and 20 ft long each, with 1 ft of gravel installed below the drain pipes. The percolation rate of the soil was not provided; however, the soil type was listed as clay with considerable sand or gravel. The estimated depth to the seasonal high water table was 140 ft bgs (NASA, 1991[k]). The as-built diagram (Appendix C) shows that the Building 364 septic tank is actually installed with one trench 3 ft wide and 60 ft long. The septic tank is installed to a depth of 15 in., is 9 ft long with 6 ft between two tank access points, and is located 20 ft, 6 in. from Building 363. The leach field is installed to a depth of 30 in.

7.9.3 Discharge Sources (Building 364 Septic System)

A list of current WSTF sewer connections was collected and reported in the CLCWS permit application. For Building 364, there are two bathroom facilities with commodes, sinks, and a floor drain in each (NASA, 2012[b]). There are no other sewer connections to the Building 364 septic tank system.

7.9.4 Discharge Volume (Building 364 Septic System)

The Building 364 septic tank was designed to service a 40 by 60 ft area for 10 employees, resulting in a design flow rate calculated of 300 gpd.

7.9.5 Operational History (Building 364 Septic System)

The Building 364 septic tank was installed in December 1991 by JSTC. This septic tank has functioned mostly as designed. The Building 364 septic tank was pumped out in July 2008, in order to facilitate repairs. Section 9.2.5 describes the malfunction and repair to this septic system. Inspections have been reportedly conducted annually since 2009 (NASA, 2013[e]).

A long-term WSTF employee stated that most WSTF septic tanks were pumped out annually from 1991 to 2009 as needed [the employee departed WSTF in 2009; Appendix A]; however, another long-term WSTF employee stated that WSTF septic tanks have not been maintained on a specific schedule through history (Appendix A). A few documents discussing maintenance of WSTF septic tanks were located. The first document was a purchase order in May 1993 for Southwest Septic Transport to pump out several WSTF septic tanks, including the Building 364 septic tank (NASA, 1993[a]). Then, in a septic tank information letter provided to NMED in 1996, it was stated, *"All WSTF septic tanks…were pumped out in 1994 and will continue to be pumped out every other year."* The table provided included Building 364 as a WSTF septic tank, indicating that this tank was pumped out in 1994 (NASA, 1996[b]). Then, the DP-392 renewal and modification application in 2006 provided a table that also listed the last pumping date of Building 364 as 1994 (NASA, 2006[d]). Finally, based on information provided by a WSTF work order, the Building 364 septic tank was pumped out in November 2012 (NASA, 2012[g]; NASA, 2013[e]).

7.10 400 Area Main Septic Tank System

The 400 Area main septic tank system was installed as part of the original WSTF site construction and services Buildings 400, 411, 412, and 440, which are located within the WSTF 400 Area (Figure 3.4). Building 400 is the *"Test Control Center,"* or Block House. This building was constructed in 1964 and contains offices and equipment for conducting and monitoring propulsion testing. Buildings 411 and 412 were both constructed in 1964, designated as *"Stand Support Building,"* and used as a *"Test Support Facility"* (NASA, 1994). Long-term WSTF personnel stated that the buildings had been and currently are used for equipment storage. Building 440 was also constructed in 1964, designated *"Diesel Generator Building,"* and used as a *"Mechanical/Electrical Equipment Shelter"* (NASA, 1994). Building 440 is currently an office building and designated *"Propulsion Building."* According to a long-term WSTF employee, Building 464 is an office trailer complex that was installed January 2013 (Appendix A). Refer to Section 7.10.3 below for a description of sewer connections by building to the 400 Area main septic tank. Figure 7.4 shows the three 400 Area septic tank systems and sewer lines, including the 400 Area main septic system. Appendix B provides historical photographs of the 400 main septic tank area, and Table 7.1 provides septic tank summary information.

7.10.1 Permit Status (400 Area Main Septic System)

The 400 Area main septic tank system is not permitted. Since this septic tank system was installed in 1964, there was no liquid waste disposal requirement for septic tank permits from NMEID at that time. Refer to Section 5.0 for a description of historical regulations. This septic tank has been assigned as SWMU 27 in the NASA WSTF Permit (NMED, 2009).

7.10.2 Description (400 Area Main Septic System)

The 400 Area septic tank system is located to the south of Building 400, adjacent to the main parking area (Figure 3.4). Descriptions of this system were provided in several documents. From a 1967 document discussing wastes and waste management at WSTF, it was stated, *"The sanitary wastes are disposed to approximately 6,200 gallon septic tank via an eight-inch gravity sanitary sewer. The septic tank capacity is for 24-hour detention period plus 20 percent additional volume for sludge space. The septic tank siphons discharge effluents alternately to two leaching fields. The percolation value for leaching fields is 4.6 minutes per inch"* (NASA, 1967). Based on a WSTF as-built drawing of the 400 Area main septic tank system (Appendix C), the two leach fields consist of a total of 14 tile trenches approximately 100 ft in length, with 7 ft, 6 in. separating each trench. The two leach fields are separated by 10 ft. Distribution boxes approximately 5 ft in width are located at the northeast corner of both leach fields. There are three "marker posts," (titled "tile field markers" in the 300 Area) located 5 ft outside the perimeter of the leach fields on the northwest, southwest, and southeast corners. (A distribution box marks the northeast corner.) The leach field area was reported to NMED as 11,000 ft^2, in the 2006 DP-392 permit renewal and modification application (NASA, 2006[d]).

The as-built drawing (Appendix C) also shows portions of the sanitary sewer lines from Buildings 400, 411, 412, and 440. Piping from each building meets at a central manhole located 56 ft, 2 in. northeast of the 400 Area main septic tank. All sanitary sewer piping leading to and from the 400 Area main septic tank has a diameter of 6 in.

7.10.3 Discharge Sources (400 Area Main Septic System)

A list of current WSTF sewer connections was collected and reported in the CLCWS permit application. Five buildings contain sewer connections to the 400 Area main septic tank system: Building 400, Building 411, Building 412, Building 440 (NASA, 2012[b]), and the recently installed Building 464 (Appendix A; Figure 7.4). Building 400 contains two bathrooms with commodes, sinks, and floor drains, a kitchen area, or break room, with a sink, a janitorial closet with a floor drain and sink, and a mechanical room with a floor drain. Buildings 411 and 412 each contain a bathroom with commodes and sinks, a shower, and a mechanical room with a floor drain. In Building 440, there is a bathroom with commodes, sink, and a floor drain (NASA, 2012[b]). The recently installed Building 464 contains two bathrooms with commodes and sinks and a break room with a sink (Appendix A). Based on an historical drawing of the 400 Area, there was also a cooling tower that discharged to the 400 Area main septic tank system. This cooling tower was located adjacent to Building 440 on the south side. According to a long-term WSTF employee, this cooling tower had not been used at WSTF since at least 1984, when the employee began working at WSTF. The cooling tower was removed from Building 440 in the early 1990s (Appendix A).

7.10.4 Discharge Volume (400 Area Main Septic System)

The discharge volume to the 400 Area main septic tank system was calculated and submitted to NMED in a letter at the request of NMED GWQB personnel. *"Table 1 contains estimates of the 300 and 400 Area…septic tank daily flow rates as you requested. The estimates are based on the number of personnel* *in each area that use the facilities serviced by the septic tank units and the 1994 universal plumbing code (UPC) flow criteria for office complexes (20 gallons per day (GPD) per employee….”* The 400 Area main septic tank was used by 39 employees at the time, for a daily flow rate of 780 gpd (NASA, 1996[e]).

7.10.5 Operational History (400 Area Main Septic System)

The 400 Area main septic tank was constructed as part of the original site construction in the 400 Area. This system functioned as designed with several repairs needed historically. Section 9.2.6 includes details of any system malfunctions or discharges.

Historical maintenance practices for the 300 and 400 Area main septic tank systems were described in a 1967 document, *“The tanks are inspected and the sludge removed as required…Sludge from septic tanks is carried to the lagoons for disposal”* (NASA, 1967). This statement is referring to transporting any sludge from the 300 and 400 Area septic tanks to either the 100 or 200 Area wastewater lagoons for disposal. According to long-term WSTF personnel, this practice of disposing of sludge from the 300 and 400 Area main septic tanks to the wastewater lagoons had ceased by the mid-1980s, when the practice of contracting outside liquid waste disposal contractors, such as JSTC, to pump out WSTF septic tanks was commenced (Appendix A). No records could be located for transporting WSTF septic tank fluid or sludge to either the 100 or 200 Area wastewater lagoons.

A long-term WSTF employee stated that most WSTF septic tanks were pumped out annually from 1991 to 2009 as needed [the employee departed WSTF in 2009; Appendix A]; however, another long-term WSTF employee stated that WSTF septic tanks have not been maintained on a specific schedule through history (Appendix A). A few documents discussing maintenance of WSTF septic tanks could be located. The first document was a purchase order in May 1993 for Southwest Septic Transport to pump out several WSTF septic tanks, including the 400 Area main septic tank (NASA, 1993[a]). Then, a septic tank information letter provided to NMED in 1996 provided a table of WSTF septic tanks, including the 400 Area main septic tank, and stated that all WSTF septic tanks were pumped out in 1994. The DP-392 renewal and modification application in 2006 provided a table that listed a pumping date for the 400 Area main septic tank as 2006 (NASA, 2006[d]).

According to the WSTF work order database, the 400 Area main septic tank was inspected by WSTF personnel on November 20, 2008. WSTF personnel determined that the septic tank required pumping, and the 400 Area main septic tank was pumped out by JSTC on December 17, 2008 (NASA, 2013[e]).

Other documented maintenance performed included removing vegetation around the septic tanks, painting the protective bollard poles surrounding the septic tank, and constructing and installing a lid on the septic tank diverter box in October 2010. The 400 Area main septic tank has been reportedly inspected yearly by WSTF personnel since 2008 (NASA, 2013[e]).

7.11 Building 447 Septic Tank System

Building 447 is located in the WSTF 400 Area to the west (Figure 3.4) and was constructed in 1990. This building encompasses an area of approximately 25 ft by 30 ft (NASA, 1990[b]). The official WSTF name for the building was the *“Altitude Simulation System Building,”* with an initial use listed as a *“support building”* (NASA, 1994) and a *“steam team support building”* (NASA, 2006[d]). According to a long-term WSTF employee, this building is used as a *“shop.”* Building 447 is serviced by the Building 447 septic tank (Figure 7.4), which also services Building 448. Building 448 was constructed in 1967, titled *“Steam Generator Support Building,”* and used as a storage building (NASA, 1994). Appendix B provides historical photographs of the Building 447 septic tank area, and Table 7.1 provides septic tank summary information.

7.11.1 Permit Status (Building 447 Septic System)

NASA submitted an application to NMEID in order to obtain a permit for the Building 447 septic tank system on April 3, 1990. NMEID approved the application on April 12, 1990 and assigned the system a permit number of LC 900333 (NASA, 1990[b]). This septic tank has not been assigned a SWMU number in the NASA WSTF Permit.

7.11.2 Description (Building 447 Septic System)

The Building 447 septic tank system consists of a 750-gal. capacity septic tank with a 300 ft^2 leach field. The leach field was designed to consist of two trenches on either side of the septic tank, 3 ft wide and 50 ft long each, with 1 ft of gravel installed below the drain pipes. The percolation rate was not provided; however, the soil type was listed as sandy loam or sandy clay. The estimated depth to the seasonal high water table was 150 ft bgs (NASA, 1990[b]). The as-built diagram (Appendix C) shows that the Building 447 septic tank system actually comprises one 60-ft trench and one 40-ft trench that are 3 ft wide. The septic tank contains two access points, and the effluent pipe from the septic tank to the leach field is approximately 5 ft in length. From a WSTF drawing, the influent pipe to the septic tank is approximately 75 ft in length. The septic pipe has a diameter of 4 in. and is constructed of PVC (NASA, 1990[c]).

7.11.3 Discharge Sources (Building 447 Septic System)

A list of current WSTF sewer connections was reported in the CLCWS permit application in 2012. The Building 447 septic tank system services Buildings 447 and 448 in the 400 Area. Building 447 contains one bathroom facility with a commode and a sink, and Building 448 contains one sink.

7.11.4 Discharge Volume (Building 447 Septic System)

The Building 447 septic system was designed to service 5 employees at 20 gal. per employee for a total of 100 gpd.

7.11.5 Operational History (Building 447 Septic System)

The Building 447 septic tank system was installed on May 8, 1990 by JSTC. Long-term WSTF personnel stated that the septic tank system has functioned as designed, except for one documented overflow of a clean-out. Refer to Section 9.2.7 for a description.

A long-term WSTF employee stated that most WSTF septic tanks were pumped out annually from 1991 to 2009 as needed [the employee departed WSTF in 2009; Appendix A]; however, another long-term WSTF employee stated that WSTF septic tanks have not been maintained on a specific schedule through history (Appendix A). A few documents discussing maintenance WSTF septic tanks were located. The first document was a purchase order in March 1993 for Southwest Septic Transport to pump out several WSTF septic tanks, including the Building 447 septic tank (NASA, 1993[a]). Two more documents provided a pumping date for the Building 447 septic tank as 1994: a septic tank summary letter with a table (NASA, 1996[b]), and the 2006 DP-392 renewal and modification application (NASA, 2006[d]). This septic tank has reportedly been inspected yearly by WSTF personnel since 2009 (NASA, 2013[e]).

7.12 Building T463 Septic Tank System

Building T463 was located in the WSTF 400 Area to the south, adjacent to Building 463 (Figure 3.4) and was a temporary office double-wide trailer that was built for a specific project. Building T463 utilized a septic tank system (Figure 7.4) installed for the building. From WSTF internal documents, this building was completed in May 1992 (NASA, 1992[b]), and was removed in April 1994 (NASA, 1993[c]). According to long-term WSTF personnel, no other buildings were ever connected to the Building T463 septic tank system. Appendix B provides historical photographs of the temporary Building T463 septic tank area, and Table 7.1 provides septic tank summary information.

7.12.1 Permit Status (Building T463 Septic System)

NASA submitted an application to NMED in order to obtain a permit for the temporary building T463 septic tank system on June 2, 1992. NMED approved the application on June 8, 1992 and assigned the system a permit number of LC 920527 (NASA, 1992[c]). This septic tank has not been assigned a SWMU number in the NASA WSTF Permit (NMED, 2009).

7.12.2 Description (Building T463 Septic System)

The permit to install or modify an individual liquid waste system contains details of the Building T463 septic tank system. The tank is a 1,200-gal. capacity unit, and the leach field encompasses 275 ft^2. The septic tank system was designed to comprise two trenches 70 ft long and 2 ft wide each, with 1 ft of gravel below the drain pipes. This design was based on a percolation rate of 4.6 mpi. The soil type listed was coarse sand or gravel, and the depth to the seasonal water table was listed as 160 ft bgs (NASA, 1992[c]). Appendix C shows a drawing of this septic tank system. There was no as-built diagram located from the installer; however, the system seems to have been installed as designed, except the location was moved to the west, with the piping from the septic tank extending to the south (Figure 7.4). The sewer piping from the trailer to the septic tank is 4-in. drain-waste-vent PVC.

7.12.3 Discharge Sources (Building T463 Septic System)

The temporary Building T463 serviced the temporary trailer T463. Long-term WSTF personnel stated that there was a bathroom within the trailer with a sink (Appendix A).

7.12.4 Discharge Volume (Building T463 Septic System)

Based on the need for the septic tank system to service 20 employees and using 20 gpd per employee, the design discharge volume for the temporary Building T463 septic tank system was 400 gpd.

7.12.5 Operational History (Building T463 Septic System)

The temporary Building T463 septic tank was installed by the American Septic Tank Co. in May 1992. Long-term WSTF personnel stated that the septic tank performed as designed, and never malfunctioned during its use (from March 1992 to April 1994).

A long-term WSTF employee stated that most WSTF septic tanks were pumped out annually from 1991 to 2009 as needed [the employee departed WSTF in 2009; Appendix A]; however, another long-term WSTF employee stated that WSTF septic tanks have not been maintained on a specific schedule through history (Appendix A). A few documents discussing maintenance of WSTF septic tanks were located. The first document was a purchase order in May 1993 for Southwest Septic Transport to pump out several WSTF septic tanks, including the temporary building T463 septic tank (NASA, 1993[a]). Then, in a septic tank information letter provided to NMED in 1996, it was stated, *"All WSTF septic tanks…were pumped out in 1994 and will continue to be pumped out every other year."* The table provided included the temporary Building T463 septic tank, indicating that this tank was pumped out in 1994 (NASA, 1996[b]). Then, the DP-392 renewal and modification application in 2006 provided a table that also listed the last pumping date of the Building T463 septic tank as 1994 (NASA, 2006[d]). This septic tank has reportedly been inspected yearly by WSTF personnel since 2009 (NASA, 2013[e]).

There were a few repairs for the temporary building T463 septic tank system, all conducted after 1994, when the tank became inactive. One was "a broken P-trap" discovered in an environmental audit of the area in February 2006. The clean-out was repaired. Then, on March 2, 2011, a 4-in. cap was installed on the septic tank inlet port (NASA, 2013[e]). Also, a long-term WSTF employee stated that the Building T463 septic tank had to be recapped several times historically due to damage caused by employees driving over the tank and lines (Appendix A).

7.13 Building 650 Septic Tank System

Building 650 is located in the WSTF 600 Area, approximately 2 ½ mi west of the 100 Area (Figure 3.5). The building was constructed as a control building for the WSTF groundwater Plume-Front Treatment System in 2001 and is titled the Plume-Front Remediation Treatment Building (650). The Building 650 septic tank system was installed adjacent to the building (Figure 7.1). Table 7.1 provides septic tank summary information. There were no historical photographs of the Building 650 septic tank area located.

7.13.1 Permit Status (Building 650 Septic System)

An application was submitted to NMED LWP to permit the Building 650 septic tank system on April 13, 2001. NMED approved the application on April 14, 2001, and assigned the system a permit number of DA 010359 (NASA, 2001). The original permit application had been submitted by Honeywell (a WSTF contractor). This septic tank has not been assigned a SWMU number in the NASA WSTF Permit (NMED, 2009).

7.13.2 Description (Building 650 Septic System)

The Building 650 septic tank system consists of a 1,200-gal. capacity tank with a leach field of 720 ft^2 (Figure 7.1). The leach field was designed to comprise three trenches 3 ft wide and 50 ft long each, with 24 high capacity gravelless infiltrators. For this septic system, the percolation rate was not provided; however, the soil type listed was sandy loam. The estimated depth to the water table was greater than 20 ft bgs (NASA, 2001). The as-built diagram (Appendix C) shows that the Building 650 leach field is actually installed with two trenches 3 ft wide and 75 ft in length. The distance from Building 650 to the septic tank is 21 ft, 8 in. The effluent line from the septic tank to the distribution box is 10 ft. long, and the pipe from the distribution box to the furthest leach field trench is 10 ft long. The septic tank contains two access points.

7.13.3 Discharge Sources (Building 650 Septic System)

According to a long-term WSTF employee who works in Building 650, the only connection to the septic tank system is to the Building 650 bathroom sink and commode (Appendix A).

7.13.4 Discharge Volume (Building 650 Septic System)

The Building 650 septic system was designed to service 2 employees at 20 gal. per employee for a total of 40 gpd (NASA, 2001).

7.13.5 Operational History (Building 650 Septic System)

The Building 650 septic tank system was installed by JSTC in April 2001 (NASA, 2001). This tank has not been pumped out to date, but has reportedly been inspected yearly by WSTF personnel since 2009 (NASA, 2013[e]). WSTF personnel that work in the area stated that this septic tank has functioned as designed with no malfunctions (Appendix A).

7.14 Buildings 802/803 Septic Tank System

Buildings 802 and 803 are located within the WSTF 800 Area (to the south), adjacent to (east and slightly north of) the 200 Area Laboratories Complex (Figure 3.2). Building 802 was constructed in 1987 for use as an *"Engineering Building,"* or office building (NASA, 1994). The term engineering building was historically used to describe office buildings. Building 803 was constructed in 1989, termed a *"Test Materials Staging Building,"* used to prepare test articles and for offices (NASA, 1994). The septic tank system is shown in Figure 7.2. Historical photographs of the Buildings 802/803 area are provided in Appendix B, and Table 7.1 provides septic tank summary information.

7.14.1 Permit Status (Buildings 802/803 Septic System)

An application was submitted to NMEID to permit the Buildings 802/803 septic tank system on April 13, 1987. NMEID approved the application on April 14, 1987, and assigned the system a permit number of LC 870401 (NASA, 1996[d]). The original permit application had been submitted by Lockheed (a WSTF contractor). NASA did not maintain a record of the submittal; however, a record of the permit was obtained from LWP personnel in 1996. This septic tank has not been assigned a SWMU number in the NASA WSTF Permit (NMED, 2009).

7.14.2 Description (Buildings 802/803 Septic System)

The Buildings 802/803 septic tank system consists of a 1,500-gal. capacity tank with a leach field of 900 ft^2 (Figure 7.2). The leach field was designed to comprise three trenches 3 ft wide and 100 ft long each, installed with 1 ft of gravel below the drain pipes. For this septic system, the percolation rate was listed as 2 mpi, and the soil type listed was coarse sand or gravel. The estimated depth to the water table was greater than 20 ft bgs (NASA, 1996[d]). Based on a WSTF drawing of the 800 Area, the effluent pipes from Buildings 802 and 803 to the septic tank are 4-in. in diameter. The as-built diagram (Appendix C) shows that the Buildings 802/803 leach field comprise four trenches 3 ft wide with lengths of 58 ft, 100 ft, 40 ft, and 80 ft, aligned in three rows with a 10 ft separation between the first and second rows and a 12 ft separation between the second and third rows. The effluent pipe from the septic tanks to the leach field is 54 ft, 8 in. long, and the pipe from the septic tank to the distribution box is 31 ft, 6 in. The septic tank contains two access points.

7.14.3 Discharge Sources (Buildings 802/803 Septic System)

A list of current WSTF sewer connections was collected and reported in the CLCWS permit application. For Building 802, the only connection to the septic tank system is in bathrooms, consisting of sinks, commodes, and floor drains, and a drinking water fountain located adjacent to the bathrooms. The Building 803 septic system connections consist of bathrooms with commodes, sinks, a shower, and a floor drain, a drinking fountain located adjacent to the bathrooms, a custodial closet with a floor drain and a sink, room 104 with a floor drain and a washing machine, and a preparation laboratory with two sinks that discharge to the septic system. In the preparation laboratory, there are also four fume hoods with sinks that previously discharged to the hazardous wastes drain lines (which have been removed), not the septic system.

7.14.4 Discharge Volume (Buildings 802/803 Septic System)

The Buildings 802/803 septic system was designed to service 30 employees at 20 gal. per employee for a total of 600 gpd (NASA, 1996[d]).

7.14.5 Operational History (Buildings 802/803 Septic System)

The Buildings 802/803 septic tank was installed in April 1987 by JSTC (NASA, 1996[d]) in order to service Buildings 802 and 803. According to long-term WSTF personnel, a septic tank was needed at this location because the ground elevations at Buildings 802 and 803 were approximately 4 ft lower than the ground elevation at the 200 Area wastewater lagoon; therefore, a pump would have been required to transfer waste upgradient from those buildings to the 200 Area wastewater lagoon. NASA determined it would be more cost effective to install a septic tank system. Long-term WSTF personnel stated that this septic tank performed adequately as designed. No malfunctions of the septic system were documented or reported in interviews of WSTF personnel.

A long-term WSTF employee stated that most WSTF septic tanks were pumped out annually from 1991 to 2009 as needed [the employee departed WSTF in 2009; Appendix A]; however, another long-term WSTF employee stated that WSTF septic tanks have not been maintained on a specific schedule through history (Appendix A). A few documents discussing maintenance of WSTF septic tanks were located. The first document was a purchase order in May 1993 for Southwest Septic Transport to pump out several WSTF septic tanks, including the Buildings 802/803 septic tank (NASA, 1993[a]). Two more documents provided a pumping date for the Buildings 802/803 septic tank as 1994: a septic tank summary letter with a table (NASA, 1996[b]), and the 2006 DP-392 renewal and modification application (NASA, 2006[d]).

An inspection of the Buildings 802/803 septic tank was completed in December 2009 and November 2012 by WSTF personnel (NASA, 2013[e]).

7.15 STGT Septic Tank System

The STGT is a radar data and tracking facility associated with TDRSS at WSTF. The STGT initial site construction began in 1988 on 42 acres of land located approximately 3 mi north of the WSTF 100 Area (NASA, 1994). The last structures built were completed in April 1994 (NASA, 2013[d]). The STGT area contains one septic tank (Figure 3.6). Appendix B provides an historical photograph of the STGT septic tank area, and Table 7.1 provides septic tank summary information.

7.15.1 Permit Status (STGT Septic System)

NASA submitted an application to NMEID in order to obtain a permit for the STGT septic tank system on October 17, 1989. NMEID approved the application on October 19, 1989 and assigned the system a permit number of LC 890939 (NASA, 1989). This septic tank has not been assigned a SWMU number in the NASA WSTF Permit (NMED, 2009).

7.15.2 Description (STGT Septic System)

The STGT septic tank system (Figure 7.5) was installed on a 20 acre lot and consists of a 1,200-gal. capacity septic tank with a 530 ft^2 leach field. The leach field is comprised of three 59-ft trenches that are 3 ft wide, installed with 1 ft of gravel below the drain pipes. Each leach field trench is separated by 10 ft. The influent pipe to the septic tank is 15 ft in length, and the effluent pipe from the septic tank and to the leach field is 10 ft in length (Appendix C). The percolation rate of the soil is 7.5 mpi with a soil type listed as clay with considerable sand or gravel. The estimated water table depth was 150 ft bgs (NASA, 1989).

7.15.3 Discharge Sources (STGT Septic System)

According to a long-term STGT employee, the STGT septic tank system serviced the security guard building bathroom prior to full time operations at the STGT site (Appendix A). It is assumed that the STGT septic tank system was also connected to the same service areas that the STGT wastewater lagoon was connected to, since the application for the septic tank states that the tank is to *"be used until construction of a permanent sewage lagoon is completed,"* and the STGT complex was in full operation in 1989. The wastewater lagoon connected to the main operations building to service bathroom facilities and the vehicle maintenance building to service a bathroom with a sink.

7.15.4 Discharge Volume (STGT Septic System)

The STGT septic system was designed to service 30 employees at 20 gal. per employee for a total of 600 gpd.

7.15.5 Operational History

The STGT site was originally designed to discharge wastewater into a lagoon. Construction completion of the STGT wastewater lagoon, however, was delayed due to leakage of the original clay liner in both the north and south cells. A detailed description of the STGT wastewater lagoon history is provided in the Wastewater Lagoon Areas HIS (100, 200, 600 Areas and STGT; NASA, 2012[e]). Due to the need for sewage disposal while modifying the original design of the STGT wastewater lagoon, NASA requested permission from NMED to construct a temporary septic tank system for the STGT site on October 17, 1989. *"This septic system will be used until construction of a permanent sewage lagoon is completed. Your approval of this permit will also allow us to discontinue use of portable latrines during the construction period"* (NASA, 1989). The STGT septic tank system was installed by CPC Septic Systems in October 1989.

The STGT septic tank system was designed for STGT personnel use temporarily, while modifications were being completed to the STGT wastewater lagoon (south cell). In August 1991, STGT personnel discussed the process for filling the south cell of the STGT wastewater lagoon. In this document, it was stated, *"The septic tank presently serving the STGT will be taken out of service"* (NASA, 1991[g]). It was stated in an internal document discussing disconnecting the STGT septic tank, *"Liquid Waste Regulations do not require notification for disconnection of a permitted system."* The document continued by stating that JSTC would be contacted *"for disconnection and maintenance recommendations for inactive septic systems"* (NASA, 1991[h]). JSTC did not contain any available records regarding disconnection or maintenance of the STGT septic tank system (Appendix A). There were no records located regarding pumping of the STGT septic system; however, it is standard practice to pump a septic tank before the system is disconnected. Therefore, it is believed that the STGT septic tank was pumped in 1991. Long-term STGT personnel stated that this septic tank performed adequately as designed, and no malfunctions of the septic system were documented or reported in interviews.

7.16 Conflicting Information

Conflicting information was discovered regarding 250 Area septic tank systems. There was one 250 Area septic tank identified for this HIS. This tank is located across Apollo Boulevard from the South Highbay, and was in use at WSTF from 1963 to approximately 1970. For history and a description of this septic tank, refer to Section 7.5; however, another possible 250 Area septic tank was identified. One long-term

WSTF employee stated that he believed that there was a septic tank installed in the WSTF 250 Area that currently services Building 255. Another employee agreed, and several additional employees were uncertain (Appendix A). WSTF drawings of the sanitary sewer lines in that area from 1990 indicate that Building 255 is connected with 4-in. PVC piping to an existing manhole, that is in turn connected to the sewer line that discharges into the 200 Area wastewater lagoon (Figure 7.2). A field check of the area also confirmed that Building 255 is currently connected to the sewer line discharging to the lagoon. This issue is further confused by an entry in the WSTF work order tracking database describing an overflow incident in Building 255 that reportedly occurred because the *"septic tank"* was full (NASA, 2013[e]). Refer to Section 9.2.2 for a description of this incident. Also, as stated in the 1994 Facilities Master Plan, *"Buildings 802 and 803 are serviced by a small septic system, and other septic systems service the 250 and 270 Areas"* (NASA, 1994). This statement was written in 1994 and referred to active septic systems, including the 250 Area. Since the septic tank system identified for this HIS (located across Apollo Boulevard from the South Highbay), was not active in 1994, the statement seems to be referring to another 250 Area septic tank system. Since the 1990 drawing shows Building 255 connected to the sewer line discharging into the 200 Area wastewater lagoon, and the building was constructed in 1990, NASA believes that Building 255 was never connected to a septic tank. Several additional long-term WSTF employees were interviewed to ascertain if any 250 Area buildings are currently connected to septic tank systems, or have been connected in the past. Two employees stated that the only septic tank in the 250 Area is the one previously identified for this HIS (Figure 7.2; Appendix A).

8.0 Waste Characterization

This section provides septic tank system sampling history and identification of non-hazardous wastes discharged to any of the septic tank systems at WSTF.

8.1 Waste Characterization of WSTF Septic Tank Systems

The only septic tanks at WSTF that were historically sampled were the 300 and 400 Area main septic tanks. In a 1967 document discussing wastes and waste management at WSTF, it was stated, *"The sewage discharged to the septic tanks in the CSM* [300 Area] *and LM* [400 Area] *test areas is not monitored chemically"* (NASA, 1967). NASA believes this statement is referring to monitoring for BOD, percent reduction, dissolved oxygen (DO), and pH. These parameters were analyzed and reported for the 100 and 200 Area wastewater lagoons in this 1967 document.

Sampling of the 300 and 400 Area main septic tanks was however, performed on a regular basis in the 1970s at WSTF. In a document outlining water sampling requirements proposed to implement an environmental protection plan at WSTF in 1973, it was stated for the 300 and 400 Area main septic tanks, *"samples of effluent at distribution box and rate of flow"* were to be monthly collected and analyzed for BOD, pH, COD, DO, settleable solids, and temperature (NASA, 1973). None of these analyses could be currently located. By 1976, the updated sampling plan did not require sampling for the 300 and 400 Area main septic tanks (NASA, 1976).

In the 1980s, the 300 and 400 Area main septic tanks were again sampled regularly at WSTF (NASA, 1984[a]). Again, results for these sampling events could not currently be located; however, there was sampling conducted twice in the 1980s for the 300 and 400 main septic tank systems where results were located. In June 1985, wastewater samples were collected and analyzed for nitrates, chlorides, sulfates and conductivity (NASA, 1985[a]). Table 8.1 provides a summary of these results. There was another sampling event that was conducted in June 1987 for the 300 and 400 Area main septic tanks (Table 8.2).

In January and February 2012, sampling of the 300 and 400 Area main septic tank systems was again conducted, this time as part of the application process to connect WSTF to the CLCWS. Table 8.3

provides a summary of analytes detected in the waste. No other evidence of sampling of any other septic tanks at WSTF was located.

8.2 Waste Management and Discharges

All septic tank systems were researched for process wastes that were or are discharged to the septic systems. There is very little documentation regarding the WSTF septic tanks and systems, therefore, the information in this section relies on the knowledge of long-term WSTF personnel who worked in the various areas where septic systems were or are in use at WSTF. The following sections provide a brief synopsis of waste management in the septic tank areas and identification of non-hazardous wastes discharged to the various septic tank systems. Table 7.1 provides brief summaries of this information.

8.2.1 Buildings 114 Septic System

There are no documents discussing wastes discharged to the Building 114 septic tank system; however, long-term WSTF personnel interviewed stated that no wastes other than sewage and hand-washing wastes had been discharged to the Building 114 septic tank system from Building 119 (Table 7.1). Subsequent to 1985, no wastes other than sewage and hand-washing wastes were discharged to the Building 114 septic tank system (Appendix A). Wastes discharged to the Building 114 septic tank system prior to 1985 will be discussed in Section 9.3.

8.2.2 Building 116 (Main Guard Gate) Septic System

WSTF security guard personnel were interviewed regarding wastes or potential wastes that could have been discharged into the Building 116 (Main Guard Gate) septic tank system. All personnel interviewed stated that no wastes were discharged to the septic tank system other than sewage, hand-washing, and common janitorial cleaning supply wastes (Table 7.1).

Historically, photographic badges had been produced at Building 116, the Main Guard Gate; however, processing of the photographs had been conducted in the 200 Area photographic laboratory, since this was the only dark room at WSTF historically (Appendix A). From approximately 1972 to the early 1990s, a Polaroid®[1] brand camera had been used. These cameras produced a finished photograph without producing chemical wastes. Following use of the Polaroid camera, personnel photographs were taken with a digital camera, again producing no chemical wastes. There was a laminating machine located at Building 116 for constructing the badges; however, long-term personnel stated that no liquid wastes were generated from this machine (Appendix A).

Long-term personnel stated that the only wastes produced in the area of the Building 116, Main Guard Gate, were wastes derived from weapons cleaning and vehicle washing activities. No other known wastes had been produced at Building 116 or the temporary trailer historically. Weapons cleaning activities reportedly involved using cotton swabs and cloths with solvent and oil. No liquid wastes were produced, and all swabs/cloths were taken to the WSTF firing range for accumulation prior to proper disposal. Any spills of chemicals within Building 116 were absorbed with cloths that were also taken to the WSTF firing range. No chemicals were stored in Building 116.

Vehicles were washed in a small parking area located north of Building 116. Effluent drained through a pipe to grade to the east of Apollo Boulevard. Section 7.1.3 provides details of this drain. All vehicle

[1] Polaroid® is a registered trademark of PLR IP Holdings, LLC.

maintenance was performed by GSA personnel in the 100 Area, at Building 151; therefore, no wastes from vehicle maintenance would have been discharged to the Building 116 septic tank system.

8.2.3 Building 117 (Forward Guard Gate) Septic System

In an internal WSTF communication, potential wastes at Building 117 (the Forward Guard Gate) were discussed. *"The new FSG* [Front Security Gate] *will have a guard building with a single fixture restroom. The occupancy will be 2- 3 people. Sanitary flow will be from a single lavatory, a single water closet, and a condensate drain from the HVAC unit"* (NASA, 2005[b]). Also, personnel that work at the building have stated that no wastes other than sewage and hand-washing wastes have ever been discharged to the septic tank system (Table 7.1). All vehicle washing and maintenance has been conducted by GSA personnel in the 100 Area, at Building 151; therefore, no wastes from vehicle maintenance would have been discharged to the Building 117 septic tank system.

8.2.4 250 Area Septic System

Since there is only sparse documentation regarding the septic tank system located in the 250 Area, and this tank ceased use over 40 years ago, information from interviews with long-term WSTF personnel were used to determine if any hazardous constituents were discharged to this septic tank system. Personnel stated that no wastes, to their knowledge, other than sewage and hand-washing wastes were ever discharged to this septic system, and the only sources for discharge were temporary trailers reportedly used for offices, with no hazardous waste production (Appendix A).

8.2.5 Building 272 Septic Systems

Referring to septic tank B in the 272 Area, it was stated in a letter to NMED in November 1991, *"The water discharged to the second tank is not contaminated, but is elevated in temperature from its use as a cooling agent"* (NASA, 1991[j]).

There were no other documents located that discussed wastes being discharged to any of the Building 272 septic tanks. A long-term WSTF employee stated that no wastes other than cooling water, sewage, hand-washing, clothes washing, and standard janitorial cleaner wastes, such as diluted bleach and Simple Green®[2], were ever discharged to any of the Building 272 septic tanks (Table 7.1). Included in the wash-water would have been soaps, commercial and *"earth friendly*" detergents, and trace amounts of oil, grease, and dust from hands, clothes, and the hypervelocity guns. The cooling water was used for cooling the hypervelocity guns after firing/testing activities. This water would have contained trace amounts of dust derived from the guns. There is a washing machine located within the Building that was historically and is currently used for washing employee work smocks. The smocks would contain trace amounts of grease, oil, and dust (Appendix A).

8.2.6 300 and 400 Area Septic Systems

The 300 and 400 Area main septic tank systems were installed in 1964 as part of the original site construction. In a 1967 document discussing waste management at WSTF, sanitary sewage was described as, *"normal material as encountered in a municipal sewage system"* (NASA, 1967). Long-term WSTF 300 Area personnel stated that only sewage, hand-washing, and common janitorial cleaning supply wastes were ever discharged to the 300 Area main septic system (Appendix A; Table 7.1). 400 Area personnel stated that sewage, hand-washing, common janitorial cleaning supply wastes, and potentially trace

[2] Simple Green® is a registered trademark of Sunshine Makers, Inc.

amounts of oils or solvents (where mentioned below) were ever discharged to any of the 400 Area septic tanks to their knowledge. Buildings 411 and 412 were and are both mechanical rooms containing equipment. No chemicals were or are stored in these buildings. There is a floor drain present in each building; however, only water discharges with trace amounts of vacuum pump oil and cleaning solvents would have been discharged to the 400 Area main septic tank system from these areas. There were no processes where discharge of chemicals or hazardous substances would have been discharged to the septic system (Appendix A; Table 7.1).

WSTF was designed with separate systems for managing hazardous wastes and non-hazardous wastes, such as the sewer system. This concept is outlined regarding the 300 and 400 Areas in a 1971 Environmental Impact Statement. *"The architectural concepts used at WSTF are for fuel and oxidizers to be handled in closed loop piping systems with venting being either to propane burners or water baths. Areas that are subject to spills of toxic liquids are paved with concrete and sloped to concrete lined catchment ponds for dilution and neutralization. Sewage is handled by septic tanks and tile fields for minimal sewage flow…Other waste in the test areas, primarily water, is discharged through daylighted drain lines to the concrete-lined collection flumes and holding ponds due to the possible contamination of such waste with propellant"* (NASA, 1971). The catchment or holding ponds in these statements are referring to the historical HWMU impoundments, and the other waste is referring to decontamination and component cleaning wastes, such as Freon®[3], alcohols, and trichloroethene.

Long-term WSTF personnel confirmed that all hazardous wastes in the 300 and 400 Areas were historically and currently managed in separate areas from the areas discharging to the 300 and 400 Area septic tanks. Hazardous wastes, including spills, were contained on concrete and washed to the concrete-lined flume and into the historical concrete-lined HWMU impoundments (Appendix A). (Following cessation of the use of the HWMU impoundments and then the mixing tanks in 1986, any spills or decontamination waste water were containerized and/or stored and shipped off-site for disposal (NASA, 1986). For the more recent septic tank systems (installed in the 1990s) in the 300 and 400 Areas (at Building 320, 364, 447, and T463), NASA already had an active Environmental Department (first established in 1985) to supervise and dispose of any hazardous wastes that may have been generated in these areas.

8.2.7 Buildings 364 and T463 Septic Systems

Several septic tank systems (for Buildings 364 and T463) were installed in areas with no hazardous waste generation, in office areas. Long-term personnel stated that only sewage, hand-washing, and common janitorial cleaning wastes were generated and disposed to the septic systems (Table 7.1).

8.2.8 Building 320 Septic System

According to long-term WSTF personnel, Building 320 was historically used as a maintenance shop for the repair of *"space shuttle quick disconnects"* and to store dry parts and equipment, such as vacuum pumps and helium boosters. The employee continued by stating that there were no processes that produced any wastes that could have been discharged to the septic system (no liquid wastes at all; Appendix A). Only sewage, hand-washing, and common janitorial supply wastes were ever discharged to this septic tank system (Table 7.1).

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

8.2.9 Building 447 Septic System

Buildings 447 and 448 were historically and currently used as *"shops"* in support of the 400 Area steam and altitude systems (NASA, 1994; NASA, 2012[b]). According to a long-term WSTF employee, these buildings contained WSTF technician equipment and tools. No processes were ever in place to discharge any chemicals to the septic system. The only wastes generated in these areas would have been trace amounts of oil, grease, and solvents discharged to the Building 447 septic tank during hand-washing activities in the various sinks (Appendix A; Table 7.1).

8.2.10 Building 650 Septic System

A long-term WSTF employee stated that the Building 650 septic tank contained connections to a bathroom and a sink within the building. Building 650 contains no floor drains, and therefore, any spills of chemicals could not be inadvertently discharged to the septic system. No processes within the area discharged to the septic tank system, and no known chemicals or substances other than sewage and hand-washing effluent has ever been discharged to the Building 650 septic tank system (Table 7.1). Any contaminated groundwater that is pumped during maintenance of the system or during starting and shutting down the remediation system is drained to a sump. Historically, the groundwater within the sump was transported to the WSTF 200 Area and discharged into the ETU. Since the ETU ceased receiving wastes (December 9, 2012), groundwater from this sump has been transported to the Mid-Plume Interception and Treatment System to be discharged into that remediation system for treatment.

8.2.11 Buildings 802/803 Septic System

Long-term WSTF personnel stated that from Building 802, only typical bathroom wastes (sewage and hand-washing wastes) and typical janitorial cleaning wastes were ever discharged to the septic tank system (Table 7.1).

For Building 803, in addition to the bathroom and typical janitorial cleaning wastes, there were also trace amounts of chemical wastes from test article preparation. A long-term WSTF employee stated that there were two sinks located in the Building 803 preparation laboratory that discharged to the septic tank system. Test articles were commonly washed in these sinks prior to testing with mild soaps, such as Ivory®[4] and Alconox®[5]. Test articles included mechanical impact samples, Teflon materials, plastics, and alloys. According to a long-term WSTF employee, residual trace fluids (e.g., oils, water-based lubricants) from the machining process would have entered the septic tank system with the soap during the washing process (Table 7.1). In addition to machined test articles, clothes were also purchased and tested in the 800 Area. These clothes were initially washed in the Building 803 preparation laboratory sinks that discharged to the Buildings 802/803 septic tank. According to a long-term WSTF employee, residual chemicals (from the clothes manufacturing process) may have been present in the soap and water effluent.

In addition to the sinks in the preparation laboratory, a long-term WSTF employee stated that a washing machine had been purchased in the 1990s in order to prepare test articles (clothes) for fire-retardant testing in the 800 Area. Internal WSTF documentation shows the fire retardant testing to have been conducted between March 31, 1992 and May 18, 1993 (NASA, 1992[a]). Long-term WSTF personnel stated that for this testing, clothes were washed in mild soaps, such as ivory and alconox, and then treated with the fire retardant chemical in the washing machine. Fire retardant effluent was captured and

[4] Ivory® is a registered trademark of Proctor & Gamble,
[5] Alconox® is a registered trademark of Alconox, Inc.

containerized for disposal (Appendix A). Corroborating evidence was provided in procedures for this testing, *"Close valve to drain and open valve to collect the fire retardant during the spin portion of the cycle…Add the appropriate amount of the specified fire retardant to the washing machine…Continue through the spin cycle catching the fire retardant solution in an appropriate container…Return the washing machine to normal operating conditions and run a cycle of clear water through the machine"* (NASA, 1992[a]). The procedures refer to closing a valve to a drain. The drain mentioned was the drain to the Building 802 septic tank system. Returning the machine to normal operating conditions refers to opening the valve so that the machine drains again to the septic system. Only trace amounts of the fire retardant chemical would have been discharged to the septic system during the rinse cycle of clear water. Following the fire retardant testing, this washing machine was used to wash employee work smocks containing trace amounts of chemicals and oils (Appendix A; Table 7.1).

Regarding hazardous wastes generated in the Building 803 preparation laboratory, the long-term WSTF employee stated that substances such as brolin, Oakites, igniter mix, and cleaning solutions were commonly used; however, these substances were always disposed of through the hazardous waste sinks with fume hoods, located across the preparation laboratory from the sinks that discharged to the septic system. The fume hood sinks discharged to the 200 Area ETU, and since Building 803 had been constructed after use of the ETU began at WSTF, there was not an historical process change for hazardous wastes that may have resulted in accidental discharge of hazardous wastes to the septic system. The employee believed that no hazardous waste discharges or spills had ever occurred to the septic system (Appendix A).

8.2.12 STGT Septic System

From the NASA WSTF Facilities Master Plan, a description of hazardous materials was listed. *"Surface and groundwater protection, sewage, and hazardous waste are managed by WSTF…Because hazardous materials are used mainly for shop operations, their use and storage is minimal and they are maintained and regulated the same as at WSTF. The WSTF Environmental Department provides guidance to WSC regarding hazardous materials"* (NASA, 1994).

There were no documents located that discussed wastes being discharged to the STGT septic tank; however, the septic tank was connected to the same areas as the wastewater lagoon. Regarding the types of wastes anticipated for discharge into the STGT wastewater lagoon, which would be the same wastes discharged to the temporary septic tank system, NASA stated, *"The proposed discharge is domestic waste water from an office complex and as such the discharge will not contain any chemical concentrations in excess of the standards of Section 3-103"* (NASA, 1988).

Long-term STGT personnel stated that all hazardous substances or waste generated at STGT have been shipped off-site for disposal since the inception of the STGT site. The only chemicals that may have been discharged to the STGT septic tank were *"typical institutional cleaning supplies used for facilities maintenance. Possibly mineral spirits and non leaded paint residue from brush/tool cleanup"* (Appendix A; Table 7.1).

9.0 Indication of Releases to the Environment

This section will provide any evidence located from historical research for any potential releases to the environment, either of chemicals or substances other than sewage and washing activities discharged to any of the septic tanks or of spills or malfunctions of the septic systems.

9.1 Spill Reports

There are no NASA WSTF spill reports completed concerning the septic tank at STGT or any septic tanks at WSTF.

9.2 Malfunctions

Several WSTF septic tank systems have malfunctioned over time, including back-ups, overflows, and surface discharges of sewage. This section describes these events by septic system, and events are summarized in Table 7.1.

9.2.1 Building 114

- On March 22, 2007, the Building 114 septic tank system malfunctioned. Long-term WSTF personnel stated that the septic system *"backed-up into the building."* (Which building was not specified in the statement; however, it was likely Building 119, since Building 114 had not been continuously occupied by WSTF personnel since approximately 1985) and *"the toilets would not flush in Building 119"* (Appendix A). WSTF personnel had attempted to clear the sewer lines from the building bathroom locations; however, the blockage remained. The sewer pipes had been excavated and the portion of the pipe that was blocked had been replaced. A yellow stake was installed over the access cover for the Building 114 septic tank in early April 2007 (NASA, 2013[e]). Long-term personnel stated that the Building 114 septic tank may have been located and pumped out at this time (Appendix A). Also, in a WSTF Permit to Excavate form completed on March 22, 2007 regarding this incident, it was stated, *"This is to uncover the septic tank that is over flowing to allow it to be pumped and removed"* (NASA, 2007). This document shows that the intent was to pump the tank; however, no documents could be located to indicate that the tank was actually pumped. [The septic tank was not removed at this time.]
- There is documentation that the Building 114 septic tank was pumped out in November 2012. A WSTF employee supervising septic tank maintenance at the time stated that the Building 114 septic tank was approximately one-third full. The employee stated that more effluent had been expected, compared to other septic tanks on site. He believed that the tank may have *"a crack"* and been leaking (Appendix A). This tank was reportedly pumped out in 1994 (NASA, 1996[b]; NASA, 2006[d]), and may have also been pumped out in 2007, when the septic system backed-up. If the Building 114 septic tank was pumped in 1994 and 2007, then the one-third full level may not indicate leakage of the tank, due to the infrequent usage of the septic system (three employees from Building 119, working at the building intermittently); however, long-term WSTF personnel (from 1987 to present) stated that this tank location was unknown to current employees prior to 2007 (Appendix A). Also, no documentation could be located to ascertain if the Building 114 septic tank had actually been pumped out in 2007. Therefore, at this time, NASA cannot determine if the Building 114 septic tank may have leaked in the past, or was just pumped recently with little use since.

9.2.2 Building 255

- An overflowing floor drain was discovered within Building 255 on April 8, 2003. The sewer line was cleared. This incident was listed in the work order database as, *"B255 has overflowing floor drain. Septic tank full"* (NASA, 2013[e]). It is believed that no septic tank has ever been installed in this area. Refer to Section 7.16 for a discussion of this issue.

9.2.3 300 Main Septic Tank System

- In March 2009, a gas-type odor adjacent to Buildings 363 and 364 were reported by employees. It was determined that the odor was derived from the septic tank. Septic enzymes were input to all commodes, urinals, drains, and sinks on June 5, 2009 to resolve the issue.

9.2.4 Building 320

- On October 23, 2012, the Building 320 septic tank leach line was repaired (NASA, 2013[e]). A long-term WSTF employee stated that the leach line approximately 20 ft downgradient of the septic tank had been inadvertently broken while excavating the line to tie into the CLCWS piping. The broken section of the line was replaced (Appendix A).

9.2.5 Building 364

- On May 29, 2008, the septic tank was uncovered, but the reason was not stated in the work order database (NASA, 2013[e]).
- In a letter to NMED describing the incident, NASA stated, *"At the beginning of June 2008, the septic system back flowed into Building 364. After the septic tank was drained, it was noted that the leachfield was not working properly. The original plan was to replace the leachfield, but when the repair construction started, it was noted that only the line to the leachfield was not working properly. The existing leachfield is in good working order. A new line to the leachfield was inserted, and new septic tank access ports were installed."* This document contains a WSTF drawing of the completed repairs (Appendix C; NASA, 2008[a]). No site clean-up actions were specified. A long-term WSTF employee stated that personnel had attempted to clear the lines first using a *"snake"* (Appendix A).
- On February 13, 2009, a WSTF work order was requested to *"advise status of as-built drawings"* for the Building 364 septic tank. This is a reference to the as-built drawing for the Building 364 septic system repair discussed above.
- On August 11, 2009, a foul odor within Building 364 was reported by personnel within the building. Septic enzymes had been input to all commodes, urinals, drains, and sinks on August 6, 2009 (NASA, 2013[e]). This odor is believed to have been caused by the smell associated with septic tank enzymes.

9.2.6 400 Area Main Septic Tank

- In March 1999, a foul odor from the 400 Area main septic tank was investigated. No results were provided; however, since this information was obtained from a database that tracks the generation of WSTF work orders, detailed information regarding incidents would not be recorded here. Enzymes were likely input to the septic system.
- On October 4, 2004, "moisture/water spot around the piping on the southwest side (northern corner)" of the 400 Area main septic tank was discovered. WSTF personnel investigated the area for a water leak (NASA, 2013[e]). Clean-up actions and results of the investigation were not recorded; however, since this information was obtained from a database that tracks the generation of WSTF work orders, detailed information regarding incidents would not be recorded here.
- An internal WSTF document describes a leak of the 400 Area main septic tank system, *"On Wednesday evening, June 21, 2006, employees discovered that an outflow pipe for the 400 Area main septic tank was broken and leaking… An immediate repair was started and a permanent repair was completed by the next day…The contaminated dirt was sprayed with a 10% bleach solution after the repairs were completed…It is unclear how much wastewater leaked onto the ground, but approximately two quarts was noted during the repairs."* Personnel completing the

repairs stated, *"The cast iron outflow pipe…has rotted through and is dripping onto the ground. A small puddle is on the ground"* (NASA, 2006[c]). According to a long-term WSTF employee, the corroded pipe was one leading from the septic tank to one of the diverter boxes (Appendix A).

- On July 11, 2006, WSTF personnel were called after normal working hours to repair a *"leaking effluent pipe on the 400 area septic tank."* The notes listed in the WSTF work order database stated, *"Called in to fix a leak on the overflow of the 400 Area septic tank. Ran a temporary piece of PVC to direct waterflow into broken 6" tee"* (NASA, 2013[e]). This statement was explaining a temporary repair that was completed until the piping could be replaced.
- In February 2010, sewage was discovered draining onto the *"concrete apron"* behind Building 411. A clog was discovered in the drain line from Building 411 to the 400 Area main septic tank and was removed (NASA, 2013[e]). No site clean-up actions were specified; however, since this information was obtained from a database that tracks the generation of WSTF work orders, detailed information regarding incidents would not be recorded here.

9.2.7 Building 447

- On March 7, 2006, a clean out for the Building 447 septic tank system was discovered to be overflowing. The sewer line was cleared, and a clean out cap was removed from the drain. The drain was then flushed to ensure it was clear (NASA, 2013[e]). No clean-up actions were specified; however, since this information was obtained from a database that tracks the generation of WSTF work orders, detailed information regarding incidents would not be recorded here.

9.2.8 Unknown leak

On August 30, 2007, a leak was repaired to one of the WSTF septic tank systems. This was recorded in the WSTF work order database system as a comment to a work order for locating all the WSTF septic tanks. The exact wording of the entry is, *"repaired leak"* (NASA, 2013[e]). No details were provided, and no information regarding this incident was located.

9.3 Hazardous Chemicals Discharged

The only evidence discovered of potentially hazardous constituents discharged to any of the WSTF septic tanks was for the Building 114 septic tank. A long-term WSTF employee who worked in Building 114 stated that between approximately 1963 and 1985, there had been waste *"plate-maker"* machine chemicals discharged via the bathroom sink of Building 114 to the Building 114 septic tank (Appendix A; Table 7.1).

9.3.1 Discharge Details

Building 114 had historically been used as the WSTF 100 Area reproduction facility. The employee interviewed stated that there were photographic process plate-maker machines used in Building 114 in order to obtain master copies of forms for reproduction on an offset press. Figure 8.1 shows an historical photograph believed to be one of these machines. The older photographic process plate-maker machine was manufactured by ITEK, and the photographic process plate-maker machine the employee used more frequently was manufactured by the A.B. Dick Company. Representatives from the successor to the A.B. Dick Company (Presstek) provided Material Safety Data Sheets (MSDS) they believed were the chemicals used in the A.B. Dick-manufactured machine. The employee stated that he believed the chemicals were the same for both machines since the process was the same (Appendix A). These MSDS are provided in Appendix D. The chemicals used were identified by the employee as an *"activator"* and a *"stop-bath."* Presstek personnel stated that the term *"stop-bath"* was another term for *"stabilizer."* These chemicals were historically diluted with water and poured into the plate-maker machines. When the chemicals ceased performing well for making the plate originals (or were *"spent"*), the employee stated that the contents of the machine, approximately 3 gal., were emptied into the bathroom sink in Building 114. The employee stated that the machines were emptied and the chemicals replaced approximately every two months, depending on how many master forms were made during that time frame. When asked regarding the timing of use for each photographic process plate-maker machine, the reproduction facility employee stated that he was uncertain when the ITEK-manufactured machine began use at WSTF, but it was used from presumably 1963 to approximately 1974. The A.B. Dick-manufactured plate-maker machine was used approximately from 1973 to the mid-to-late 1980s (1985-1989); however, the employee stated that discharges of the spent chemicals from this machine ceased in 1985, when reproduction facility chemicals began being containerized (Appendix A).

9.3.2 Suspected Discharge

In addition to the photographic process plate-maker machines, there was one electrostatic plate-maker machine, also manufactured by the A.B. Dick Company (Model 143, SN 8621), historically used in the 100 Area reproduction facility (NASA, 1991[f]). The reproduction facility employee interviewed was unsure when this machine began use at WSTF, but the employee believed it was at least several years before the employee began working in the 100 Area reproduction facility. The electrostatic plate-maker machine was used until approximately 1973, soon after the employee began working in the 100 Area reproduction facility (Appendix A). This machine was excessed from WSTF in August 1991 (NASA, 1991[f]).

Wastes from this electrostatic plate-maker machine may have potentially been discharged to the Building 114 septic tank system. The reproduction facility employee stated that the capacity of the machine was approximately 4 quarts; however, the employee stated that while the machine was operating, the addition of more chemicals to the machine was necessary due to evaporation. The employee further stated that the machine chemical solutions were oil-based, and the solution was spent very rarely. The employee could not recall exactly how often the chemicals were spent or the disposition of the spent wastes from this machine (Appendix A). Since wastes from the photographic plate-maker process were discharged to the Building 114 septic tank system, wastes from this machine were potentially discharged to the septic tank system as well.

Soon after the employee began working in the reproduction facility, the A.B. Dick-manufactured photographic process machine became the predominant plate-maker machine, and use of the other two machines (the ITEK-manufactured photographic process machine and the electrostatic process machine) was phased out (Appendix A).

9.3.3 Additional Documentation

There were also several documents located that provide information regarding the chemicals used in the WSTF 100 Area reproduction facility historically. In 1986, NASA hired an outside Environmental consulting firm to inventory current WSTF waste streams and to compile a computerized database of waste-specific information for future waste management at WSTF. Harding Lawson Associates (HLA) designed a system based on the WSTF Area (100, 200, etc.), the specific location (reproduction facility, Chemistry Laboratory, etc.), and the waste stream number (beginning at 01 for the first waste stream from that location). In the HLA waste report table, there was one waste stream listed from the 100 Area reproduction facility. No specific chemical names or MSDS were provided; however, the waste was summarized as *"spent printing solutions"* used because *"printing machines must have solutions changed periodically."* The quantity of wastes annually was listed as *"0-60 gallons"* and the waste was listed as hazardous based on ignitable characteristics (HLA, 1987). Based on the MSDS provided by Presstek, the waste discussed in the HLA report was likely derived from the chemicals used in the electrostatic plate-maker machine, since two of the three chemicals listed for the electrostatic plate-maker machine had characteristics of ignitability listed on the MSDS (Appendix D).

In addition to wastes identified by HLA, historical WSFT individual waste profile sheets (WIWPS) were located from 1991 (Appendix D). There are seven individual wastes identified for the reproduction facility. Most of these hand-written WIWPS were completed by the employee who had identified the discharge to the Building 114 septic tank. Two of the wastes are identified as producing solid wastes only (the chemical was used on cloths or cotton swabs only, and therefore, would not have been discharged to the Building 114 septic tank. These two WIWPS are not included in Appendix D). Another two WIWPS appear to be associated with the photographic plate-making process and seem to have been completed due to a change in reproduction facility chemicals used, based on the hand-written phrase *"replaces solvent"* (WIWPS 10-07-03 and 10-07-07; NASA, 1991[c, e]). The remaining three WIWPS identify wastes likely derived from the electrostatic plate-maker machine (WIWPS 10-07-01, 10-07-02, and 10-07-04; NASA, 1991[a, b, d]). These three chemicals are similar to the chemicals provided by Presstek for the electrostatic plate-maker machine. The WIWPS identifying liquid wastes are provided with corresponding MSDS in Appendix D.

9.3.4 Photographic Printing Process Knowledge

Offset printing is a commonly used printing technique in which the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface. When used in combination with the lithographic process, which is based on the repulsion of oil and water, the offset technique employs a flat (planographic) image carrier on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a water-based film (termed *"fountain solution"*), maintaining the non-printing areas as ink-free.

Based on research of chemical processes and techniques used during the approximate time discharges from the ITEK and A.B. Dick-manufactured photographic process plate-maker machines occurred at WSTF (1963-1985) in conjunction with information provided by Presstek, the process used was most likely the silver salt diffusion transfer process (DTR-process). In the DTR-process, non-developed silver halide of an image-wise exposed photographic silver halide emulsion layer material is transformed with a silver halide *"solvent"* into soluble silver complex compounds which are allowed to diffuse into an image-receiving element and are reduced with a developing agent to form a reversed silver image. The chemicals used in the process as described by Presstek (activator and stabilizer) would be the type chemicals typically used in the DTR-process (ip.com, 1993-1995). The chemicals referenced in the 1991 WIWPS (10-07-03 and 10-07-07) and in the MSDS provided by Presstek (Appendix D) are consistent with the DTR-process. Based on this process knowledge and information obtained from interviews of long-term WSTF personnel, silver bearing waste steams were most likely discharged to the Building 114 septic tank. The waste streams would have consisted of silver salts dissolved in water, with the amount of silver present in the waste stream varying depending on usage. Waste streams generated from commercial industrial photographic and imaging processing are known to contain a range of silver concentrations from 5 mg/l up to 12,000 mg/l (EPA, 1999). According to Presstek personnel, the concentration of silver in the plate-maker waste stream at WSTF would have been approximately equal to the silver concentrations from a commercial industrial photographic and imaging process for polyester film (Appendix A). Polyester films are commonly used in aerial photography, industrial x-rays, and microscopy (Kodak, 2013). The U.S. Geological Survey conducted a study regarding recycling silver in the United States. In this document, the amount of silver contained in photographic material was provided. For industrial x-rays, the amount of silver was estimated as 4–6 grams per square m (USGS, 2003). WSTF plates are assumed to have been approximately 12 in. by 12 in., which would result in a silver content, prior to use, of 0.3 to 0.6 grams per plate.

In order to obtain an estimate of the potential concentration that may have been present in the historical photographic process plate-maker waste stream, sampling and analysis results for a recent (2011) 5-gal., spent x-ray processing film solution at WSTF were reviewed. The concentration of silver in the spent x-ray solution was approximately 200 ppm. These analytical results are provided in Appendix D. Based on the inferred similar photographic process and the similar waste amounts generated (5 gal. of x-ray solution and 3 gal. of spent plate-maker waste), the photographic process plate-maker waste stream likely contained approximately 200 ppm silver at the point of generation. At the time of discharge to the Building 114 septic tank, this waste stream would have been significantly diluted with water by normal bathroom usage (commode and sink use); however, based on the 40 CFR Part 261.24 regulatory limit for silver, further investigation of silver in the Building 114 septic tank area is warranted.

9.3.5 Electrostatic Printing Process Knowledge

The electrostatic plate-making process was described in a book by Frank Romano in 1995. This process involves electrostatically charging a photoconductive layer, either positively or negatively, depending on the type of photoconductive insulating layer. When exposed to light, the coating loses a portion of the charge, depending on the light intensity. The variation of the amount of charge retained on the coated plastic, paper, or metal plate creates an electrical pattern of the image. The image is then made visible by spraying the image area with oppositely charged particles (in the toner) than was previously applied to the plate. The toner adheres to the areas that have retained a charge. The toner image is transferred to the plate by heat and pressure (Romano, 1995).

WSTF excess records identified the manufacturer (A.B. Dick Company) and model number (143, SN 8621) for the electrostatic plate-maker machine at WSTF (NASA, 1991[f]). With the model number, Presstek personnel were able to provide a MSDS for the three chemicals used in this machine (Appendix D). Two of the three chemicals are VOCs, based on a flash point of less than 140 degrees Fahrenheit. The reproduction facility employee interviewed stated that it was necessary to add chemicals to the machine during operation for proper machine function. This indicates that the VOC chemicals for this machine evaporated during use. The third chemical used in the electrostatic process plate-maker machine was a solution product containing two to five percent potassium hexyacyanoferrate. This chemical was not classified as hazardous on the MSDS provided, and therefore, would not be considered a reactive cyanide per 40 CFR Part 261.23; however, based on the 40 CFR Part 268.48 regulatory limit for total cyanide as an underlying hazardous constituent, further investigation of total cyanide in the Building 114 septic tank area is warranted.

10.0 Data Gaps

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. Also, there was no mechanism in place to generate or maintain septic records. Files were not centralized, and records have been lost over time. Therefore, the most significant data gap identified while conducting this historical research effort is the lack of records, including construction data, dates, and potential discharges other than sewage to the WSTF septic tank systems.

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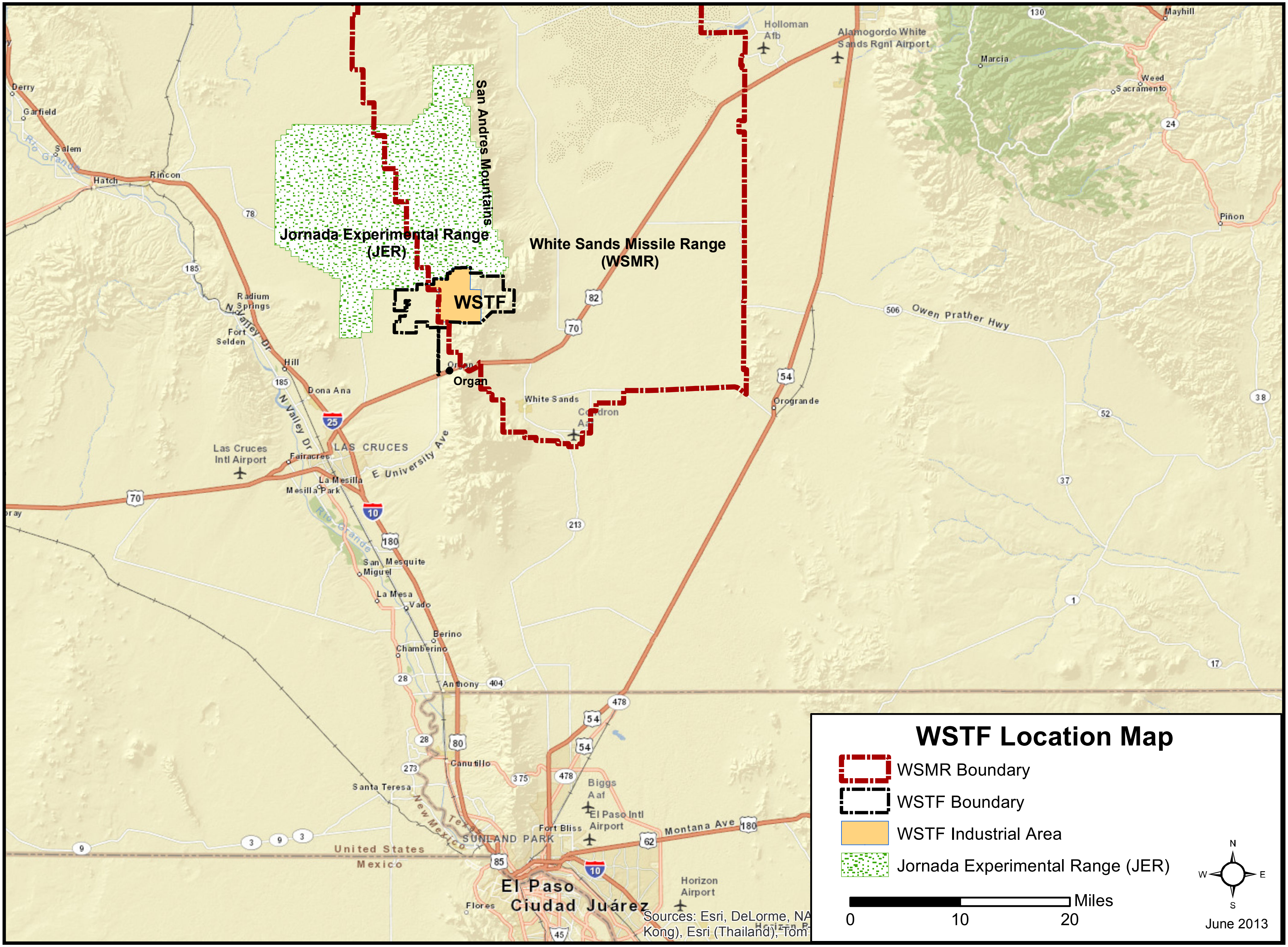
Figures

Figure 2.1 **WSTF Location Map**

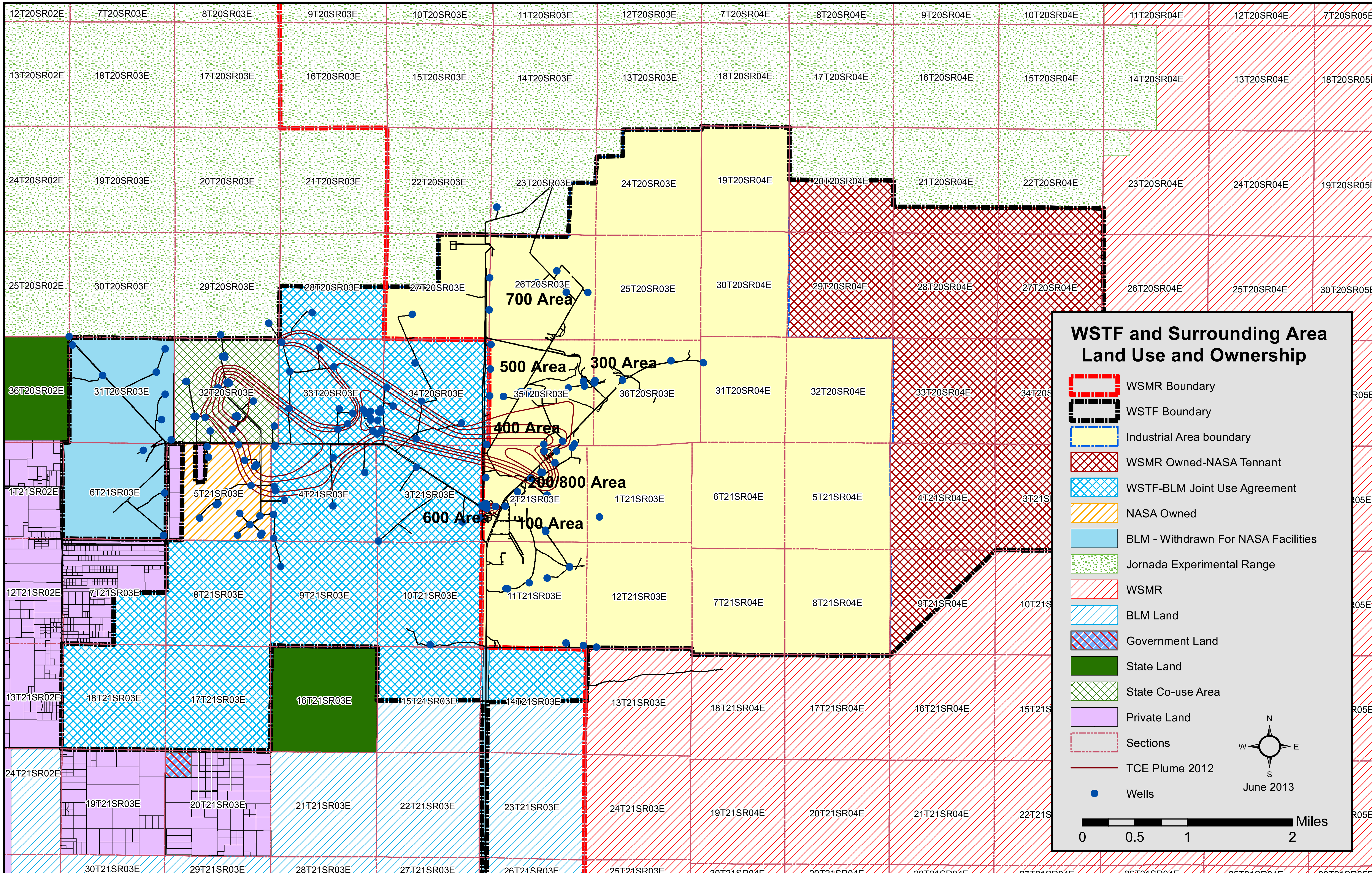
(SEE NEXT PAGE)



WSTF Location Map
WSMR Boundary
WSTF Boundary
WSTF Industrial Area
Jornada Experimental Range (JER)
Miles
0
10
20
N
S
E
W
June 2013
Jornada Experimental Range (JER)
San Andres Mountains
White Sands Missile Range (WSMR)
WSTF
Organ
Las Cruces
El Paso
Ciudad Juárez
Sources: Esri, DeLorme, NA
Kong), Esri (Thailand), Tom

Figure 2.2 **Land Ownership Map**

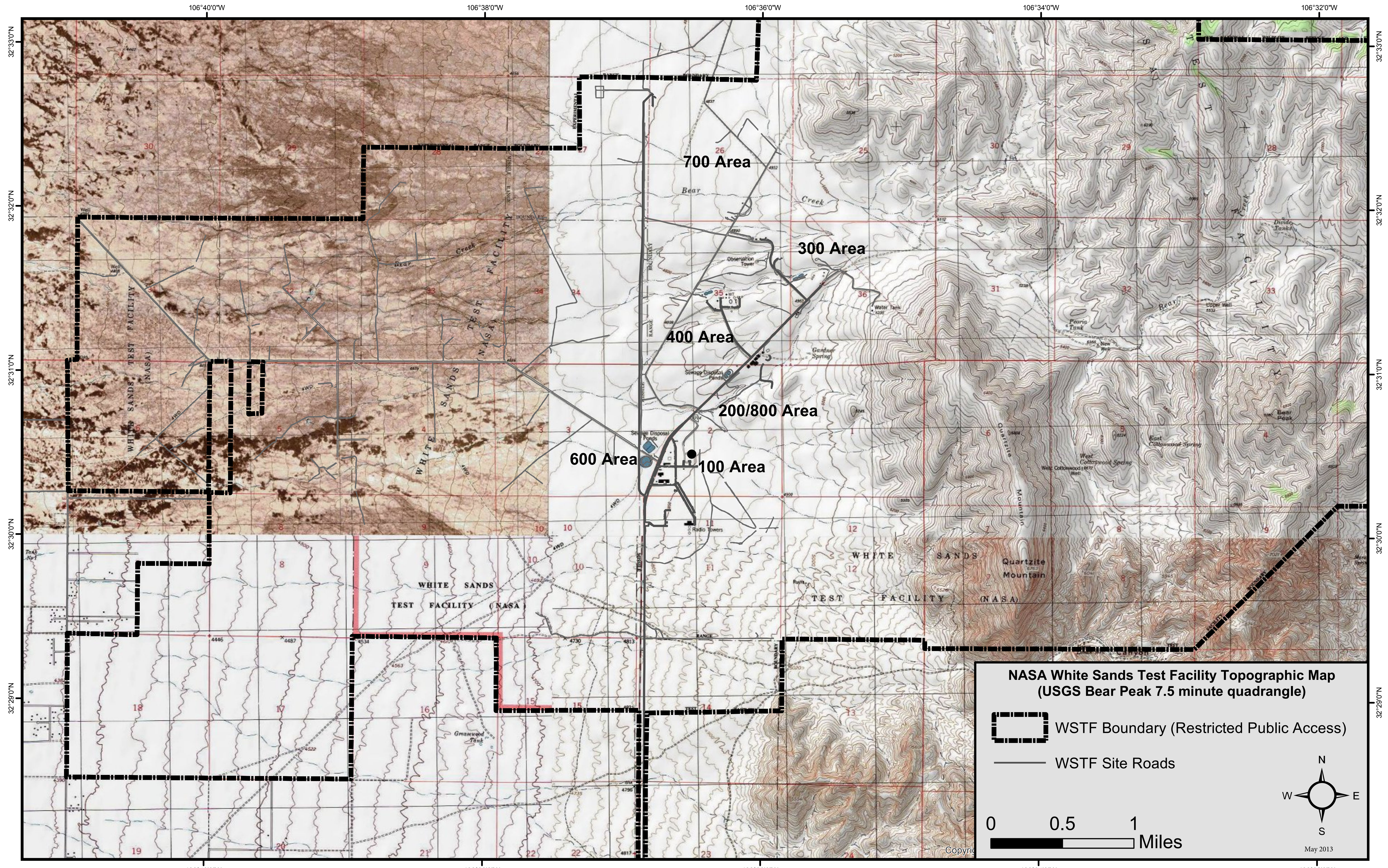
(SEE NEXT PAGE)



WSTF and Surrounding Area
Land Use and Ownership
WSMR Boundary
WSTF Boundary
Industrial Area boundary
WSMR Owned-NASA Tennant
WSTF-BLM Joint Use Agreement
NASA Owned
BLM - Withdrawn For NASA Facilities
Jornada Experimental Range
WSMR
BLM Land
Government Land
State Land
State Co-use Area
Private Land
Sections
TCE Plume 2012
Wells
N
W
E
S
June 2013
Miles
0
0.5
1
2
700 Area
500 Area
300 Area
400 Area
200/800 Area
600 Area
100 Area
12T20SR02E
7T20SR03E
8T20SR03E
9T20SR03E
10T20SR03E
11T20SR03E
12T20SR03E
7T20SR04E
8T20SR04E
9T20SR04E
10T20SR04E
11T20SR04E
12T20SR04E
7T20SR05E
13T20SR02E
18T20SR03E
17T20SR03E
16T20SR03E
15T20SR03E
14T20SR03E
13T20SR03E
18T20SR04E
17T20SR04E
16T20SR04E
15T20SR04E
14T20SR04E
13T20SR04E
18T20SR05E
24T20SR02E
19T20SR03E
20T20SR03E
21T20SR03E
22T20SR03E
23T20SR03E
24T20SR03E
19T20SR04E
20T20SR04E
21T20SR04E
22T20SR04E
23T20SR04E
24T20SR04E
19T20SR05E
25T20SR02E
30T20SR03E
29T20SR03E
28T20SR03E
27T20SR03E
26T20SR03E
25T20SR03E
30T20SR04E
29T20SR04E
28T20SR04E
27T20SR04E
26T20SR04E
25T20SR04E
30T20SR05E
36T20SR02E
31T20SR03E
32T20SR03E
33T20SR03E
34T20SR03E
35T20SR03E
36T20SR03E
31T20SR04E
32T20SR04E
33T20SR04E
1T21SR02E
6T21SR03E
5T21SR03E
4T21SR03E
3T21SR03E
2T21SR03E
1T21SR03E
6T21SR04E
5T21SR04E
4T21SR04E
12T21SR02E
7T21SR03E
8T21SR03E
9T21SR03E
10T21SR03E
11T21SR03E
12T21SR03E
7T21SR04E
8T21SR04E
9T21SR04E
13T21SR02E
18T21SR03E
17T21SR03E
16T21SR03E
15T21SR03E
14T21SR03E
13T21SR03E
18T21SR04E
17T21SR04E
16T21SR04E
24T21SR02E
19T21SR03E
20T21SR03E
21T21SR03E
22T21SR03E
23T21SR03E
24T21SR03E
19T21SR04E
20T21SR04E
21T21SR04E
30T21SR03E
29T21SR03E
28T21SR03E
27T21SR03E
26T21SR03E
25T21SR03E
30T21SR04E
29T21SR04E
28T21SR04E
27T21SR04E
26T21SR04E
25T21SR04E
30T21SR05E

Figure 2.3 WSTF Topographic Map

(SEE NEXT PAGE)



NASA White Sands Test Facility Topographic Map
(USGS Bear Peak 7.5 minute quadrangle)
WSTF Boundary (Restricted Public Access)
WSTF Site Roads
0
0.5
1
Miles
N
S
E
W
May 2013
700 Area
300 Area
400 Area
200/800 Area
600 Area
100 Area
WHITE SANDS TEST FACILITY (NASA)
Quartzite Mountain
Bear Peak
Bear Creek
Radio Towers
Sewage Disposal Ponds
Observation Tower
Water Tank
Gardner Spring
106°40'0"W
106°38'0"W
106°36'0"W
106°34'0"W
106°32'0"W
32°33'0"N
32°32'0"N
32°31'0"N
32°30'0"N
32°29'0"N

(SEE NEXT PAGE)

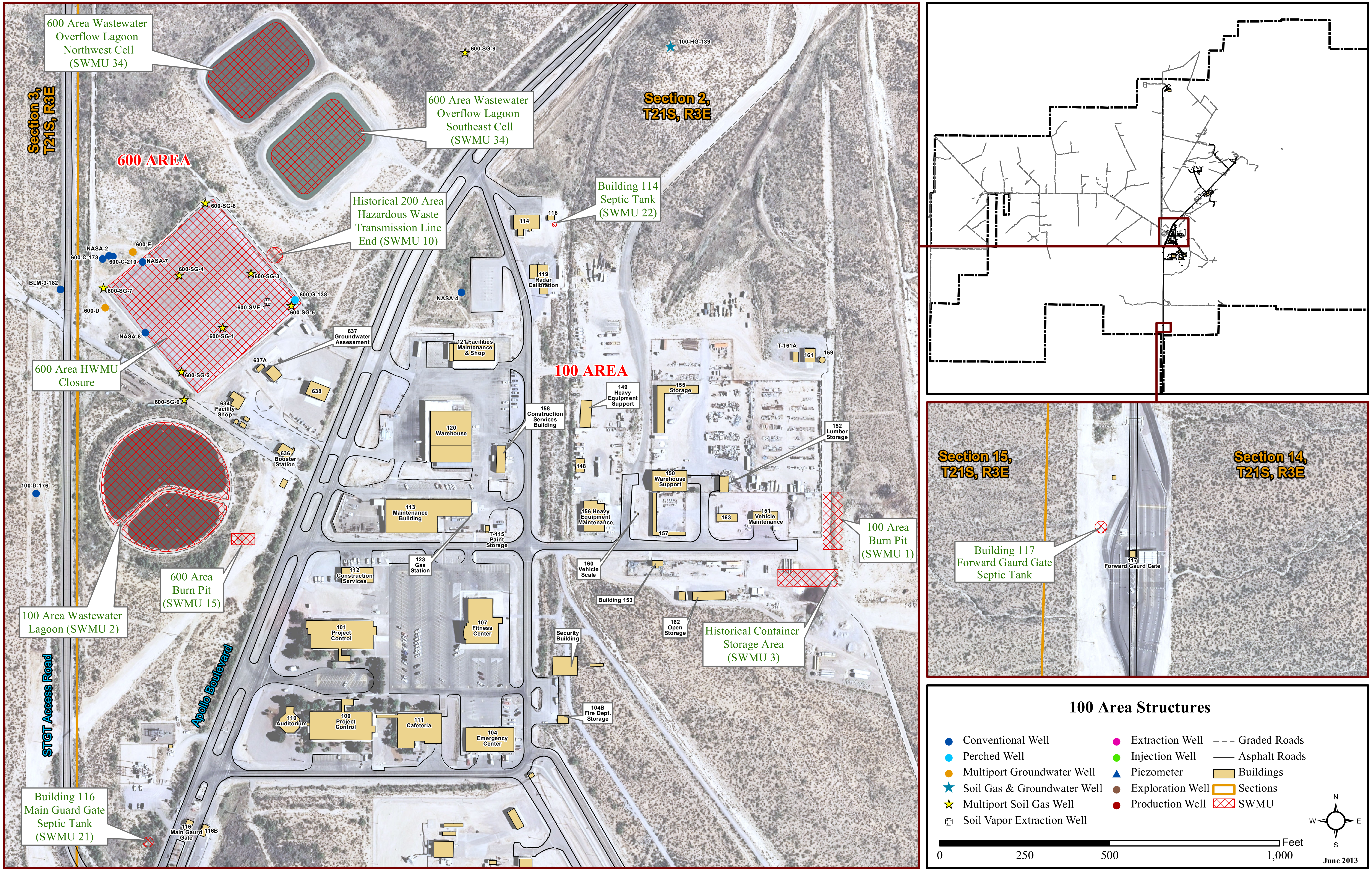
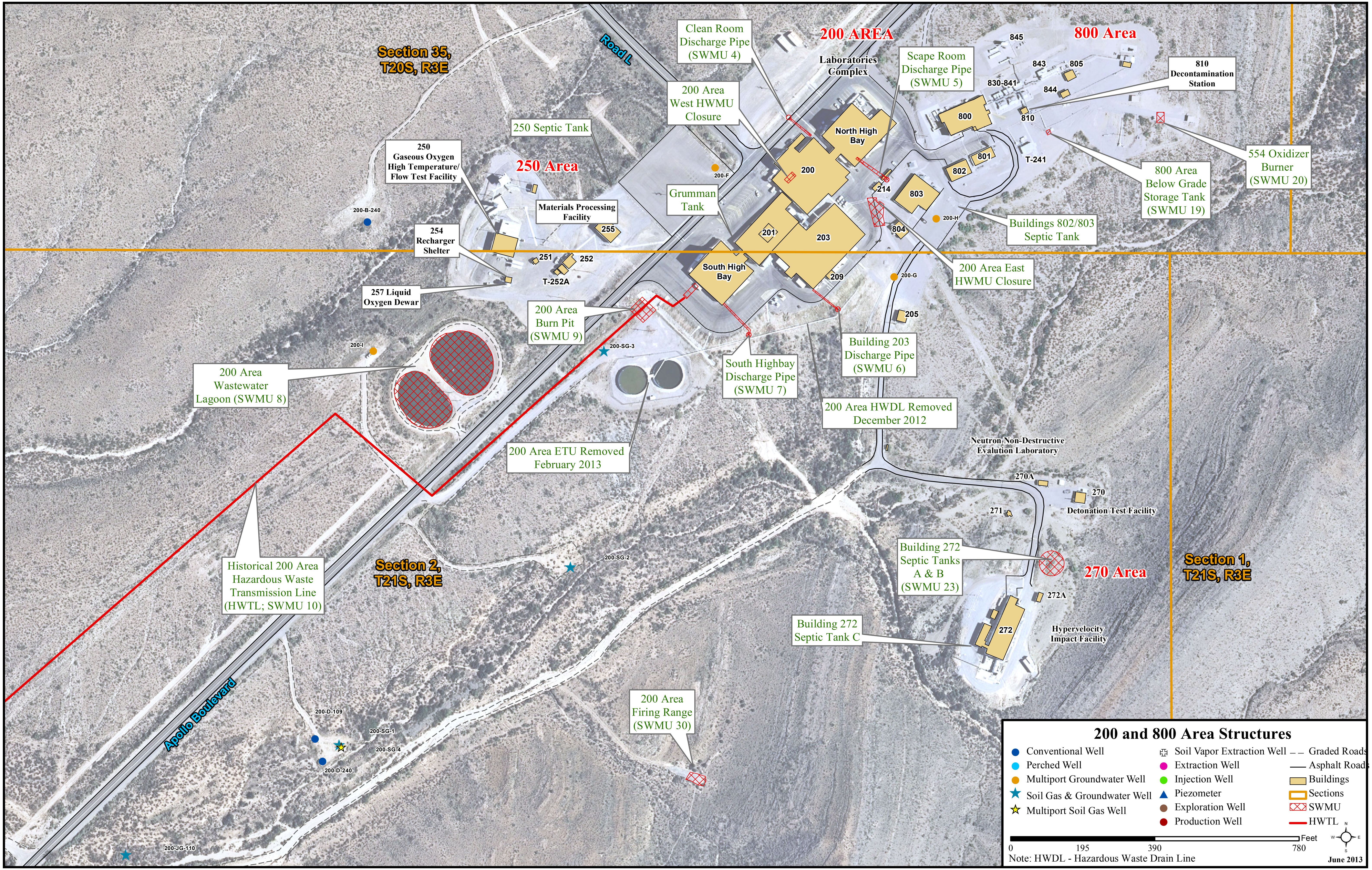

100 Area Structures
600 Area Wastewater Overflow Lagoon Northwest Cell (SWMU 34)
600 Area Wastewater Overflow Lagoon Southeast Cell (SWMU 34)
Section 3, T21S, R3E
Section 2, T21S, R3E
600 AREA
100 AREA
Historical 200 Area Hazardous Waste Transmission Line End (SWMU 10)
Building 114 Septic Tank (SWMU 22)
600 Area HWMU Closure
600 Area Burn Pit (SWMU 15)
100 Area Wastewater Lagoon (SWMU 2)
100 Area Burn Pit (SWMU 1)
Historical Container Storage Area (SWMU 3)
Building 116 Main Guard Gate Septic Tank (SWMU 21)
Building 117 Forward Gaurd Gate Septic Tank
Section 15, T21S, R3E
Section 14, T21S, R3E
117 Forward Gaurd Gate
STGT Access Road
Apollo Boulevard
600-SG-9
100-HG-139
600-SG-8
600-E
NASA-2
600-C-173
600-C-210
NASA-7
600-SG-4
600-SG-3
BLM-3-182
600-SG-7
600-G-138
600-SVE
600-SG-5
600-D
NASA-8
600-SG-1
600-SG-2
600-SG-6
100-D-176
NASA-4
114
118
119 Radar Calibration
637 Groundwater Assessment
637A
638
634 Facility Shop
636 Booster Station
121 Facilities Maintenance & Shop
120 Warehouse
158 Construction Services Building
149 Heavy Equipment Support
155 Storage
T-161A
161
159
148
152 Lumber Storage
150 Warehouse Support
156 Heavy Equipment Maintenance
163
151 Vehicle Maintenance
157
113 Maintenance Building
T-115 Paint Storage
123 Gas Station
112 Construction Services
160 Vehicle Scale
Building 153
162 Open Storage
101 Project Control
107 Fitness Center
Security Building
104B Fire Dept. Storage
110 Auditorium
100 Project Control
111 Cafeteria
104 Emergency Center
116 Main Gaurd Gate
116B
Conventional Well
Perched Well
Multiport Groundwater Well
Soil Gas & Groundwater Well
Multiport Soil Gas Well
Soil Vapor Extraction Well
Extraction Well
Injection Well
Piezometer
Exploration Well
Production Well
Graded Roads
Asphalt Roads
Buildings
Sections
SWMU
N
S
E
W
0
250
500
1,000
Feet
June 2013

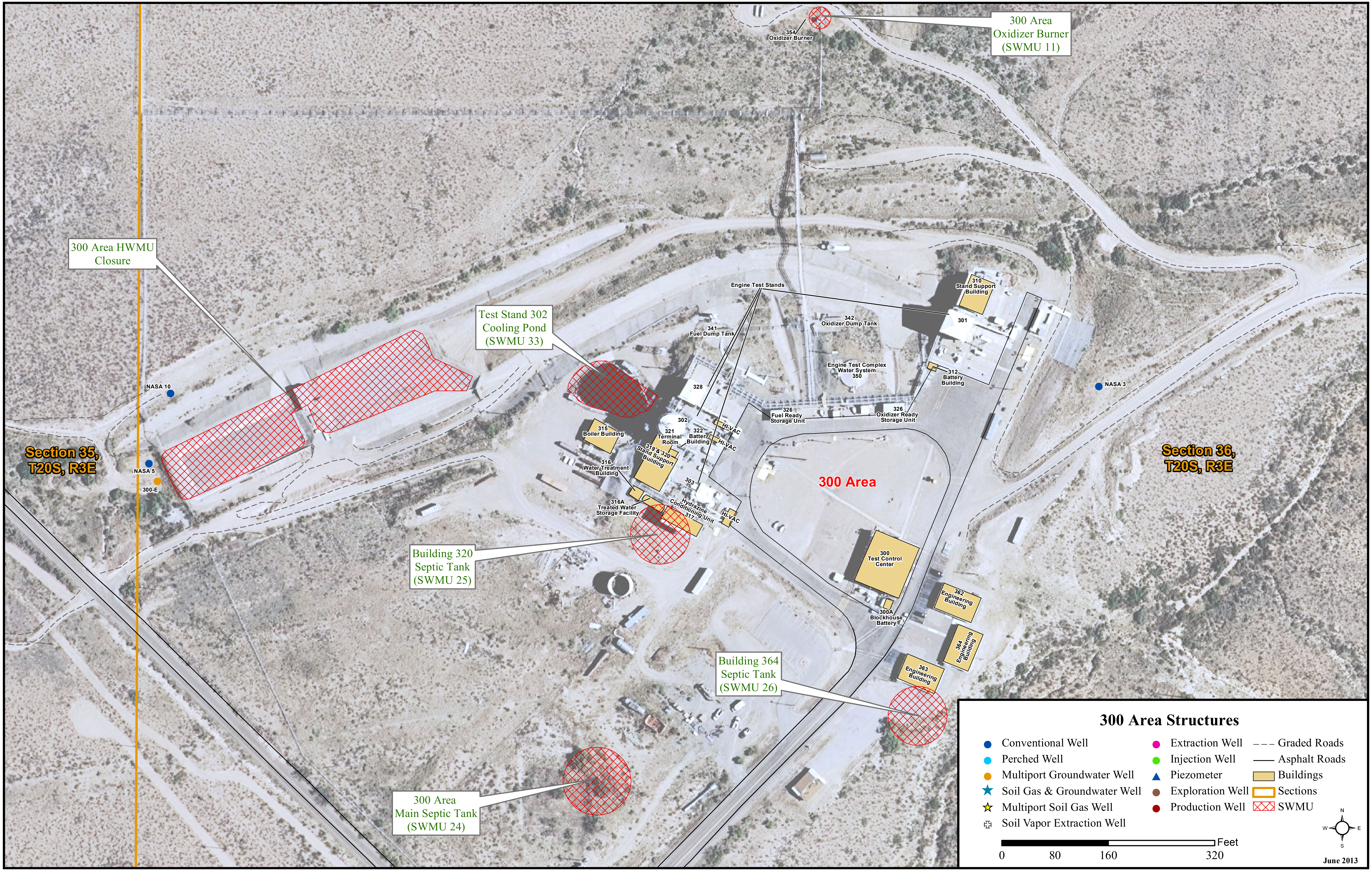
Figure 3.2 **200 and 800 Area Structures**

(SEE NEXT PAGE)



200 AREA
800 Area
250 Area
270 Area
Section 35, T20S, R3E
Section 2, T21S, R3E
Section 1, T21S, R3E
Road L
Apollo Boulevard
Laboratories Complex
Clean Room Discharge Pipe (SWMU 4)
Scape Room Discharge Pipe (SWMU 5)
200 Area West HWMU Closure
250 Septic Tank
250 Gaseous Oxygen High Temperature/ Flow Test Facility
Materials Processing Facility
254 Recharger Shelter
257 Liquid Oxygen Dewar
Grumman Tank
200 Area Burn Pit (SWMU 9)
200 Area Wastewater Lagoon (SWMU 8)
South Highbay Discharge Pipe (SWMU 7)
Building 203 Discharge Pipe (SWMU 6)
200 Area HWDL Removed December 2012
200 Area ETU Removed February 2013
200 Area East HWMU Closure
Buildings 802/803 Septic Tank
800 Area Below Grade Storage Tank (SWMU 19)
554 Oxidizer Burner (SWMU 20)
810 Decontamination Station
Neutron Non-Destructive Evaluation Laboratory
Detonation Test Facility
Building 272 Septic Tanks A & B (SWMU 23)
Building 272 Septic Tank C
Hypervelocity Impact Facility
Historical 200 Area Hazardous Waste Transmission Line (HWTL; SWMU 10)
200 Area Firing Range (SWMU 30)
North High Bay
South High Bay
200
201
203
209
214
205
800
801
802
803
804
805
810
843
844
845
830-841
T-241
251
252
255
T-252A
270
270A
271
272
272A
200-B-240
200-F
200-H
200-G
200-I
200-SG-3
200-SG-2
200-SG-1
200-SG-4
200-D-109
200-D-240
200-JG-110
200 and 800 Area Structures
Conventional Well
Perched Well
Multiport Groundwater Well
Soil Gas & Groundwater Well
Multiport Soil Gas Well
Soil Vapor Extraction Well
Extraction Well
Injection Well
Piezometer
Exploration Well
Production Well
Graded Roads
Asphalt Roads
Buildings
Sections
SWMU
HWTL
0
195
390
780
Feet
Note: HWDL - Hazardous Waste Drain Line
June 2013

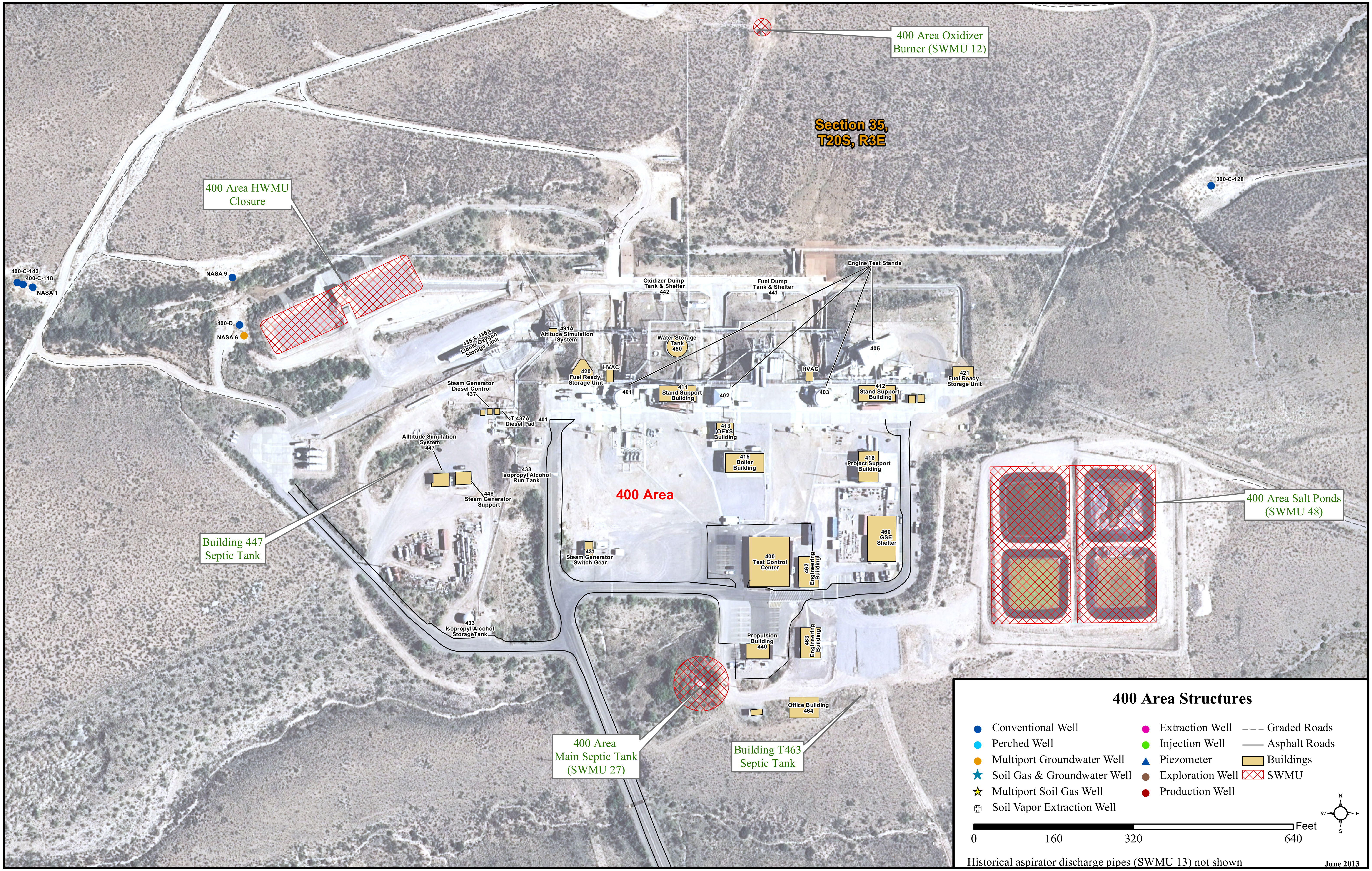
(SEE NEXT PAGE)



300 Area Oxidizer Burner (SWMU 11)
354 Oxidizer Burner
300 Area HWMU Closure
Test Stand 302 Cooling Pond (SWMU 33)
Engine Test Stands
341 Fuel Dump Tank
342 Oxidizer Dump Tank
310 Stand Support Building
301
312 Battery Building
Engine Test Complex Water System 350
328
302
326 Fuel Ready Storage Unit
326 Oxidizer Ready Storage Unit
315 Boiler Building
321 Terminal Room
322 Batter Building
HI-VAC
HI-VAC
319 & 320 Stand Support Building
316 Water Treatment Building
303
316A Treated Water Storage Facility
Hydrazine Conditioning Unit 317
HI-VAC
300 Area
NASA 10
NASA 5
300-E
NASA 3
Section 35, T20S, R3E
Section 36, T20S, R3E
Building 320 Septic Tank (SWMU 25)
300 Test Control Center
300A Blockhouse Battery
362 Engineering Building
364 Engineering Building
363 Engineering Building
Building 364 Septic Tank (SWMU 26)
300 Area Main Septic Tank (SWMU 24)
300 Area Structures
Conventional Well
Perched Well
Multiport Groundwater Well
Soil Gas & Groundwater Well
Multiport Soil Gas Well
Soil Vapor Extraction Well
Extraction Well
Injection Well
Piezometer
Exploration Well
Production Well
Graded Roads
Asphalt Roads
Buildings
Sections
SWMU
N
W
E
S
Feet
0
80
160
320
June 2013

Figure 3.4 **400 Area Structures**

(SEE NEXT PAGE)


400 Area Oxidizer Burner (SWMU 12)
Section 35, T20S, R3E
400 Area HWMU Closure
300-C-128
400-C-143
400-C-118
NASA 1
NASA 9
400-D
NASA 6
Engine Test Stands
Oxidizer Dump Tank & Shelter 442
Fuel Dump Tank & Shelter 441
435 & 435A Liquid Oxygen Storage Tank
491A Altitude Simulation System
Water Storage Tank 450
405
420 Fuel Ready Storage Unit
HVAC
401
411 Stand Support Building
402
403
412 Stand Support Building
421 Fuel Ready Storage Unit
Steam Generator Diesel Control 437
T-437A Diesel Pad
413 OEXS Building
415 Boiler Building
416 Project Support Building
Altitude Simulation System 447
433 Isopropyl Alcohol Run Tank
448 Steam Generator Support
400 Area
400 Area Salt Ponds (SWMU 48)
Building 447 Septic Tank
431 Steam Generator Switch Gear
400 Test Control Center
462 Engineering Building
460 GSE Shelter
433 Isopropyl Alcohol Storage Tank
Propulsion Building 440
463 Engineering Building
Office Building 464
400 Area Main Septic Tank (SWMU 27)
Building T463 Septic Tank
400 Area Structures
Conventional Well
Perched Well
Multiport Groundwater Well
Soil Gas & Groundwater Well
Multiport Soil Gas Well
Soil Vapor Extraction Well
Extraction Well
Injection Well
Piezometer
Exploration Well
Production Well
Graded Roads
Asphalt Roads
Buildings
SWMU
N
W
E
S
Feet
0
160
320
640
Historical aspirator discharge pipes (SWMU 13) not shown
June 2013

(SEE NEXT PAGE)

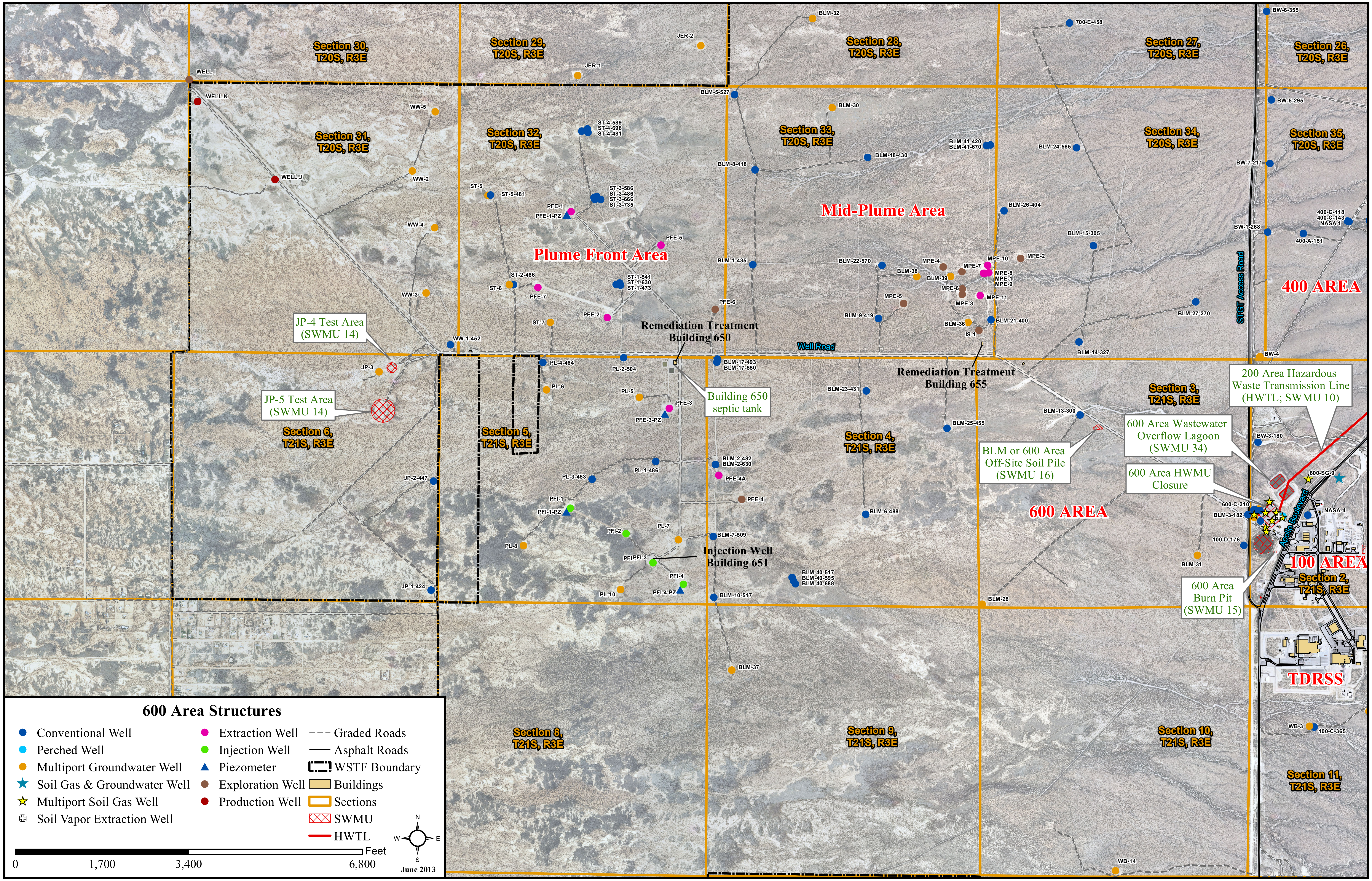

Section 30, T20S, R3E
Section 29, T20S, R3E
Section 28, T20S, R3E
Section 27, T20S, R3E
Section 26, T20S, R3E
Section 31, T20S, R3E
Section 32, T20S, R3E
Section 33, T20S, R3E
Section 34, T20S, R3E
Section 35, T20S, R3E
Mid-Plume Area
Plume Front Area
400 AREA
JP-4 Test Area (SWMU 14)
Remediation Treatment Building 650
Well Road
Remediation Treatment Building 655
STGT Access Road
JP-5 Test Area (SWMU 14)
Building 650 septic tank
200 Area Hazardous Waste Transmission Line (HWTL; SWMU 10)
Section 6, T21S, R3E
Section 5, T21S, R3E
Section 4, T21S, R3E
Section 3, T21S, R3E
600 Area Wastewater Overflow Lagoon (SWMU 34)
BLM or 600 Area Off-Site Soil Pile (SWMU 16)
600 Area HWMU Closure
600 AREA
Apollo Boulevard
100 AREA
Injection Well Building 651
Section 2, T21S, R3E
600 Area Burn Pit (SWMU 15)
TDRSS
Section 8, T21S, R3E
Section 9, T21S, R3E
Section 10, T21S, R3E
Section 11, T21S, R3E
600 Area Structures
Conventional Well
Perched Well
Multiport Groundwater Well
Soil Gas & Groundwater Well
Multiport Soil Gas Well
Soil Vapor Extraction Well
Extraction Well
Injection Well
Piezometer
Exploration Well
Production Well
Graded Roads
Asphalt Roads
WSTF Boundary
Buildings
Sections
SWMU
HWTL
Feet
0
1,700
3,400
6,800
N
E
S
W
June 2013

Figure 3.6 **STGT Area Structures**

(SEE NEXT PAGE)

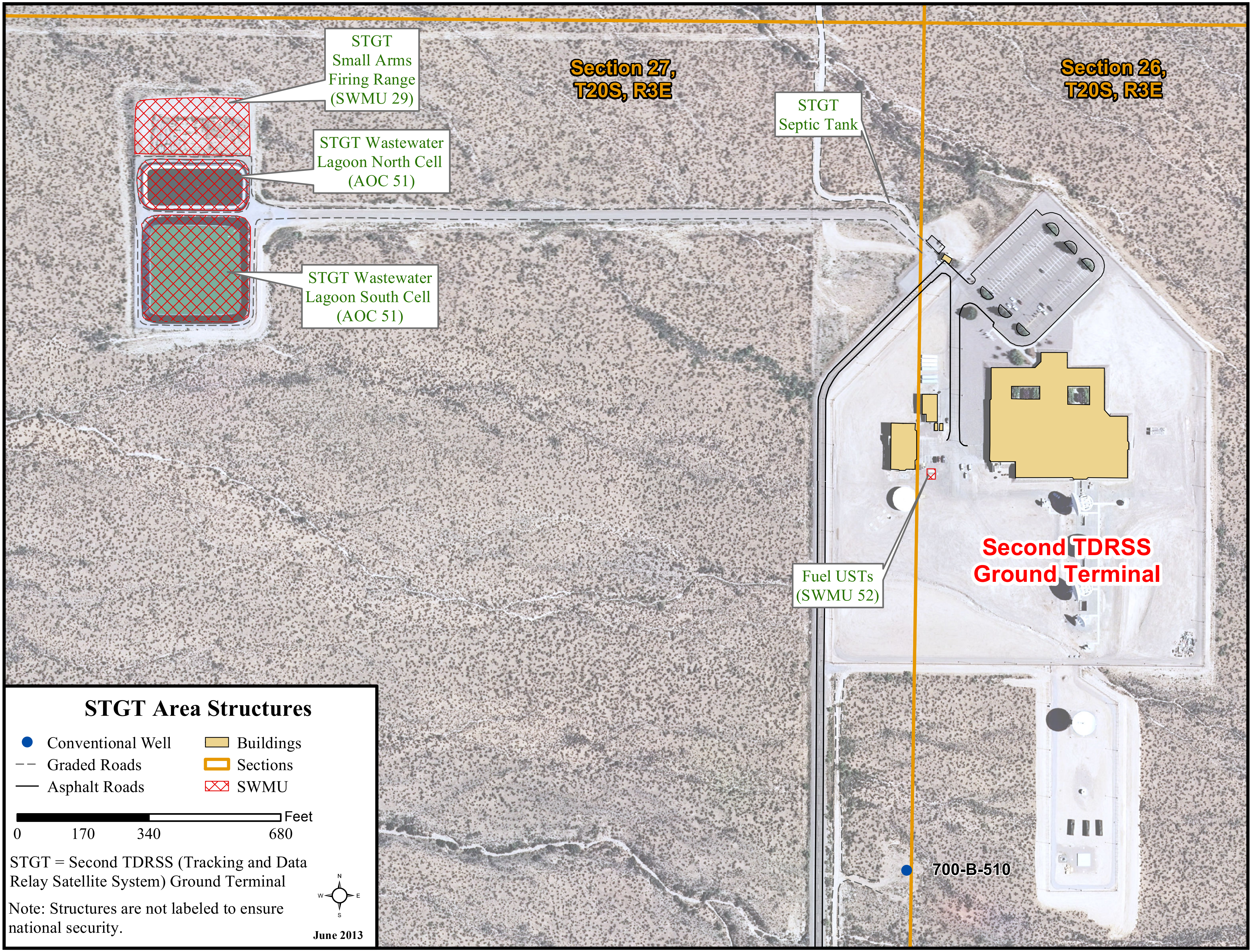

STGT Small Arms Firing Range (SWMU 29)
STGT Wastewater Lagoon North Cell (AOC 51)
STGT Wastewater Lagoon South Cell (AOC 51)
Section 27, T20S, R3E
Section 26, T20S, R3E
STGT Septic Tank
Fuel USTs (SWMU 52)
Second TDRSS Ground Terminal
700-B-510
STGT Area Structures
Conventional Well
Graded Roads
Asphalt Roads
Buildings
Sections
SWMU
Feet
0
170
340
680
STGT = Second TDRSS (Tracking and Data Relay Satellite System) Ground Terminal
Note: Structures are not labeled to ensure national security.
N
E
S
W
June 2013

Figure 3.7 **WSTF Industrial Areas**

(SEE NEXT PAGE)

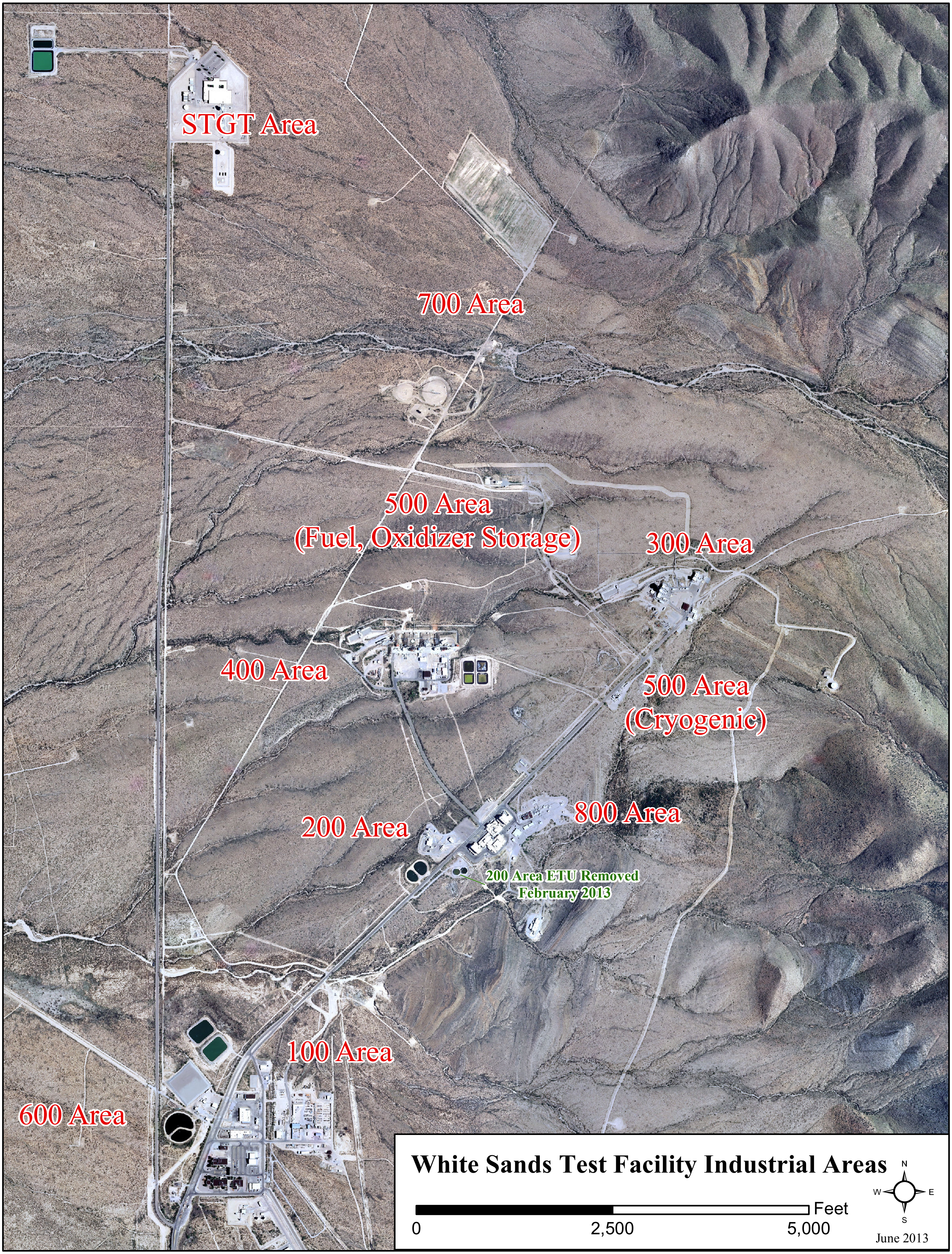

STGT Area
700 Area
500 Area
(Fuel, Oxidizer Storage)
300 Area
400 Area
500 Area
(Cryogenic)
200 Area
800 Area
200 Area ETU Removed
February 2013
100 Area
600 Area
White Sands Test Facility Industrial Areas
N
W
E
S
Feet
0
2,500
5,000
June 2013

Figure 7.1 100/600 Area Sanitary Sewer Lines and Septic Tanks

(SEE NEXT PAGE)

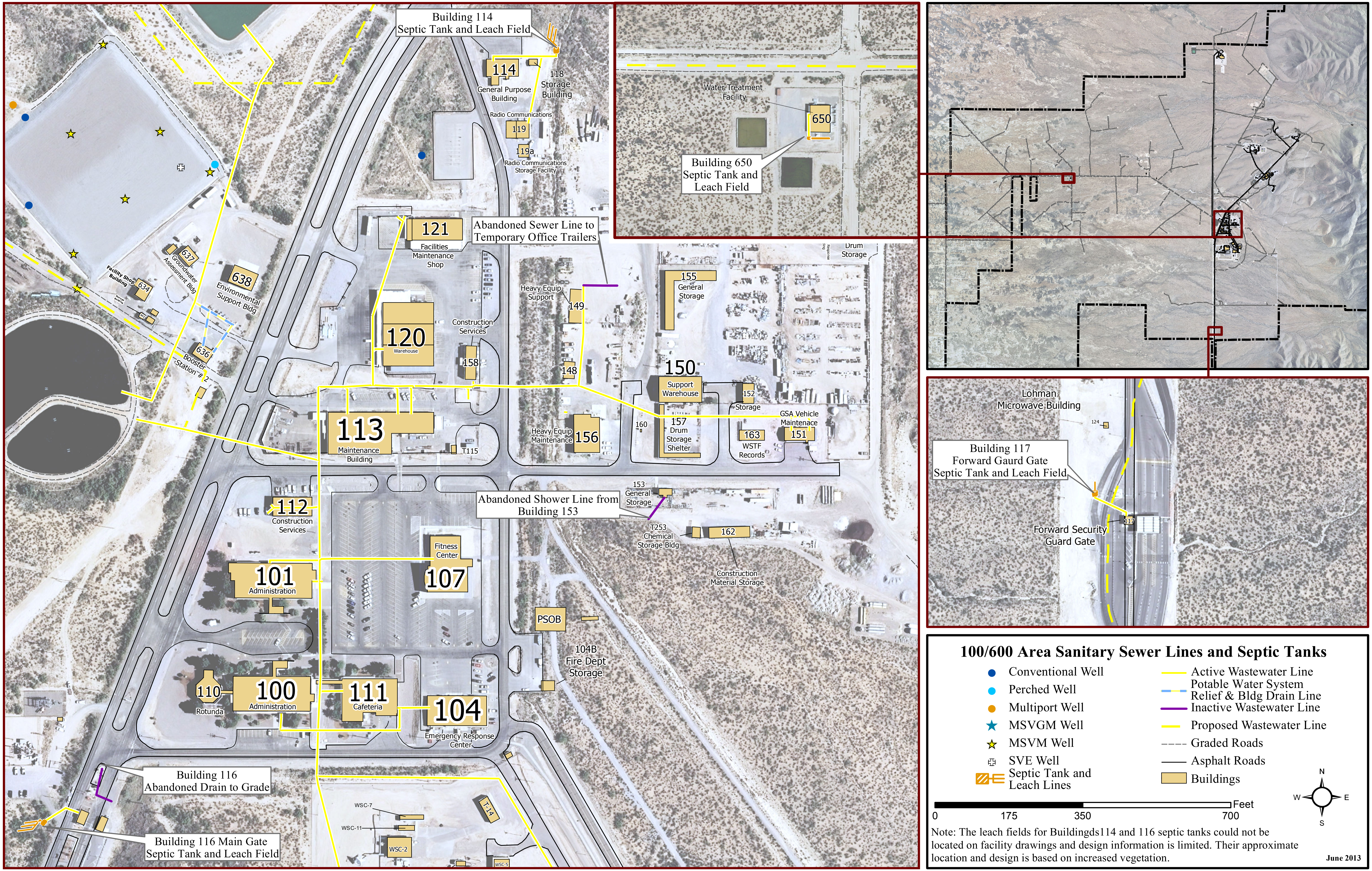

Building 114
Septic Tank and Leach Field
114
General Purpose Building
118 Storage Building
Radio Communications
119
119a
Radio Communications Storage Facility
121
Facilities Maintenance Shop
Abandoned Sewer Line to
Temporary Office Trailers
637
Groundwater Assessment Bldg
638
Environmental Support Bldg
Facility Shop Building
634
636
Booster Station #2
120
Warehouse
Construction Services
158
Heavy Equip Support
149
148
155
General Storage
150
Support Warehouse
152
Storage
GSA Vehicle Maintenance
151
163
WSTF Records
160
157
Drum Storage Shelter
Heavy Equip Maintenance
156
113
Maintenance Building
T115
Drum Storage
112
Construction Services
Abandoned Shower Line from
Building 153
153
General Storage
T253
Chemical Storage Bldg
162
Construction Material Storage
Fitness Center
107
101
Administration
PSOB
104B
Fire Dept
Storage
110
Rotunda
100
Administration
111
Cafeteria
104
Emergency Response Center
Building 116
Abandoned Drain to Grade
Building 116 Main Gate
Septic Tank and Leach Field
WSC-7
WSC-11
WSC-2
T-14
WSC-5
Water Treatment Facility
650
Building 650
Septic Tank and
Leach Field
Lohman
Microwave Building
124
Building 117
Forward Gaurd Gate
Septic Tank and Leach Field
Forward Security
Guard Gate
117
100/600 Area Sanitary Sewer Lines and Septic Tanks
Conventional Well
Perched Well
Multiport Well
MSVGM Well
MSVM Well
SVE Well
Septic Tank and
Leach Lines
Active Wastewater Line
Potable Water System
Relief & Bldg Drain Line
Inactive Wastewater Line
Proposed Wastewater Line
Graded Roads
Asphalt Roads
Buildings
N
W
E
S
Feet
0
175
350
700
Note: The leach fields for Buildingds114 and 116 septic tanks could not be located on facility drawings and design information is limited. Their approximate location and design is based on increased vegetation.
June 2013

Figure 7.2 200/800 Area Sanitary Sewer Lines and Septic Tanks

(SEE NEXT PAGE)

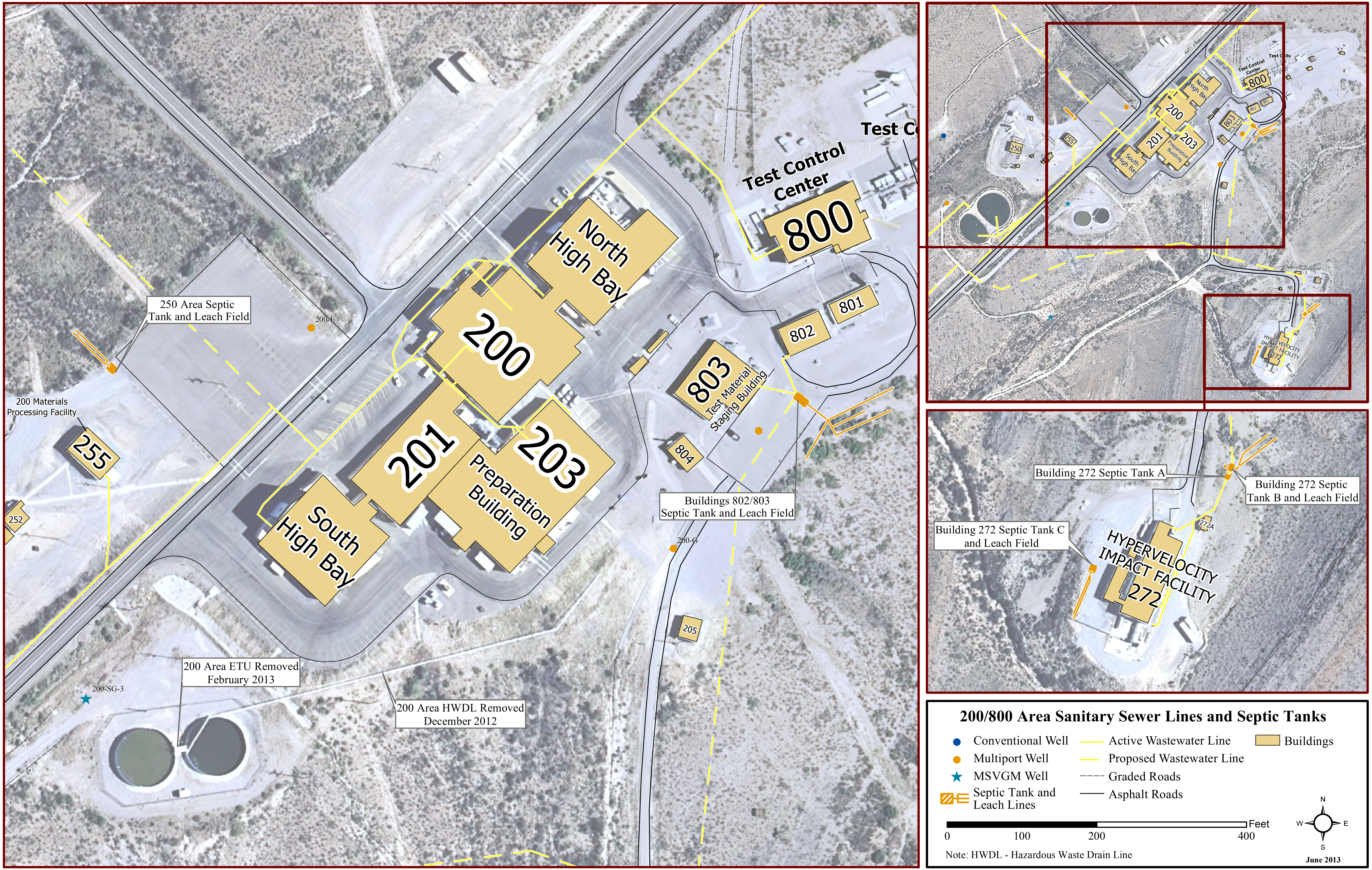
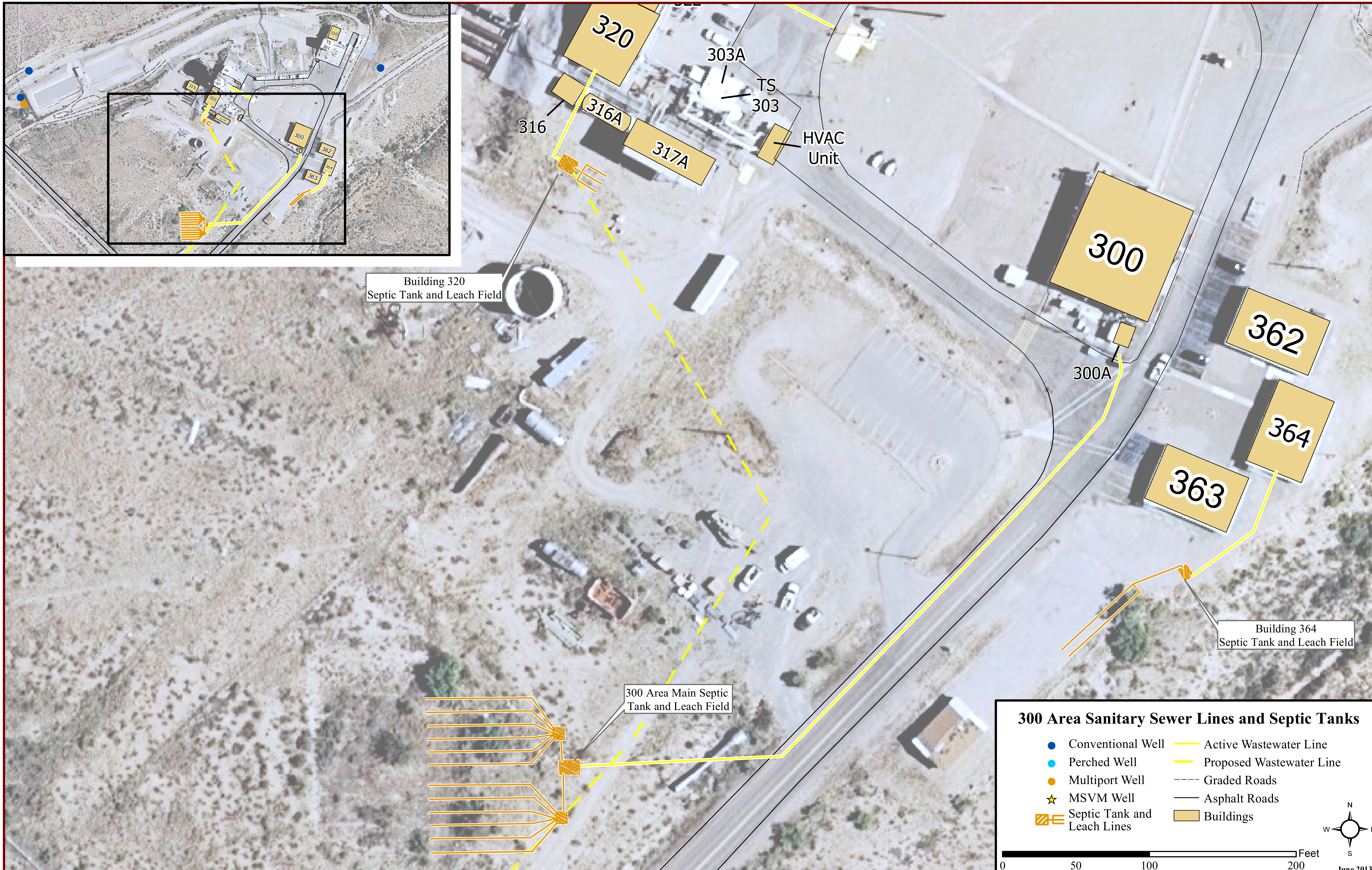

200/800 Area Sanitary Sewer Lines and Septic Tanks
Conventional Well
Multiport Well
MSVGM Well
Septic Tank and Leach Lines
Active Wastewater Line
Proposed Wastewater Line
Graded Roads
Asphalt Roads
Buildings
Feet
0
100
200
400
N
W
E
S
Note: HWDL - Hazardous Waste Drain Line
June 2013
Test Control Center
800
North High Bay
200
201
203
Preparation Building
South High Bay
255
252
802
801
803
Test Material Staging Building
804
205
250 Area Septic Tank and Leach Field
200 Materials Processing Facility
Buildings 802/803 Septic Tank and Leach Field
200 Area ETU Removed February 2013
200 Area HWDL Removed December 2012
200-I
200-G
200-SG-3
Building 272 Septic Tank A
Building 272 Septic Tank B and Leach Field
Building 272 Septic Tank C and Leach Field
HYPERVELOCITY IMPACT FACILITY
272
272A
250

Figure 7.3 300 Area Sanitary Sewer Lines and Septic Tanks

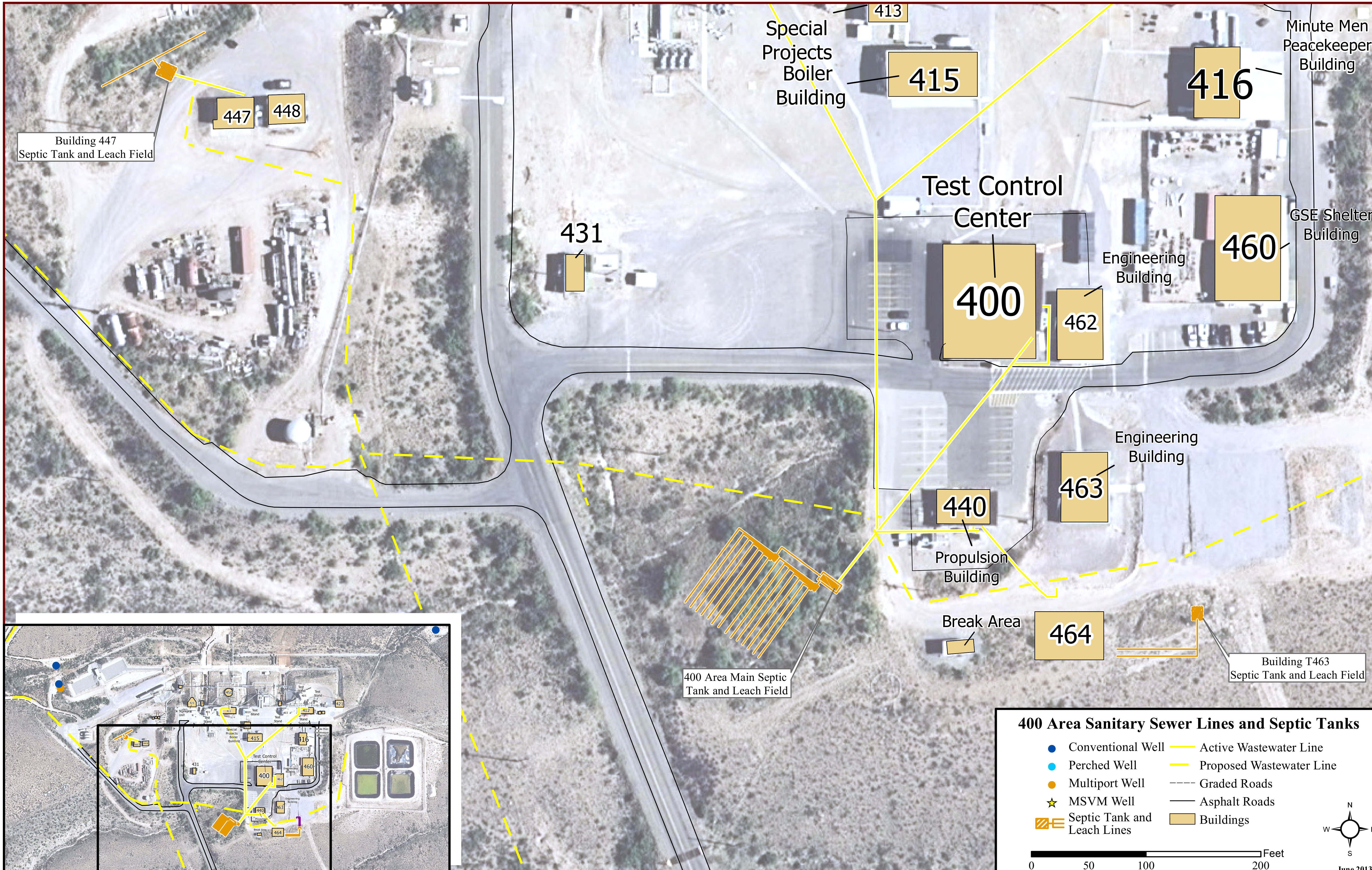
(SEE NEXT PAGE)



320
316
316A
317A
303A
TS
303
HVAC
Unit
300
300A
362
364
363
310
TS
301
312
315
Building 320
Septic Tank and Leach Field
Building 364
Septic Tank and Leach Field
300 Area Main Septic
Tank and Leach Field
300 Area Sanitary Sewer Lines and Septic Tanks
Conventional Well
Perched Well
Multiport Well
MSVM Well
Septic Tank and
Leach Lines
Active Wastewater Line
Proposed Wastewater Line
Graded Roads
Asphalt Roads
Buildings
N
W
E
S
Feet
0
50
100
200
June 2013

Figure 7.4 400 Area Sanitary Sewer Lines and Septic Tanks

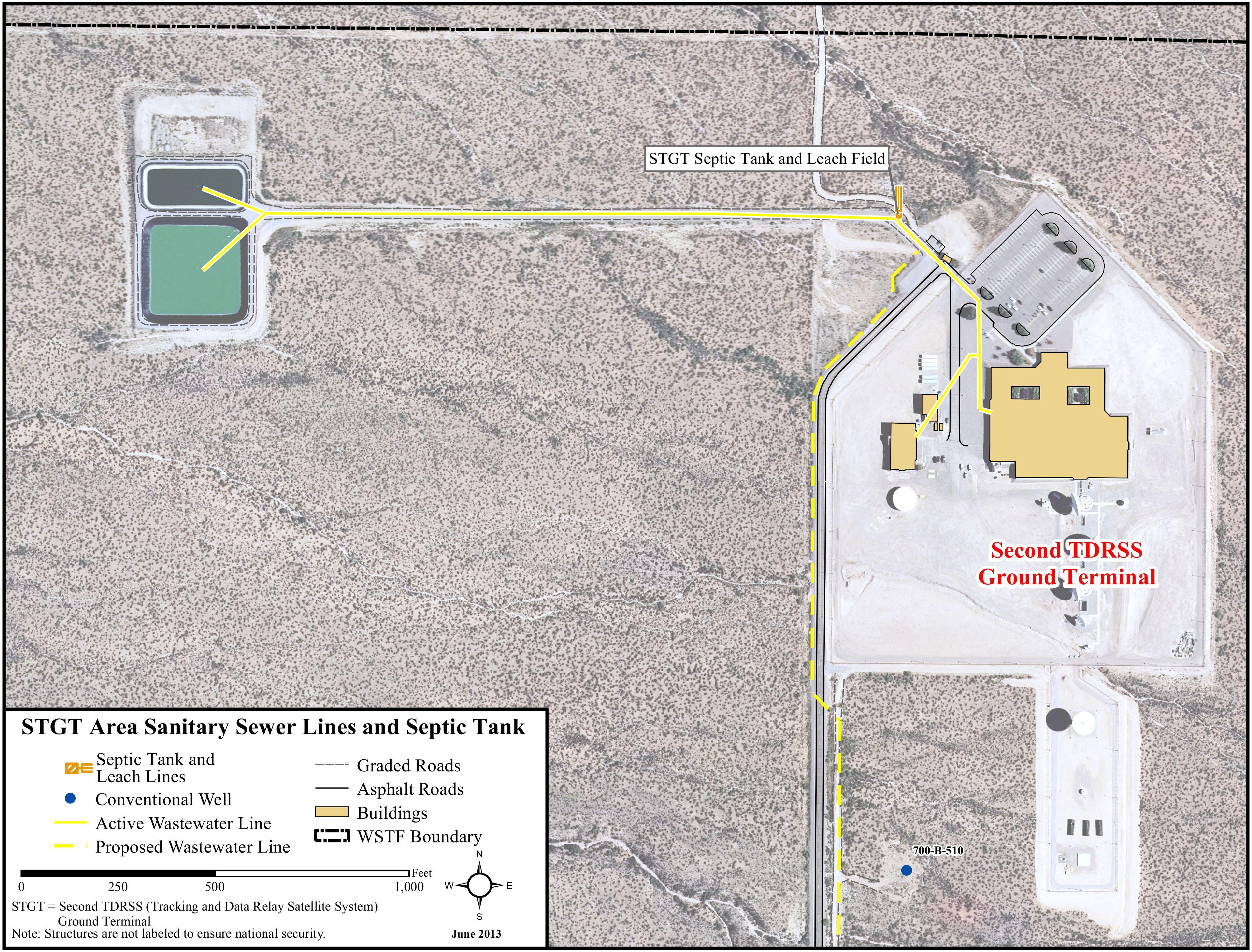
(SEE NEXT PAGE)



413
Special Projects Boiler Building
415
416
Minute Men Peacekeeper Building
447
448
Building 447 Septic Tank and Leach Field
431
Test Control Center
400
462
Engineering Building
460
GSE Shelter Building
Engineering Building
463
440
Propulsion Building
Break Area
464
400 Area Main Septic Tank and Leach Field
Building T463 Septic Tank and Leach Field
400 Area Sanitary Sewer Lines and Septic Tanks
Conventional Well
Perched Well
Multiport Well
MSVM Well
Septic Tank and Leach Lines
Active Wastewater Line
Proposed Wastewater Line
Graded Roads
Asphalt Roads
Buildings
Feet
0
50
100
200
N
S
E
W
June 2013

Figure 7.5 STGT Area Sanitary Sewer Lines and Septic Tank

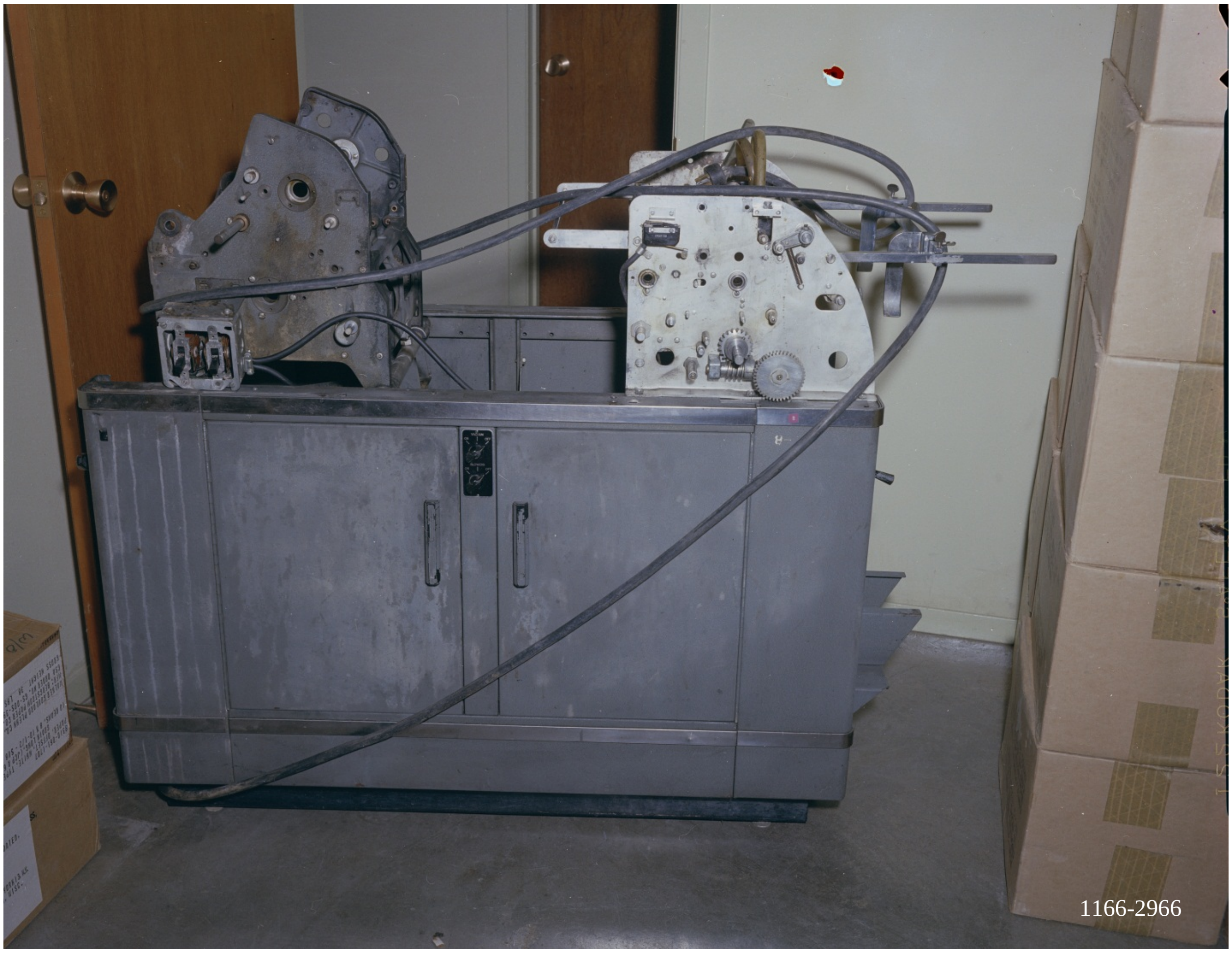
(SEE NEXT PAGE)



STGT Septic Tank and Leach Field
Second TDRSS Ground Terminal
700-B-510
STGT Area Sanitary Sewer Lines and Septic Tank
Septic Tank and Leach Lines
Conventional Well
Active Wastewater Line
Proposed Wastewater Line
Graded Roads
Asphalt Roads
Buildings
WSTF Boundary
0
250
500
1,000
Feet
N
E
S
W
STGT = Second TDRSS (Tracking and Data Relay Satellite System) Ground Terminal
Note: Structures are not labeled to ensure national security.
June 2013

Figure 8.1 **Building 114 Plate-Maker Machine (1966)**

(November 1966)



This photograph is believed to be one of the Building 114 plate-maker machines that used “activator” and “stabilizer” chemicals. The spent chemicals were discharged to the Building 114 septic tank approximately from 1963 to 1985.

Tables

Table 7.1 WSTF Septic Tank System Summary

(SEE NEXT PAGE)

Table 7.1 WSTF Septic Tank System Summary

Septic Tank Designation	SWMU	Dates Active	Size (gallons)	Designed Leach Field Area (ft^2)	Designed Flow Rate (gpd)	Permit Number	Service Area	Discharge Source Other Than Bathrooms/ Sinks/ Janitorial	Maintenance	Malfunctions	Wastes Discharged to Septic System	Hazardous Substances	Comments
Building 114	22	1963-present	1,200	Unknown	600	NA	Building 114; Temporary Office Trailer (removed 1964); Building 119	NA	Pumping History Unclear: possibly 1994/2007; definitely 2012	Backed-up into buildings March 2007: portion of line replaced; tank may potentially be leaking	Sewage and hand-washing wastes	Silver and cyanide from historical plate-maker machine wastes	This is the only septic tank believed to have received hazardous substances; permits were not required in liquid waste regulations prior to 1979
Building 116 (Main Guard Gate)	21	1966-present	500	1,250	200	NA	Building 116; Temporary Office Trailer T164 (removed 1999)	NA	Believed to have never been pumped	NA	Sewage, hand-washing and common janitorial supply wastes	NA	Permits were not required in liquid waste regulations prior to 1979.
Building 117 (Forward Guard Gate)	NA	April 17, 2006-present	900	231.6	80	DP-392	Building 117	HVAC (heating, ventilation, and air conditioning) condensate drain	Never pumped	NA	Sewage and hand-washing wastes	NA	NMED GWQB approved under DP-392 was only for 120 days from May 12, 2006. NASA did not apply for a LWP permit.
250 Area tank	NA	1963 or 1964-~1970	~2,600	Unknown	Unknown	NA	Temporary Office Trailers in 250 Area (removed 1964/1965)	NA	Unknown	Unknown	Reportedly sewage and hand-washing wastes	NA	Ended use ~1970; Constructed of redwood with Orangeburg leach lines; Depression shown at tank location in 1977
Building 272 (tanks A and B)	23	December 19, 1991-present	1,200 each	600	600 each	LC 910939	Building 272	highbay gunroom: 4 floor drains; shower; washing machine	Pumped 1993; 1994	NA	Cooling water for highbay gun, washing machine, sewage, hand-washing, and common janitorial supply wastes (wastes include detergents, diluted bleach, "simple green", trace amounts of dust from gun, grease, oils)	NA	Designed in series: tank A for septage and tank B for gun cooling water
Building 272 (tank C)	NA	April 15, 2005-present	900	480	200	DP-392	Building 272	utility room floor drain	Never pumped	NA		NA	NMED approval documentation could not be located. NASA did not apply for a LWP permit
300 Area main tank	24	1963-present	5,800	11,000	680[1]	NA	Building 300	NA	May have removed sludge to 100/200 wastewater lagoons prior to mid-1980s; pumped 1993, 1994, 2005, 2012	Foul odor in March 2009: enzymes input to septic system	Sewage, hand-washing, and common janitorial supply wastes	NA	Permits were not required in liquid waste regulations prior to 1979; contains tile leach fields

Table 7.1 WSTF Septic Tank System Summary													
Septic Tank Designation	SWMU	Dates Active	Size (gallons)	Designed Leach Field Area (ft²)	Designed Flow Rate (gpd)	Permit Number	Service Area	Discharge Source Other Than Bathrooms/ Sinks/ Janitorial	Maintenance	Malfunctions	Wastes Discharged to Septic System	Hazardous Substances	Comments
Building 320	25	August 1993-present	1,200	360	200	LC 930858	Building 320	Shower	Pumped 1994, 2012	Repaired leach line in October 2012	Sewage, hand-washing, and common janitorial supply wastes	NA	Permitted originally by Lockheed (WSTF contractor), not NASA; Building 320 was originally constructed with no sewer connections; a bathroom was added in 1993
Building 364	26	December 1991-present	1,200	180	300	LC 910918	Building 364	NA	Pumped 1993, 1994, 2008, 2012	Back-flowed into Building 364 in June 2008: installed new line to leach field and access ports; foul odor in August 2009: input enzymes to septic system	Sewage, hand-washing, and common janitorial supply wastes	NA	NA
400 Area main tank	27	1964-present	6,200	11,000	780[1]	NA	Buildings 400, 411, 412, 440, and 464	3 mechanical rooms with floor drain; shower; historical cooling tower	May have removed sludge to 100/200 wastewater lagoons prior to mid-1980s; pumped 1993, 1994, 2006, 2008; removed vegetation, constructed diverter box lid	Foul odor in March 2009 (enzymes likely input to system); October 2004: wet soil N corner on SW side; Broken outflow pipe in June 2006: replaced piping; July 2006: leak from corroded pipe to diverter box; February 2010: sewage leaking to concrete behind Building 411.	Sewage, hand-washing, and common janitorial supply wastes (wastes include trace amounts of oils and solvents)	NA	Permits were not required in liquid waste regulations prior to 1979; contains tile leach fields
Building 447	NA	May 8, 1990-present	750	300	100	LC 900333	Buildings 447, 448	NA	Pumped 1993, 1994	March 2007: overflowing cleanout: flushed system	Sewage, hand-washing, and common janitorial supply wastes (wastes include trace amounts of grease, oils, and solvents)	NA	Buildings 447 and 448 are 400 Area steam system support buildings
Building T463	NA	May 1992-April 1994	1,200	275	400	LC 920527	temporary Building T463	NA	Pumped 1993, 1994	Repaired broken P-trap, installed inlet port, recapped several times (all performed when system inactive)	Sewage, hand-washing, and common janitorial supply wastes	NA	Only in use from March 1992 to April 1994; the system has been inactive since then
Building 650 (Plume-Front Area)	NA	April 2001-present	1,200	720	40	DA 010359	Building 650	NA	Never pumped	NA	Sewage and hand-washing wastes	NA	Permitted originally by Honeywell (WSTF contractor)

Table 7.1 WSTF Septic Tank System Summary													
Septic Tank Designation	SWMU	Dates Active	Size (gallons)	Designed Leach Field Area (ft^2)	Designed Flow Rate (gpd)	Permit Number	Service Area	Discharge Source Other Than Bathrooms/ Sinks/ Janitorial	Maintenance	Malfunctions	Wastes Discharged to Septic System	Hazardous Substances	Comments
Buildings 802 and 803	NA	April 1987-present	1,500	900	600	LC 870401	Buildings 802, 803	shower; washing machine; preparation laboratory with 2 sinks	Pumped 1993, 1994	NA	Test article washing, washing machine, sewage, hand-washing, and common janitorial supply wastes (wastes include trace amounts of oils, water-based lubricants, fire retardant, and residual chemicals from the clothes manufacturing process)	NA	Permitted originally by Lockheed (WSTF contractor); elevation of Buildings 802/803 is 4 ft lower than 200 Area wastewater lagoons
STGT	NA	October 1989-present	1,200	530	600	LC 890939	STGT operations building, vehicle maintenance building, possibly the guard gate	shop	No records; believed to have been pumped in 1991	NA	Sewage, hand-washing, and common janitorial supply wastes (wastes include trace amounts of mineral spirits and non-leaded paint from washing tools/brushes)	NA	Installed after the initial STGT lagoon failed to hold water for temporary use until the lagoon was completed

Notes:
gpd = gallons per day
NA = not applicable
STGT = Second Tracking Data Relay Satellite System Ground Terminal
[1] Indicates that the design flow rate for the large tanks was calculated using 1996 current employees and 1994 UPC criteria and reported to NMED on October 2, 1996.

Table 8.1 300 and 400 Area Main Septic Tank Analyses – 1985

Parameter	300 North	300 South	400 West
Chloride (mg/l)	178	94	129
Sulfate (mg/l)	140	244	156
Nitrate (mg/l)	< 1	< 1	< 1
Conductivity (µ mohs)	2586	5129	1630

300 North = discharge to the north of the septic tank (assumed to be effluent from tank to distribution box to the north)
300 South = discharge to the south of the septic tank (assumed to be effluent from tank to distribution box to the south)
400 West = discharge to the west of the septic tank (assumed to be effluent from tank)

Table 8.2 300 and 400 Area Main Septic Tanks Analyses – 1987

Parameter	Units	Detection Limit	300 Area	400 Area
BOD	mg/l	1	116	86
COD	mg/l	2	140	20
Fecal Coliforms	mpn/100 ml	0	1.7×10^5	1.6×10^6
Total Coliforms	mpn/100 ml	0	9.2×10^5	1.6×10^6
Total Cyanide	mg/l	0.01	ND	ND
Fluoride	mg/l	0.1	0.8	0.7
Nitrate as N	mg/l	0.01	2.88	5.93
pH	pH units	0.1	8.06	7.60
Settleable Solids	mg/l	0.1	ND	0.1
TDS	mg/l	2	1226	1187
Arsenic	mg/l	0.003/0.006	ND	ND
Barium	mg/l	0.005	0.017	0.022
Cadmium	mg/l	0.005	ND	ND
Chromium	mg/l	0.01	ND	ND
Lead	mg/l	0.004	ND	ND
Mercury	mg/l	0.0001	0.0001	ND
Selenium	mg/l	0.002	ND	ND
Silver	mg/l	0.03	ND	ND

Notes:
BOD = Biological Oxygen Demand
COD = Chemical oxygen demand
TDS = total dissolved solids
mpn = most probable number
ND = The analyte was not detected above the detection limit.

Table 8.3 300 and 400 Area Main Septic Tanks Analytes Detected – 2012

Parameter/ Sample Date	Analyte	EPA Analytical Method	Result	Reporting Limit	Detection Limit	Units	Quality Assurance Flag
300 Area							
Semi-volatile Organics/ 31-Jan-12	Bis(2-ethylhexyl) Phthalate	625	25	4.7	1.2	µg/l	
1-Feb-12	Bis(2-ethylhexyl) Phthalate	625	14	51	12	µg/l	J
31-Jan-12	Phenol	625	***14***	4.7	1.0	µg/l	
1-Feb-12	Phenol	625	***26***	51	11	µg/l	J
Dioxin & Furans/ 31-Jan-12	1,2,3,4,6,7,8-HpCDD	1613	< 1.7	9.6	0.96	pg/l	J (R)
	OCDD	1613	9.33	19.2	2.7	pg/l	J
	2,3,4,7,8-PeCDF	1613	0.705	9.6	0.42	pg/l	J
Radium/ 31-Jan-12	Radium 226	903.0	0.14 ± 0.15	NA	0.27	pCi/l	
	Radium 228	904.0	0.33 ± 0.34	NA	0.66	pCi/l	
Inorganic Parameters/ 31-Jan-12	Aluminum, Total	200.7	160	100	20	µg/l	
	Antimony, Total	200.8	0.3	1.0	0.10	µg/l	RB J
	Arsenic, Total	200.8	0.8	1.0	0.10	µg/l	J
	Barium, Total	200.7	27	20	2	µg/l	RB
	Boron, Total	200.7	160	200	40	µg/l	J
	Cadmium, Total	200.8	0.2	1.0	0.02	µg/l	J
	Chromium, Total	200.7	2	10	0.4	µg/l	RB J
	Copper, Total	200.8	34.7	1.0	0.03	µg/l	
	Iron, Total	200.7	230	100	30	µg/l	
	Lead, Total	200.8	0.7	1.0	0.2	µg/l	J
	Manganese, Total	200.7	33	10	2	µg/l	
	Molybdenum, Total	200.7	11	25	2	µg/l	J
	Nickel, Total	200.8	4.0	1.0	0.04	µg/l	
	Selenium, Total	200.8	3.3	2.0	0.07	µg/l	
	Silver, Total	200.8	0.06	1.0	0.03	µg/l	RB J
	Uranium, Total	200.8	8.8	1.0	0.002	µg/l	
	Vanadium, Total	200.7	7	50	0.6	µg/l	J
	Zinc, Total	200.7	179	20	3	µg/l	
Anions/ 31-Jan-12	Chloride	300.0	120	4.0	1.3	mg/l	
	Fluoride	300.0	0.87	0.10	0.02	mg/l	
	Sulfate	300.0	327	10	3	mg/l	
31-Jan-12	Total Dissolved Solids	SM 2540 C	998	23	22	mg/l	
	Total Suspended Solids	SM 2540 D	109	22	NA	mg/l	
	Biochemical Oxygen Demand (BOD)	SM 5210 B	219	2.0	NA	mg/l	
1-Feb-12	Oil and Grease, Total	1664	35.3	2.0	2.0	mg/l	
	Sulfide, Total	SM 4500-S2-F	2.5	1.8	0.4	mg/l	RB

Table 8.3 300 and 400 Area Main Septic Tanks Analytes Detected – 2012

Parameter/ Sample Date	Analyte	EPA Analytical Method	Result	Reporting Limit	Detection Limit	Units	Quality Assurance Flag
400 Area							
Semi-volatile Organics/ 07-Feb-12	2,4-Dichlorophenol	625	1.2	4.8	1.0	µg/l	J
07-Feb-12	Bis(2-ethylhexyl) Phthalate	625	55	4.8	1.2	µg/l	
08-Feb-12	Bis(2-ethylhexyl) Phthalate	625	3.8	4.7	1.2	µg/l	J
07-Feb-12	Phenol	625	***61***	4.8	1.0	µg/l	
08-Feb-12	Phenol	625	***23***	4.7	1.0	µg/l	
Organo-chlorine Pesticides/ 07-Feb-12	Endrin	608 Modified	0.034	0.094	0.0045	µg/l	J
Dioxin & Furans/ 07-Feb-12	1,2,3,4,6,7,8-HpCDD	1613	< 1.4	9.6	1.1	pg/l	J (R)
	OCDD	1613	< 15	19.2	2.8	pg/l	J (R)
	2,3,4,7,8-PeCDF	1613	0.597	9.6	0.48	pg/l	J
	1,2,3,4,6,7,8-HpCDF	1613	0.678	9.6	0.43	pg/l	J
Radium/ 07-Feb-12	Radium 226	903.0	0.06 $\pm$ 0.11	NA	0.24	pCi/l	
	Radium 228	904.0	0.41 $\pm$ 0.33	NA	0.62	pCi/l	
Inorganic Parameters/ 07-Feb-12	Aluminum, Total	200.7	210	100	20	µg/l	
	Antimony, Total	200.8	0.6	1.0	0.10	µg/l	RB J
	Arsenic, Total	200.8	1.3	1.0	0.10	µg/l	
	Barium, Total	200.7	27	20	2	µg/l	
	Boron, Total	200.7	210	200	40	µg/l	
	Cadmium, Total	200.8	1.4	1.0	0.02	µg/l	
	Chromium, Total	200.7	2	10	0.4	µg/l	J
	Copper, Total	200.8	56.4	1.0	0.03	µg/l	
	Iron, Total	200.7	330	100	30	µg/l	
	Lead, Total	200.8	1.0	1.0	0.2	µg/l	
	Manganese, Total	200.7	43	10	2	µg/l	
	Molybdenum, Total	200.7	11	25	2	µg/l	J
	Nickel, Total	200.8	5.7	1.0	0.04	µg/l	
	Selenium, Total	200.8	5.1	2.0	0.07	µg/l	
	Silver, Total	200.8	0.10	1.0	0.03	µg/l	RB J
	Uranium, Total	200.8	8	25	0.03	µg/l	J
	Vanadium, Total	200.7	9	50	0.6	µg/l	J
	Zinc, Total	200.7	248	20	3	µg/l	
Anions/ 07-Feb-12	Chloride	300.0	237	10	4	mg/l	
	Fluoride	300.0	0.73	0.10	0.02	mg/l	
	Sulfate	300.0	377	10	3	mg/l	
07-Feb-12	Total Dissolved Solids	SM 2540 C	***1310***	45	43	mg/l	

Table 8.3 300 and 400 Area Main Septic Tanks Analytes Detected – 2012

Parameter/ Sample Date	Analyte	EPA Analytical Method	Result	Reporting Limit	Detection Limit	Units	Quality Assurance Flag
07-Feb-12	Total Suspended Solids	SM 2540 D	180	25	NA	mg/l	
	Biochemical Oxygen Demand (BOD)	SM 5210 B	422	2.0	NA	mg/l	
Volatile Organic Compounds/ 08-Feb-12	Benzene	624	0.80	5.0	0.71	µg/l	J
	Bromoform	624	0.75	5.0	0.60	µg/l	J
	Trichloroethene (TCE)	624	0.70	5.0	0.65	µg/l	J
08-Feb-12	Oil and Grease, Total	1664	16.3	2.0	2.0	mg/l	
	Sulfide, Total	SM 4500-S2-F	2.4	1.8	0.4	mg/l	RB

Notes:

300 Area: No analytes were detected for Organochlorine Peticides and Low Level Polychlorinated Biphenyls (by EPA Method 608 Modified), Volatile Organic Compounds (by EPA Method 624), EDB, DBCP & 123TCP in Water (by EPA Method 504.1), Nitrate as Nitrogen (by Method 300.0), and Total Cyanide (by Method 335.4)

400 Area: No analytes were detected for Low Level Polychlorinated Biphenyls (by EPA Method 608 Modified), EDB, DBCP & 123TCP in Water (by EPA Method 504.1), Nitrate as Nitrogen (by Method 300.0), and Total Cyanide (by Method 335.4)

J – Indicates the result is an estimated value less than the quantitation limit but greater than or equal to the detection limit.

NA – Not applicable

R – As reported by the laboratory, “indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.”

RB – Indicates that the analyte was detected in the associated method blank at a concentration that may have contributed to the sample results.

Concentrations above New Mexico Water Quality Control Commission regulations (Section 20.6.2.3103 NMAC, subsection A, B, and C) are identified by bold italic text.

Appendix A WSTF Septic Tank Systems Interview Summary

Appendix A
WSTF Septic Tank Systems Interview Summary

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
Tracking and Data Relay Satellite System (TDRSS) 1989-present (2013) and Second TDRSS Ground Terminal (STGT) 1997-present (2013)	**STGT** • The Vehicle maintenance building at STGT contained only a bathroom with a sink that discharged to the STGT wastewater lagoon (and would have discharged to the STGT septic tank prior to use of the STGT lagoon). "The only wastes would have been sewage and rinse water for latex paint brushes. Degreasers and oils were always containerized and shipped off-site for disposal." • The only solvent ever used was "Virginia 10", but it was always containerized and disposed of off-site. • STGT transformers never contained oil, so no PCBs. There were never any other PCB type components at STGT due to the recent age of the facility (1988/1989). • Regarding the STGT septic tank, the employee stated, "This predates my involvement with STGT;" however, the employee believed that the STGT septic tank was installed prior to STGT full operations and that it serviced "the Guard Post…prior to installation of the North and South Lagoons." "The septic tank was designated temporary for this time period while it serviced the Guard Post."	• History of TDRSS, STGT, and a historical underground diesel storage tank spill were also discussed.
TDRSS and STGT 1997-present (2013)	**STGT** • STGT uses pre-coolers with softened water. Water flows across pads and drains into the STGT lagoon. (This would have drained into the STGT septic tank prior to use of the STGT lagoon.) • The only solvent used at STGT was "Virginia 10". It was containerized and shipped off-site for disposal. • STGT transformers never contained any oil, so no PCBs.	• No additional information or comments.
TDRSS 1989-present (2013) and STGT mid 1990s-present (2013)	**STGT** • There was a pre-cooler (with no chemical treatment) that discharged "one pass" water to the STGT wastewater lagoon. This system was in operation from 1988-2008 (and therefore would have been active when the STGT septic tank was in use). • There are no septic tanks at TDRSS and there are no other septic tanks at STGT than the one located adjacent to the guard station (identified in this HIS).	• The history of TDRSS and discharges to the WSTF 100 Area wastewater lagoon were also discussed.

<table>
<tr><th>Position/ Location</th><th>Significant White Sands Test Facility (WSTF) Septic Tank Systems Information</th><th>Other Information or Comments</th></tr>
<tr><td>WSTF 1971;
WSTF 100 Area Reproduction Facility 1973-2012</td><td>Building 114
• The WSTF 100 Area reproduction facility was located in Building 114, the employee believed from 1963 to the mid-1980s. In the mid-1980s, the reproduction facility was moved to Building 101.
• The employee began working in the reproduction facility in 1973, and worked in the facility until his retirement in 2012.
• The building was used mostly as an office building.
• There were two small bathrooms in Building 114 with commodes and sinks.
• Photographic type chemicals had historically been poured into the Building 114 sinks that discharged to the septic system.
• Prior to Xerox-type machines, the process for making forms/documents was similar to processing photographs. A “plate-maker for an offset press” was used. This machine basically made a picture of a master form in order to run the master form on a press machine that would make many copies. The “plate-maker machine” was manufactured by the A.B. Dick Company.
• Photographic chemicals used were “activator” and “stop-bath.” These chemicals were diluted with water and added to the machine. The machine held approximately 3 gallons of chemicals total. When the photographic chemicals “stopped working” properly to develop the master forms, the solutions from the machine (3 gallons at a time) were poured into the bathroom sinks in Building 114. Then fresh chemicals were added to the machine.
• These chemicals were drained (to the septic system) approximately every two months, depending on how many forms were made.
• Discharge of chemicals from this machine occurred from approximately 1973 to 1984 or 1985.
• In 1984 or 1985, the chemicals began being containerized and disposed of through the WSTF Environmental Department.
• [The employee was contacted again to clarify historical evidence located during research for the HIS.] When asked if the employee used an electrostatic plate-maker machine as well as the A.B. Dick-manufactured photographic process machine, the employee stated that he had.
• The employee clarified that three plate-maker machines were used historically, two photographic-type process machines and one electrostatic process machine. The first</td><td>• The employee had no knowledge of Building 119.
• The employee could not remember the model number for any reproduction facility machines.
• The employee believed that the photographic chemicals discharged were Kodak brand or from the A.B. Dick Company.
• “In the early days no gloves were worn” while handling chemicals; however, “later,” the employee had worn gloves.
• The employee also stated that there had been a blueprint making machine that created large prints (36x36). This machine used ammonia chemicals; however, this machine did not produce spent waste. The employee stated that chemicals “evaporated.”
• The offset press machine also did not produce any liquid wastes. The machine was cleaned weekly with solvents; however the cleaning was done using only soft goods; no liquid</td></tr>
</table>

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	photographic process machine was manufactured by "ITEK," and "was old when I got there (in 1973)." This machine was very similar to the A.B. Dick-manufactured machine described before. The employee believed this machine was used at WSTF as the first plate-making machine, presumably from 1963 until approximately 1974. The same chemicals used in the newer A.B. Dick-manufactured machine were used in this machine, and the "spent solutions" were also poured into the Building 114 sinks (presumably from 1963) until use of the machine ended in approximately 1974. • "The electrostatic machine was used sometime after the use of the ITEK machine." The employee did not know when the machine began use at WSTF; however, the machine ceased use in approximately 1974. This machine used "a completely different process than the other two machines." The chemicals used were "oil-based." Additional chemicals had to be added to the machine as it was operating, and a net loss of chemicals usually occurred. The machine held approximately 4 quarts of chemicals/solutions. • Rarely, the chemicals in the electrostatic machine needed changing, when the plates were no longer properly made; however, this was much less often than the photographic process machines. The employee could not provide a frequency and did not recall what became of the spent electrostatic machine chemicals (if any were ever discharged to the septic system.). • The use of the photographic process A.B. Dick-manufactured machine replaced the use of the other two machines at WSTF in the reproduction facility. • No other chemicals or wastes were ever discharged to the Building 114 septic system to the employee's knowledge. • The Building 114 septic tank was never pumped out while the employee worked in the building (from 1973 to the mid-1980s.	wastes were produced. • Use of the A.B. Dick-manufactured photographic process machine ended in the mid-to-late 1980s (1985-1989), when WSTF began using Xerox-type machines. • Building 114 began use as a storage facility in the mid-1980s as well. • The plate made was a sturdy paper material, "similar to the cover of a report." • "The photographic process made a positive image."

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
WSTF 1989-2006 (mostly as a Librarian); consultant 2006-present (2013)	**Building 114** • The WSTF 100 Area reproduction facility was already located in Building 101 when the employee began working at WSTF in 1989. • Building 114 was being used for storage already by 1989 as well. In the mid-to-late 1990s, the building was also used rarely as a classroom for the WSTF safety department. • The employee recalled that the photographic process A. B. Dick-manufactured plate-maker machine had been located in the reproduction facility, although it was not in use, until 1997 or 1998. • Several bottles of the chemicals used in the machine had been discovered in the reproduction facility “at the back” in approximately 2000 [documentation located showed it was 1999.]	• No additional information or comments.
Representative from Presstek (or Andy Mark, Inc.), successor to A.B. Dick Company	**Photographic Processes/Chemicals** • Presstek had obtained the A.B. Dick Company in 2004, when the A.B. Dick Company filed for bankruptcy. • NASA had not purchased the plate-maker machine directly from the A. B. Dick Company; however, this was not unusual due to the wide distribution of A. B. Dick-manufactured machines sold by many different companies. • The first representative contacted believed that the activator was “a silver-plate material,” and the stop-bath chemicals would be a “stabilizer.” The second representative contacted agreed that the chemicals involved were “activator” and “stabilizer” and “the plate-maker process had not changed through time;” therefore, the representative could provide Material Safety Data Sheets (MSDS) for the chemicals used. “The process was used to develop a silver emulsion in film” and would result in silver in the spent waste. • [WSTF Records for an electrostatic plate-maker machine were located. The machine was also manufactured by the A.B. Dick Company, and the model number was provided to the Presstek representative.] The representative provided MSDSs for the three chemicals used in the electrostatic plate-maker machine. • The representative stated that the process used to make plates was the same process used for developing on polyester film; therefore, information regarding silver concentration in wastes for a commercial photographic process on polyester film	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	would be identical to the silver concentration in the plate-maker wastes.	
WSTF Facility Engineering	**Building 119** • Building 119 was originally constructed to support a weather satellite that was used to map ocean currents. • Activities from the building were operating in late 1996, and the satellite failed in late 1997. The building was "turned over" to the communications group after that.	• No additional information or comments.
WSTF 200 Area/ Communications support 2001-2005; Branch Manager Communications 2006-present (2013)	**Building 119** • The employee believed that Building 119 was constructed approximately in 1997 to support a satellite used to track Pacific Ocean temperature patterns. Building 119 had an opening in the roof and a raised platform underneath the opening that housed the satellite tracking system. • "There were no other waste streams other than septic, to my knowledge."	• No additional information or comments.
WSTF Security Supervisor 1991-2005	**Building 116 (Main Guard Gate)** • The employee stated that only bathroom waste was ever discharged into the Building 116 septic system. • "I know of no spills of chemicals or wastes in any septic system on site while I was there." • "Badges have been made at the gate for years prior to my arrival at the site. When I first arrived and until we received a digital system, Polaroid photos were taken. I know that security officers used a Polaroid camera for years prior to my arrival at the site as well. To my knowledge, the main gate never had chemicals used for processing pictures. When we had this sort of need, the Photographic Shop was used." [in the WSTF 200 Area] • "To my knowledge, vehicle maintenance has never been performed at the main gate." Security officers obtained vehicles post 9/11/2001; Fire Department personnel served as mobile security prior to 9/11. "…but again these vehicles were never serviced at the main gate other than checking fluid levels." • "I do not remember the main gate septic tank ever being pumped out…" • "I can say that we did not have any issues with this septic system and that it always functioned properly…."	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
TDRSS and WSTF Security 1993-2011	**Building 116 (Main Guard Gate)** • The original Building 116 was very small and did not contain a bathroom. The bathroom for the area was located within a trailer installed to the north of Building 116. • In 1999, this trailer had been removed "due to asbestos concerns," and an extension with a bathroom had been built onto Building 116. At this time, WSTF personnel had dug up the sewer line and connected the new bathroom. • The entire area had been excavated in 1999/2000 from the trailer following the sewer line. • Regarding wastes at the Building 116 (Main Guard Gate), only weapons cleaning, vehicle washing, and Bar-B-Que cooking activities had ever produced wastes; however, only cooking wastes, (grease from washing dishes) were ever discharged to the septic system. • Security personnel cleaned their weapons at the Main Guard Gate with "Hoppie's solvent and Hoppie's oil." These weapons cleaners were used in small quantities (on cloths, pipe cleaners, Q-tips). All wastes were placed in plastic bags and transported to the WSTF firing range and placed in a special trash can there. • Vehicles were washed at the Main Guard Gate just north of Building 116. There was a grate drain that discharged to a pipe. This pipe ran under Apollo Boulevard and discharged to grade over soil "into a ditch" to the east of the Boulevard. • Vehicle wash water contained dish soaps such as "Dawn" or commercially available car washing soap powders that were mixed with water. • All vehicle maintenance was performed by GSA (General Services Administration; not at the Main Guard Gate). • No chemicals (other than weapons cleaners, discussed above) were stored at Building 116 (Main Guard Gate). Any spills of these chemicals were cleaned up with cloths that were transported to the firing range (and placed in the special trash can). • Janitorial personnel cleaned/mopped the building, but brought their supplies and took wastes with them when they left. • The Building 116 septic tank had never been pumped while the employee worked at Building 116, not even when the bathroom extension was connected in 1999/2000. • Prior to digital photography, there was a Polaroid camera used at WSTF that took four photographs at once. Security personnel then cut the photographs and laminated them	• No additional information of comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	in a machine. This machine did not produce any chemicals/wastes. • Digital photography was already in use after 1993.	
WSTF Security 1994-1999 WSTF Fire 1999-present (2013)	**Building 116 (Main Guard Gate)** • Only “bathroom wastes” (no other chemicals) were ever discharged to the Building 116 (Main Guard Gate) while the employee worked there. • Prior to using digital cameras, an instant camera was used for taking employee badge photographs at the Main Guard Gate. • No vehicle maintenance was performed at Building 116. • The septic tank was not pumped out during the time the employee worked at Building 116 (Main Guard Gate).	• No additional information or comments.
WSTF Security 2001-present (2013)	**Building 116 (Main Guard Gate)** • “There was no actual vehicle maintenance done at the Main Gate; all work has been performed at the GSA Building” (since the employee began working at WSTF). • “I do not believe there was any waste generated other than sewage.”	• No additional information or comments.
WSTF Security 2008-present (2013)	**Building 116 (Main Guard Gate)/ Building 117 (Forward Guard Gate)** • The employee stated that vehicle washing ceased at Building 116 (Main Guard Gate) approximately 3-4 years ago. • Vehicles are currently washed at the GSA building at WSTF. • No vehicles were historically washed at Building 117 (Forward Security Gate).	• No additional information or comments.
WSTF Photography Laboratory 2005-present (2013)	**Building 116 (Main Guard Gate)** • WSTF employee badges were made using “a Polaroid instant camera starting around 72 [1972]. They also had a self-contained machine that made badges. I believe the photo lab had the only darkroom on site.” Another long term WSTF employee (over 20 years) that worked in the 200 Area Photography Laboratory concurred.	• No additional information or comments.
Facility Engineering	**Building 116 (Main Guard Gate)** • Building 116 (Main Guard Gate) has been “placed on the demo list for FY14 [NASA fiscal year 2014],” if no user for the building is identified.	• No additional information or comments.
34 years at WSTF; Environmental Department	**Building 116 (Main Guard Gate); Septic Tanks** • Regarding the Building 116 (the Main Guard Gate) potential wastes, photograph negatives were taken to the WSTF 200 Area Photography Laboratory for processing	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
Compliance Section mostly	in the "early days." Following that, a Polaroid camera had been used. • A temporary trailer had been located at the WSTF Main Guard Gate area in the past. Both the original building and the trailer had contained very small work spaces and a bathroom [in the trailer]. No photo processing equipment had been kept there. • WSTF septic tanks were not regulated as containing hazardous wastes. Any septic tanks pumped out had the waste disposed of by septic contractors under the Liquid Waste Program regulations, not the Ground Water Quality Bureau or Hazardous Waste Bureau regulations. • Some septic tanks had been sampled for the application process to the City of Las Cruces Wastewater System connection project.	
Environmental Department 1999-present (2013) Supervisor Compliance Section 2011-present	**Septic Tanks and Former ETU Wastes** • Both the 400 Area main septic tank and the Building 364 septic tanks needed repair "recently." • Several septic tanks had overflowed in the past, prior to 2008. • The employee stated that the WSTF septic tanks were not on a set maintenance schedule (for pumping); when one overflowed, then it was pumped. • WSTF always (currently) uses off-site septic companies to perform pumping activities for septic tanks. • Building 272 tank C was only used for bathroom wastes. The other two septic tanks (A and B) may have had other process wastes and cooling water discharged to them. • Septic tanks currently scheduled for retaining at WSTF include the Building 117 (forward guard gate), and possibly the Building 116 (Main Guard Gate). • Building 272 tank C and Building 117 do not contain a Liquid Waste Program permit number because they were submitted directly under Discharge Permit-392. • Now that the Evaporation Tank Unit (ETU) has been removed from WSTF, wastes that were formerly discharged to the ETU are being disposed differently. "The Component Services rinse water is going to the sewage lagoons." Regarding other wastes that will eventually be discharged to the City of Las Cruces Wastewater System (CLCWS): "There are a few that are being neutralized and placed in the sewage lagoons. Most are being containerized until the sewer line is available, or are containerized and sent off site depending on waste determination."	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
WSTF Environmental Department Compliance Section 2009-present (2013)	**Former ETU Wastes** • Most wastes that were formerly discharged to the ETU are being containerized and shipped off-site for disposal. • “Wherever we can we attempt to place remediation-related wastes at MPITS.” • “Our larger waste streams (such as LabCon Rinsewater) are being managed as non-hazardous waste streams and we have permission from the NMED [New Mexico Environment Department] to discharge to the sewage lagoons. Other smaller volumes of nonhazardous waste streams from the 200 area are also being discharged to the sewage lagoons, since they are typically comprised of soap water from washing chem lab [Chemistry Laboratory] glassware.”	• No additional information or comments.
WSTF Fire Department Chief 1963-1996	**100 Area** • Regarding abandoned pipes in the 100 Area: there was a pipe that discharged to grade from a shower located in Building 153 in the 100 Area. This Building was historically used as a gymnasium for NASA employees from approximately 1964 to 1973. The building contained exercise bicycles, weights, etc. The shower was provided for cleaning after exercise. Common soaps and shampoos would have been in the discharge. • The abandoned sewer pipe to the north of Building 156 was historically connected to 11 or 12 trailers that were used by the Zia Company as main offices (approximately in January 1964) prior to completion of Buildings 100/101, and the remaining 100 Area buildings. • There was a “four-plex” of trailers that contained bathrooms and water fountains. Several duplexes contained no bathrooms and were used for copying/printing/drafting activities. • In 1963, when the employee began working at WSTF, Building 114 was in use. There was a temporary trailer with a bathroom installed adjacent to Building 114. The employee assumed the trailer was plumbed into the piping for Building 114, or directly into the Building 114 septic tank. The WSTF Fire Department used this building for offices until the more permanent Fire Department building (Building 112) was completed approximately in July 1964. The trailer was moved to the 100 Area main burn pit area and burned. • Additional Fire Department personnel stated that Building 118 [with no sewer access] had been used historically to store Fire Department equipment and hoses, not	• The first WSTF Fire Department location was Building 112, where the WSTF facilities/construction department is currently located. The current location for the WSTF Fire Department is Building 104. • Regarding the disposition of the trailers located originally north of Building 156, one trailer became kitchen and sleeping quarters for the WSTF Fire Department (connected to the 100 Area wastewater lagoon). Many trailers were used as “smoke trailers” or burned for fire-fighting practice. Remains of trailers were buried in the 100 Area adjacent to the burn pit.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	Building 114. • After the completion of Building 101, the 100 Area temporary trailers were abandoned (approximately in mid-1965). The trailers were removed from the area throughout 1965. • Regarding the **WSTF 250 Area**: More trailers were used in the 250 Area than in the 100 Area. The Grumman Corporation used these trailers for offices prior to the completion of the 200 Area. The Grumman Corporation tested the LEM [Lunar Excursion Module]. When Building 201 had been competed in late 1965, approximately nine trailers had been shipped off-site. • The small building located adjacent to the 250 Area trailers did not contain any sewer access and had been used as a small test/laboratory facility prior to the completion of the 200 Area. The building was used for storage after the completion of the 200 Area buildings.	
WSTF 200 Area 1965-2008	**250 Area** • The employee did not work directly in the 250 Area, but was aware of activities there. The small building located adjacent to the trailers was used for “ready supplies and hardware.” The temporary trailers located in the area were used by the Zia Company for offices during “Apollo testing.” The trailers contained bathrooms that discharged to the 250 Area septic tank. • To the employee’s knowledge, there were no processes that would have discharged any chemicals/wastes to the septic system except for “normal bathroom wastes” (including hand washing) • The employee did not know how many employees worked in the area. • The employee also did not know if any spills/malfunctions of the system ever occurred, or if the tank was ever serviced (pumped out).	• No additional information or comments.
WSTF 200/250 Areas 1983-present (2013)	**250 Area** • The 250 Area originally consisted of an open-air weld shop with a cement pad and a wall, but no roof or official building. Then, the control building (252) was constructed. This building “used a port-a-potty for many years.” When Building 255 was built, a bathroom was installed in the building. The employee believed that the building had been connected to the 200 Area wastewater lagoon. • A second long-term employee in the 250 Area stated that the only septic tank located	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	in the 250 Area was connected to several temporary trailers used for training. This tank was located at the edge of the 250 Area and was surrounded by yellow bollard poles. [This is the septic tank identified and discussed in this HIS.]	
WSTF 200 Area Calibration Laboratory and later Office Chief 1969-1990	**250 Area** • The employee verified that temporary trailers and a small building were located in the 250 Area; however, the employee did not have any personal knowledge of the area or activities.	• WSTF developed materials testing capabilities after the death of three astronauts in the 1967 fire. The employee asked to be transferred to WSTF from WSMR [White Sands Missile Range] at this time. • The "dangers of working with hazardous chemicals/hypergols were not well known in the early days." • Discussed discharges from the historical 200 Area discharge pipes "behind" the 200 Area complex and use of Freons and TCE.
WSTF 272 Area 1997-present (2013)	**Building 272** • Water is used to cool the hypervelocity guns down. The only substance in the cooling water would be trace amounts of dust from the guns. • The only chemicals ever used that may have been discharged to the septic systems were common cleaning chemicals such as diluted bleach and simple green. • The washing machine was used to clean clothes, specifically work smocks. Effluent from washing would contain common commercial detergents like Tide, "and lately Earth friendly detergents." Trace amounts of oil and dust would also be in the wash effluent. • The employee stated that the septic systems had always performed adequately with no	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	malfunctions (no back-ups or failures).	
WSTF Propulsion Areas (300/400) 1963/1964-1986 (consultant to present)	**300 and 400 Areas** • The employee did not know any process that would discharge any wastes or chemicals to the 300 or 400 Area septic tanks except for normal bathroom wastes (sewage, hand-washing, janitorial cleaning activities). • Propulsion areas were designed so that wastes, especially hazardous wastes, would be funneled to the “ponds” [HWMU impoundments]. The entire test areas were concrete-lined and contained channels/flumes that forced any spills or wastes to flow downgradient into the “ponds.” The sewerage system was always separate. It would be unlikely that any hazardous wastes were discharged. **250 Area** • The septic tank “discharged down the hill where it was green.” • There had historically been a lot of trailers located in the 250 Area that had been used for offices. • The employee did not know what the small building located adjacent to the trailers contained or if there was sewer access to it.	• The employee discussed historical Freon usage in the propulsion test areas. “Freons contaminated almost all areas during initial construction. Entire pipelines were filled with Freons for flushing. The Freons flowed on the ground, usually to low-lying areas.” • TCE was used extensively for cleaning small components in the propulsion test areas using “squeeze bottles.” • Historical accidents and 700 Area Landfill waste management procedures were also discussed. • Details for 200 Area fire-suppression tests (for the armored transport vehicle) were also provided.
WSTF Facilities Department 1976-present (2013)	**Building T463, 300, 400 Areas, Building 114, 250 Area** • There was only one temporary trailer (Building T463) connected to the septic tank system. There was never any other building or other connection to this septic tank. • This trailer (T463) was used for offices in support of testing done in the 1990s. “The septic tank is still there but does not receive waste from any building.” • The building was “probably set up on the prepared area sometime near the end June	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	of 1992." • The WSTF 100 Area reproduction facility moved from Building 114 to Building 101 "sometime between 1984 (when [another employee] started work here at WSTF and recalled it was still in B114) and 1990 (when I installed a swing gate in the counter opening when it was located in B101.)" • Regarding the existence of a septic tank connected to Building 255, "The drawings in Drafting are dated 1-1990, and they show a 4" PVC SS [polyvinyl chloride sanitary sewer] line from the building to an existing SS manhole. So I'd say no, it was always connected to the existing 200 Area SS system."	
Three WSTF 300 Area employees; two from 1978 and one from 1976 to the present (2013)	**300 Area** • All three employees stated that only "approved commercially available chemicals" were ever used in the bathrooms or janitor areas within the 300 Area. Wastes to septic tanks would have consisted of sewage, hand-washing, and janitorial wastes. • No spills or discharges of other substances were known to have occurred. • Floor drains (other than in bathrooms) within the 300 Area historically discharged to the concrete-lined flumes (that led to the HWMU impoundments). • One employee stated that the 300 Area Blockhouse was the project control building and no hazardous activities were conducted in that area. • Building 320 was used as a maintenance shop historically "to repair space shuttle quick disconnects" and to store dry parts and equipment like vacuum pumps and helium boosters. No processes producing liquid wastes at all were conducted in the building. • Building 364 has always been used solely for offices, with no use of chemicals or waste production. This area was called "the NASA Project Office for Propulsion." • Employees remembered that the Building 364 septic tank system had needed repairs, but they did not know any details.	• No additional information or comments.
	400 Area • The employee verified that Building 447 contained a bathroom and "shop," and Building 448 contained only a sink. • Buildings 447 and 448 contained technician equipment and tools and a technician "shop" in support of the steam and altitude systems in the 400 Area. The only wastes that could have discharged to the septic tank system from these areas would be trace	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
WSTF 400 Area 1978-present (2013)	amounts of oil, grease, and solvents that were washed from employee's hands. • Buildings 411 and 412 were both mechanical rooms containing equipment and no stored chemicals. There is a floor drain in each building that discharges to the 400 Area main septic system. Water with trace amounts of vacuum pump oil and cleaning solvents would have historically been discharged through these floor drains. There never were any processes that would have discharged wastes from these buildings (411 and 412) to the septic system. • Discharges of any hazardous substances to any 400 Area septic tank was very unlikely (and the employee did not know of any discharges or spills to the septic systems). • Hazardous chemicals and substances were historically handled in different areas where there were historical drains and flumes that led directly to the "ponds" [HWMU impoundments]. When the "ponds" were closed, any hazardous waste streams were containerized and transported to the ETU, Fuel Treatment Unit, or shipped off-site for disposal. "Someone would have had to work hard to bring something hazardous into an area where it was not stored or used and then dump it into those drains. It just wouldn't make sense since there was another disposal process already in place."	
WSTF Environmental Department 1999-present (2013); Lead Plume-Front Technician	**Building 650** • The only connections to the septic tank are a bathroom commode and sink within Building 650. The building contains no floor drains. • Water generated during maintenance or start-up or shut-down of the Plume-Front Remediation System is classified as hazardous, but it is drained to a sump. Water collected in the sump was transported and discharged to the ETU in the past. Currently, this groundwater is transported and discharged to the Mid-Plume Interception and Treatment system. • There have been no spills or chemicals ever discharged to the Building 650 septic tank system to the employee's knowledge. • The septic system has always performed properly. • The employee believed that the Building 650 septic tank has never been pumped out.	• No additional information or comments.

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WSTF Branch Manager 250, 270, 700, 800 Areas 2004-present (2013)	**800 Area** • The 800 Area supports other key capabilities at WSTF. "Currently our test activities include fuel and oxidizer testing for various programs. Additionally, we support long/short term stress rupture testing for COPVs [composite overwrapped pressure vessels], O_2 flammability testing and multiple Liquid/Gaseous O_2 testing efforts." • The employee did not know any processes that would have discharged any wastes to the septic system other than normal bathroom wastes. • No spills or accidental discharges of chemicals ever occurred to the septic system to the employee's knowledge. • The system has never malfunctioned to the employee's knowledge.	• No additional information or comments.
WSTF 800 Area (technician to supervisor) 1974-2010 (consulting to present)	**Building 802** • The reason there was a septic tank installed for Buildings 802 and 803 was because elevations at the buildings (802/803) were approximately four feet below the elevation for Building 800, which was connected to the 200 Area wastewater lagoon. A pump would have been required to transfer waste uphill from Buildings 802/803 to the wastewater lagoon. • Building 801 does not contain any sewer access. • Building 802 has always been used for offices and contained bathrooms with commodes and sinks that discharged to the septic system. • The employee did not know of any spills to the septic system. "There was not really a mechanism where any chemicals could have been discharged to the septic system." • The septic system had been installed in 1987 after the development of a full-time Environmental Department to oversee hazardous waste disposal at WSTF. • There were never any processes that would have discharged wastes or chemicals to the septic system (other than bathroom wastes). • The septic system functioned properly, with an occasional commode back-up, but not any malfunctions of the septic system.	• No additional information or comments.
	Building 803 • Building 803 always contained offices and a preparation laboratory for preparing test materials prior to 800 Area testing. • The washing machine had been purchased in the 1990s for approximately 12 months of fire retardant testing. Clothes were purchased, washed in the preparation laboratory	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
WSTF Building 803 (Preparation Laboratory Supervisor) 1989-present (2013)	sinks, and then treated with fire retardant in the clothes washer. Fire retardant effluent was captured from the washing machine and placed in a drum then disposed through the Environmental Department. • Following fire retardant testing (and currently), the washing machine was/is used for washing laboratory smocks with common detergent, like Tide. This effluent was/is discharged to the septic system. The only substances discharged in wash water would have been residue from the clothes manufacturing process (on the purchased new clothes) and residual fluids from the machining process (such as oils and water-based lubricants). • To the employee's knowledge, there have never been any spills of chemicals or wastes to the septic system. No WSTF personnel had ever informed the employee of any spills. • There were never any processes that required anything hazardous to be discharged to the septic system. There were two sinks located in the center of the preparation laboratory that were used for initial cleaning of test articles (that discharged to the septic system). • "Only very mild soaps were allowed for use, including ivory soap and alconox. Test articles included mechanical impact samples, Teflon materials, plastics, alloys, and clothes" (cotton T-shirts, long john-type clothing, sweaters, etc.). • "Anything hazardous was disposed of at the fume hood sinks" that discharged to the ETU historically. "All processes dealing with hazardous substances or chemicals were written to ensure that disposal was through the fume hood sinks not the sinks to the septic system." • The Building 803 preparation laboratory began operations in late 1988. The ETU was already operating; therefore, no hazardous chemicals were discharged prior to use of the ETU. • Hazardous chemicals used in the Building 803 preparation laboratory were Brolin, oakites, igniter mix, and cleaning solutions. These substances always contained WSTF Individual Waste Profile Sheets and were disposed of through the fume hood sinks that discharged to the ETU. • The septic system has always functioned properly.	

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
WSTF Facilities 1978-present (2013)	**STGT and 250 Area** • The STGT septic tank leach field was installed to the north of the STGT road, not to the south. • The 250 Area septic tank (located across from the South highbay) had been in use from site construction to the early 1970s. • The employee thought the septic tank may have been removed in the 1980s, but was not sure.	• Discussed a non-NASA-owned septic tank at the ADF-SW.
WSTF Facilities 1985-present (2013)	**Septic Systems** • The septic tank is still marked with steel, concrete-filled, yellow-painted bollard poles arranged in a circular pattern at the surface. The tank area and downslope is currently covered with large vegetation. The employee stated that the presence of bollard poles at the surface and the large vegetation supported the theory that the septic tank was still present. • The employee also knew of no documentation regarding the 250 Area septic tank. • Building 802 had always been used for offices, and Building 803 had been part of testing in the 800 Area. • Building 114 had been the first building installed at WSTF and was used originally for project control (office) purposes. The employee believed the building had been used in the past for Fire Department fire hose storage [Fire Department personnel stated it was Building 118 that was historically used for Fire Department storage] and WSTF records storage. No WSTF personnel currently work in the building (since the mid-1980s). • Building 119 is currently used as a radio and communications building, with three employees. • The employee believed that the Building 114 septic tank "may have a crack in it." This tank had been pumped out in 2012 and was only "about one third full" at that time. • The employee showed approximately where the Building 116 septic tank and leachfield are located, based on increased vegetation growth and wooden stakes installed at the surface. The employee believed that due to the large and dense vegetation growth in the septic tank area, the Building 116 (Main Guard Gate) septic tank may never have been pumped out. The tank only served a few employees historically, and had not been used in several years (since the WSTF security force	• No additional information or comments.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	had begun exclusively using Building 117, the Forward Guard Gate). • Badges for WSTF personnel were made at the Main Guard Gate for all WSTF personnel historically. The employee was unsure if photographic wastes could have been discharged. • Maintenance of septic tanks was not performed on a regular basis in the past. • There was sanitary sewer piping at Building 153 that historically drained to grade. This piping had been connected to a shower that had been abandoned prior to 1985, when the employee began working at WSTF. This line was capped and abandoned in place. • North of Building 156, there was another sanitary sewer line that was abandoned (prior to 1985). This line had historically been connected to "temporary office trailers" in the area "that may have been original to the construction of WSTF." The line had been capped and abandoned in place when the trailers were removed from the area. Portions (near the new building) of this abandoned sewer line may have been broken during construction of Building 149 in 2012. The employee saw PVC pieces that may be broken sewer piping. More investigation of the area is needed to determine if the sewer piping was broken. • Regarding the pipe draining to grade east of Building 116 (Main Guard Gate), the pipe is still open (not capped), but there are no current discharges to the pipe (and there had not been "at least for several years"). • Regarding a possible septic tank at Building 255, the employee field checked the sewer connection; Building 255 is connected to a manhole discharging to the 200 Area wastewater lagoon. • The leach line to the Building 320 septic tank (approximately 20 ft downgradient of the septic tank) was inadvertently broken during excavation of the piping in order to tie into the CLCWS piping in March 2012. The line was immediately repaired. • The cooling tower that was historically located adjacent to Building 440 to the south was removed from WSTF in the early 1990s, but had not been in use for many years. The tower was not in use in 1985, and another long-term WSTF employee stated that it was not in use by 1984 either, when the second employee began working at WSTF.	

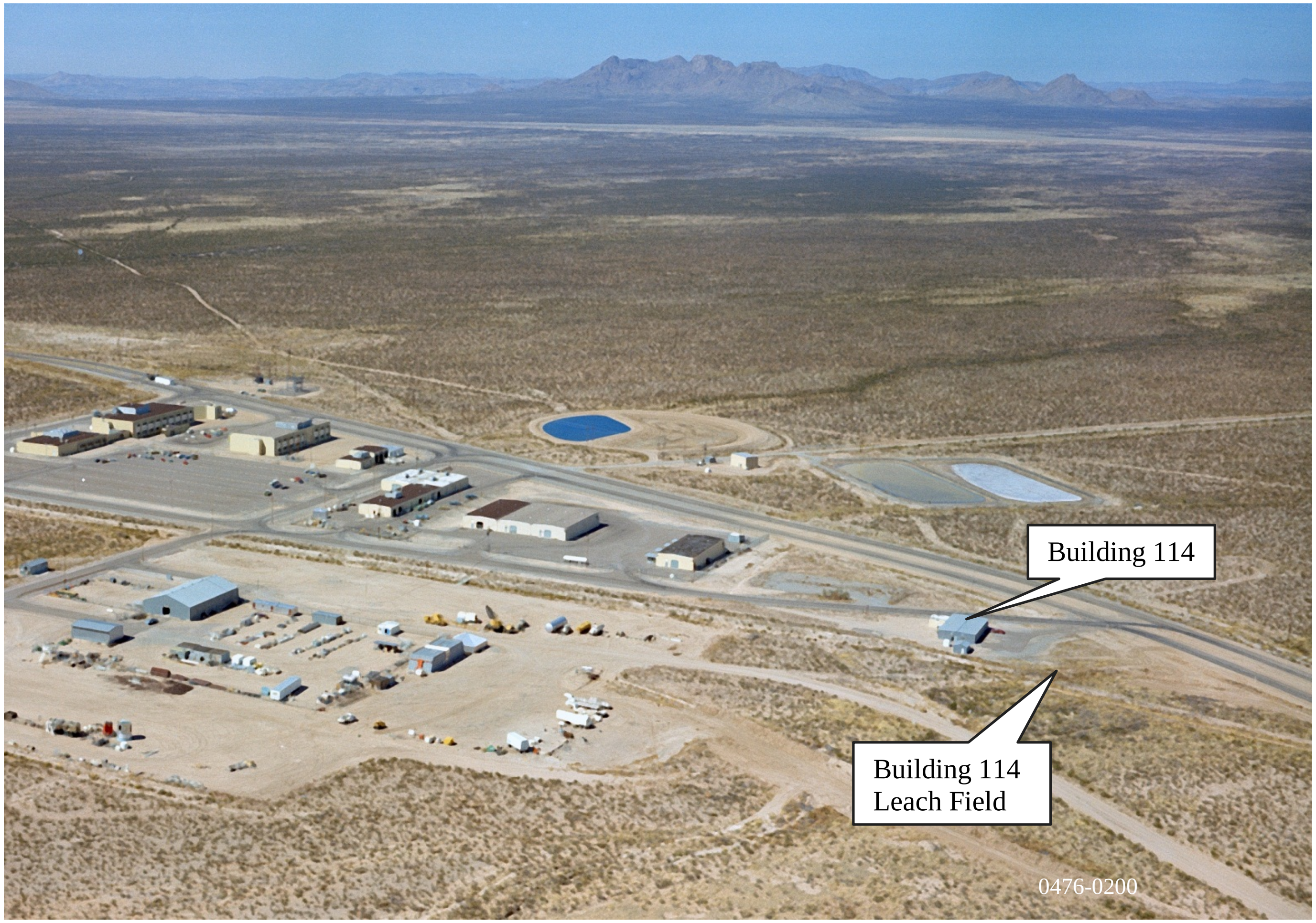
Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
WSTF Facilities 1987-2009	**Septic Systems** • To the employee's knowledge, no wastes other than sewage, hand-washing, cooling water (Building 272), were discharged to any WSTF septic tank. • Building 114 septic tank had backed up "into the building" (assumed to be Building 119) in 2007. This resulted in an emergency tank location and pump-out, the employee believed. • The employee believed the Building 114 septic tank had not been pumped out prior to 2007 because current WSTF personnel were not aware of the tank location prior to that time. • Most WSTF septic tanks were pumped out annually from 1991 to at least 2009, except for Building 114 and Building 116 because the exact locations were unknown to current personnel. The WSTF computer database should contain records of septic tank maintenance. [The database information does not support annual pumping of WSTF septic tanks.] • At least since the employee began working, WSTF hired outside septic companies to perform septic tank maintenance at WSTF. • The Building 116 (Main Guard Gate) septic tank was located "in the 2000s down in the pit where people used to park." • "There is a septic tank that serves Building 255." [There seems to be no septic tank for Building 255.] • Building 252 personnel had used "a port-a-potty" prior to the construction of Building 255.	• No additional information or comments.
WSTF plumber 1995-present (2013)	**Septic Systems** • The employee believed there was a septic tank located at Building 255, but was unsure. • Regarding Building 114 septic system, there have been two times historically when there was a problem with Building 119. One time, while digging with heavy equipment, a water supply line had been broken. The second was a back-up of the septic system in 2007. The toilets would not flush within Building 119. "The lines had been snaked," but this did not resolve the issue. The lines were dug up and repaired. • During this 2007 incident, the employee believed the Building 114 septic tank had been pumped out. • To the employee's knowledge, the Building 114 septic tank had not been pumped out	• There is currently a triple-wide trailer (Building 464) located in the Building T463 septic tank area; however due to lower ground elevation than the T463 septic tank, the trailer is connected into the 400 Area main septic system.

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	historically, before the 2007 malfunction. • To the employee's knowledge, the Building 116 (Main Guard Gate) septic tank had never been pumped out. • Other septic tanks at WSTF were pumped out periodically. Refer to the computer database for a record. • Building 119 had been installed in the late 1990s, and the septic piping had been installed to the Building 114 septic piping, and not directly to the Building 114 septic tank. It was not necessary to "locate" the Building 114 septic tank at the time of installation of Building 119. • Regarding the temporary Building T463 septic tank system, the septic tank had been inactive since the temporary trailer (T463) was removed. • Through time, personnel had driven over the septic tank and lines, and the tank had to be recapped several times historically. [This was after the system was inactive.] • In 2006, the 400 Area main septic system had malfunctioned. One of the pipes to one of the diverter boxes (that lead to the leachfields) had corroded through and was leaking sewage onto the ground. Personnel stayed late (past 5 pm) to patch the pipe with PVC. • The Building 364 septic tank system backed up. Personnel "snaked" the system lines, but this did not resolve the issue. The leachfield was excavated and repairs were made. • To the employee's knowledge, no other wastes (than sewage or hand-washing wastes) were discharged to any WSTF septic system.	
Johnny's Septic Tank Company (JSTC) Personnel (part-owner)	**Septic Systems** • JSTC installed many WSTF septic tanks: Building 272 (A, B, and C), Building 320, Building 364, Building 447, Building 650, Building 802, and Building 117 (Forward Guard Gate). • No Liquid Waste Program Permit applications were filed for Building 272 tank C and Building 117 (Forward Guard Gate) "because these tanks were installed on a government facility and permits were not required." [This is not true, according to Liquid Waste regulations; however these tanks were installed under DP-392 instead of the Liquid Waste Program.] • No records were located for construction, maintenance, or disconnection of the STGT system.	• JSTC was founded by Johnny Suggs in 1950. The business was passed to Johnny's son Wayne and his sons Wayne Jr. and Daniel Suggs. • A Liquid Waste Program Permit for ADF-SW guard gate septic tank was provided to WSTF

Position/ Location	Significant White Sands Test Facility (WSTF) Septic Tank Systems Information	Other Information or Comments
	• Maintenance provided to WSTF septic tanks includes: November 2012: pumped out Building 114, 320, and 364 septic tanks; December 2008: pumped out the 400 Area main septic tank; July 2008: pumped out the WSTF grease trap and repaired the drain filter/drainfield. (This was for Building 111, cafeteria, not a septic tank). • May 2, 2008: Pumped out a WSTF septic tank [believed to be the Building 364 septic tank.]. This was "an emergency" request and was completed "after hours" (after 5 pm).	personnel. This tank is not NASA-owned, and not part of this investigation.

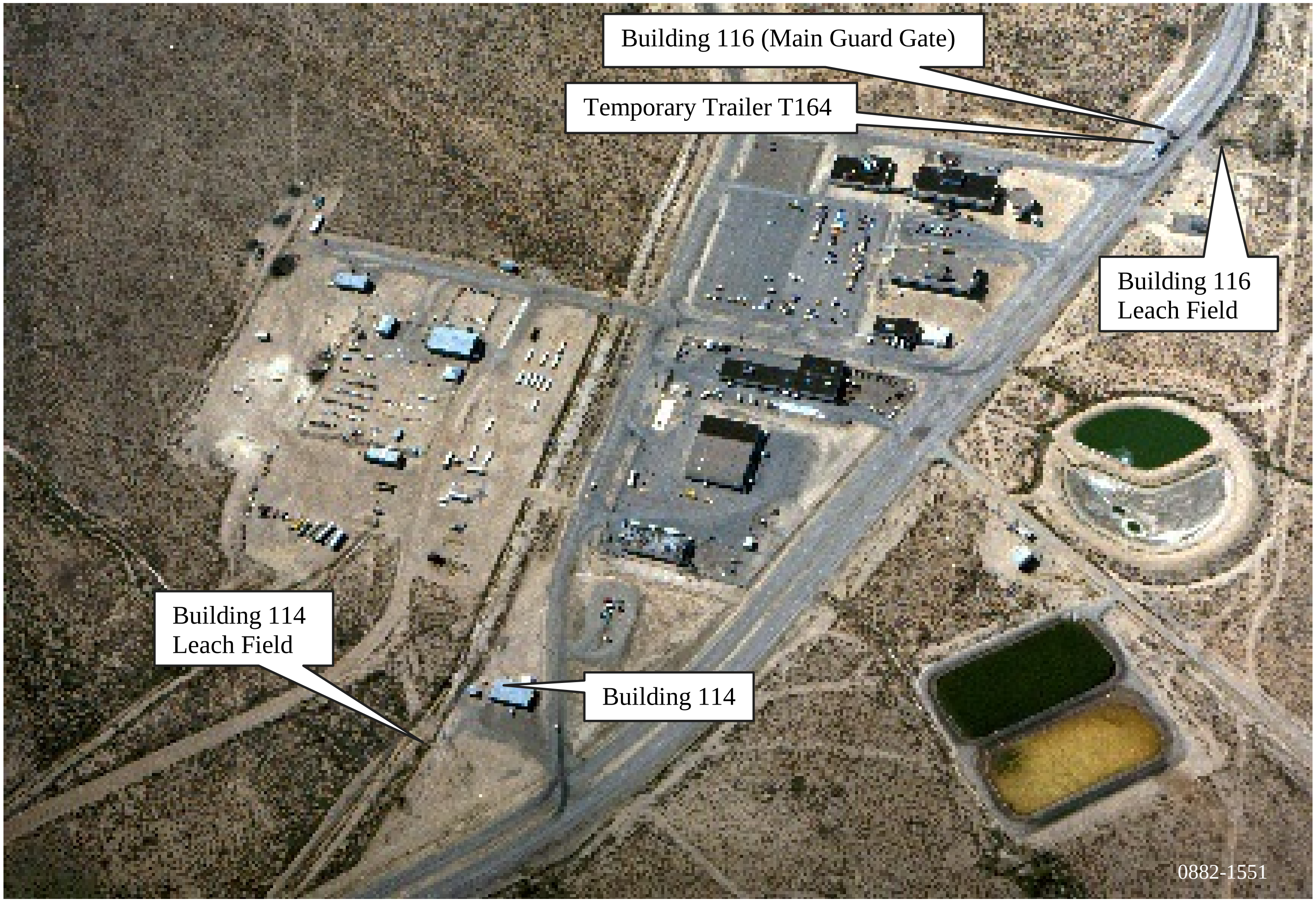
Appendix B WSTF Septic Tank Systems Photographs

Figure B.1 **WSTF Building 114 Area (1976) – view to the west**



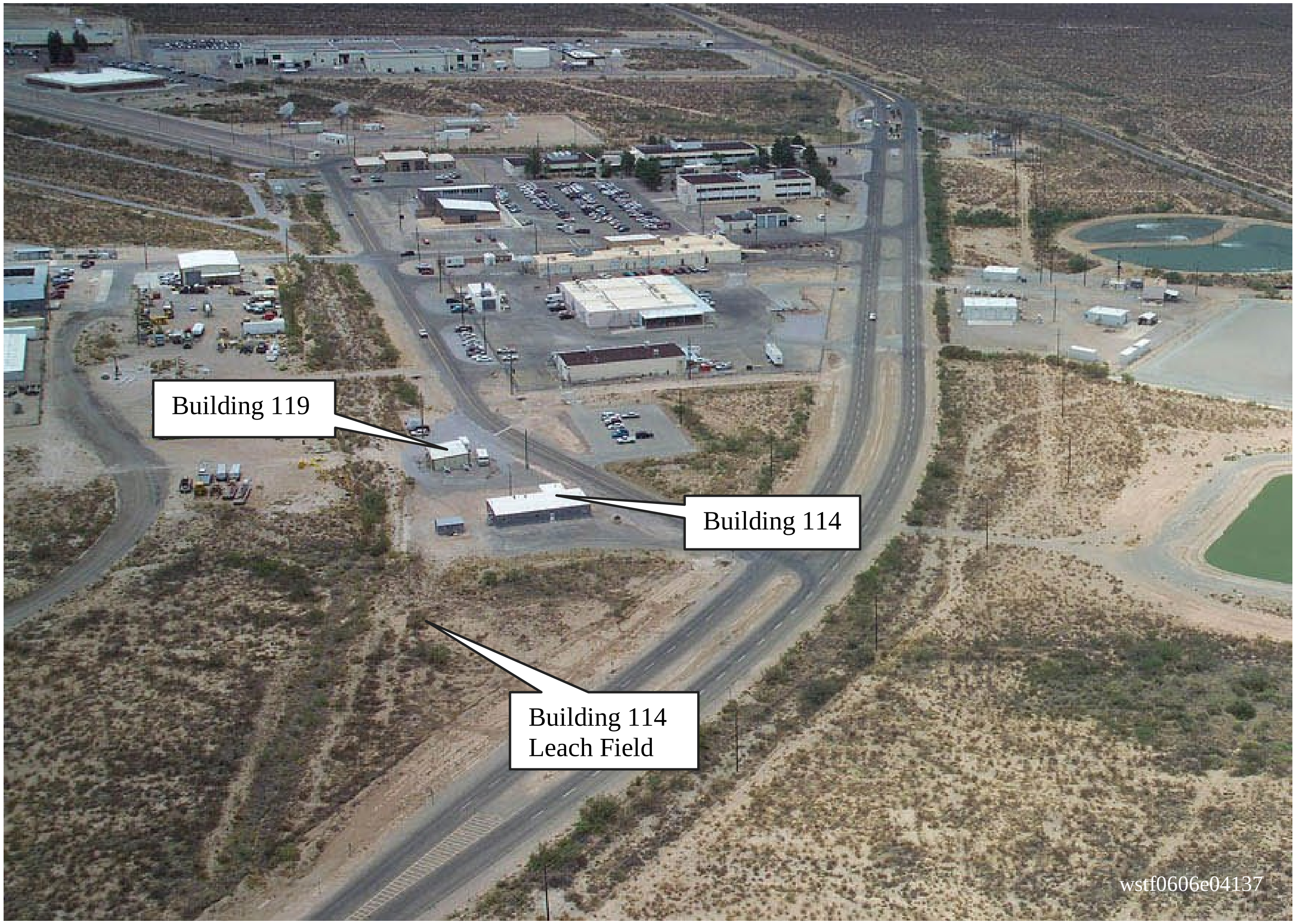
This photograph shows the Building 114 Area in April 1976. Notice the vegetation growth indicating where the Building 114 leach field is located. This photograph was taken during the time the plate-maker machine chemicals were being discharged to the Building 114 septic tank.

Figure B.2 **WSTF 100 Area (1982) – view to the south**



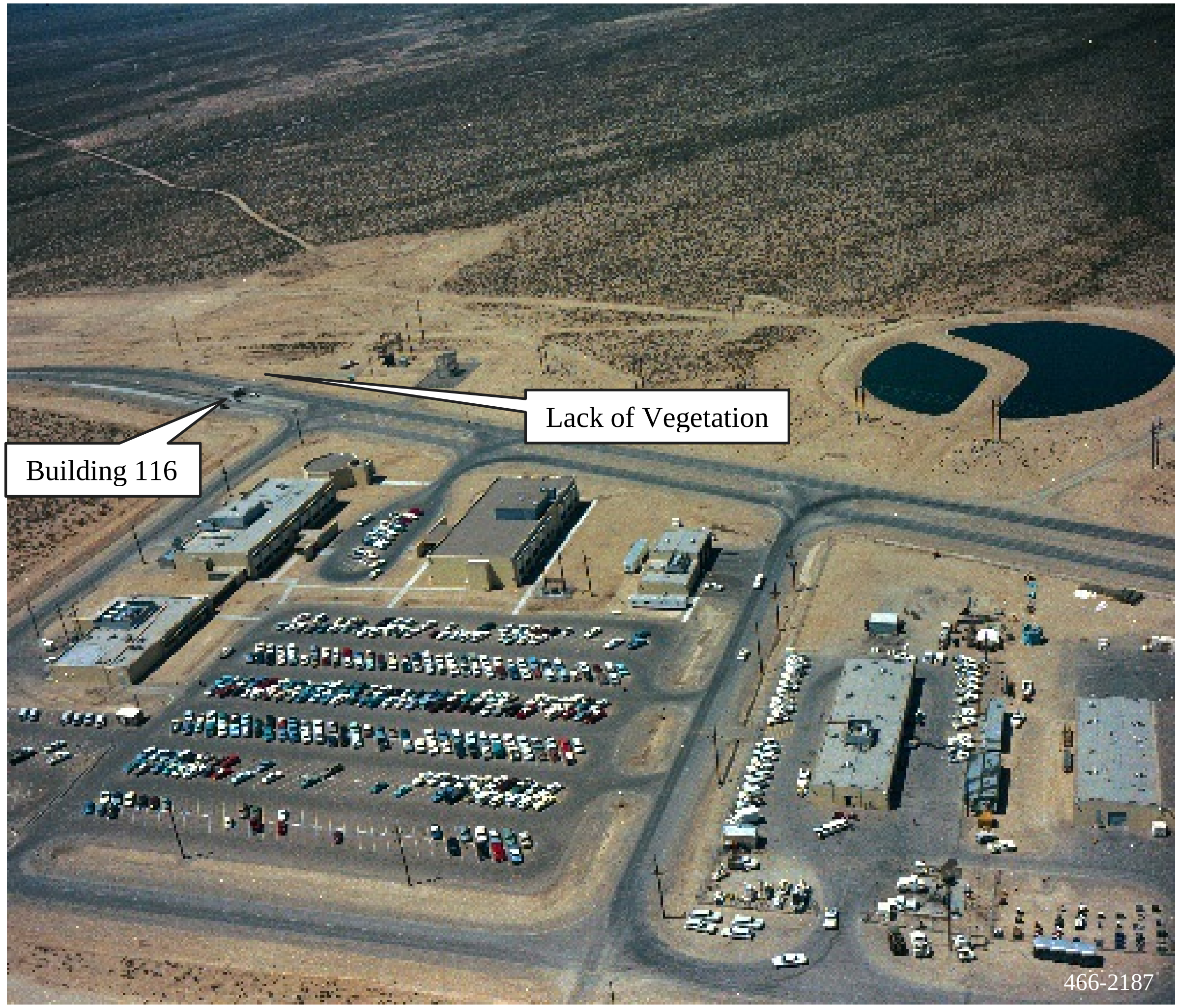
This photograph shows the WSTF 100 Area, Building 114, and Building 116 Areas in August 1982. It was taken during the time the plate-maker machine chemicals were being discharged to the Building 114 septic tank. Building 119 is not present.

Figure B.3 WSTF Building 114 Area (2006) – view to the south



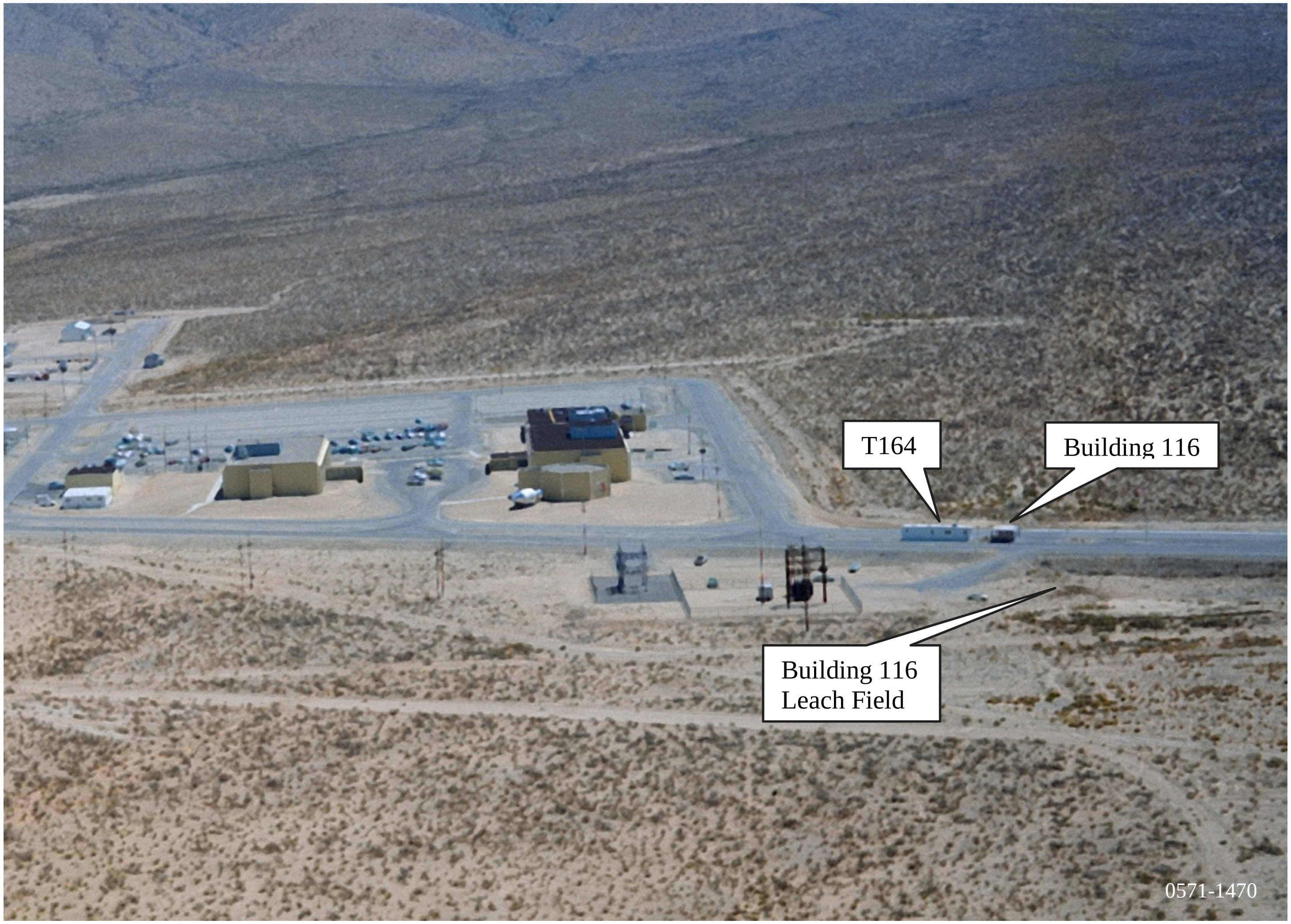
This photograph shows the Building 114 Area in June 2006. Increased vegetation growth indicates the location of the Building 114 septic tank leach field.

Figure B.4 **WSTF 100 Area Showing Building 116 (Main Guard Gate) Area (1966) – view to the west**



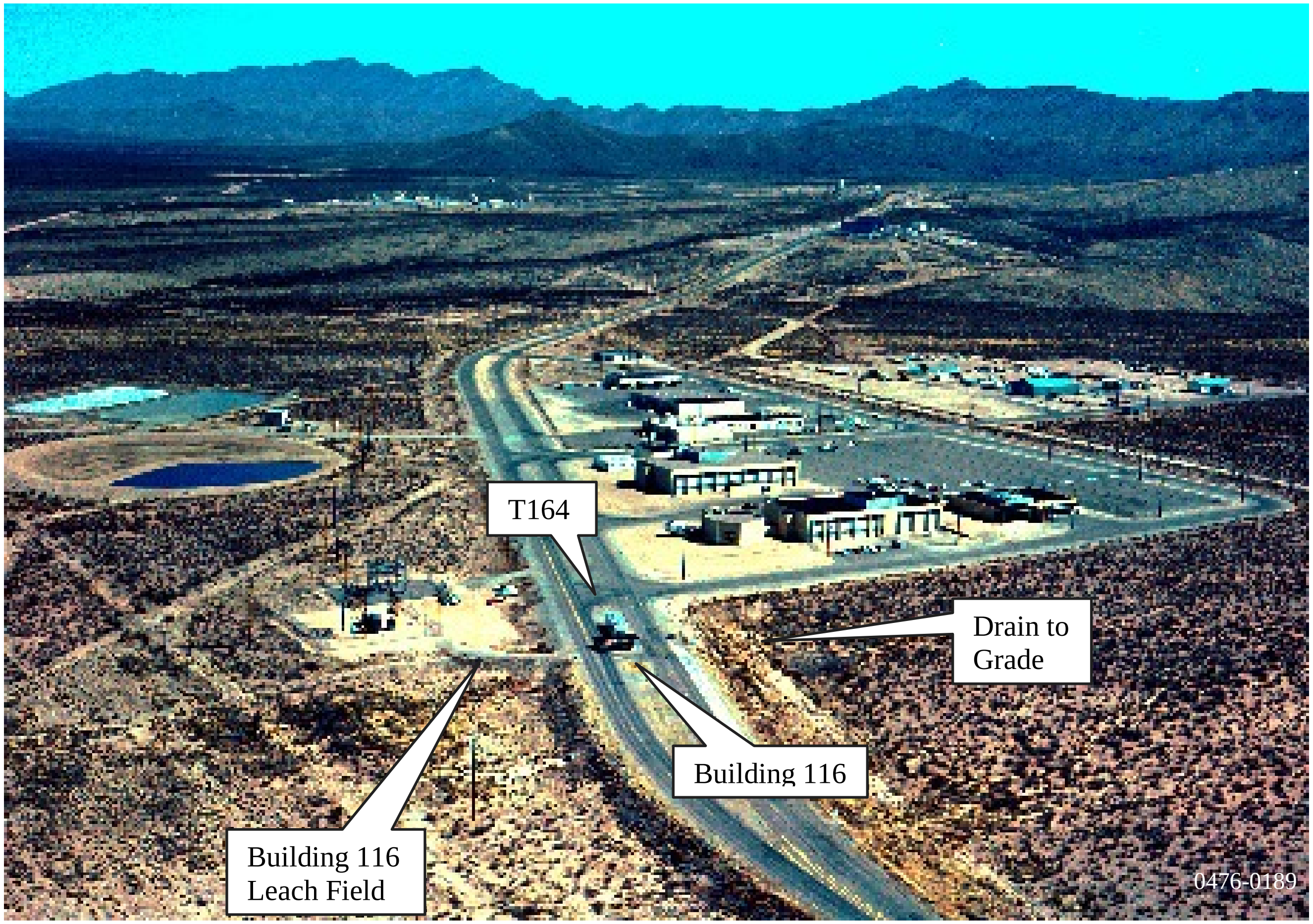
This photograph shows the WSTF 100 Area (and Building 116, the Main Guard Gate) in April 1966. The temporary trailer T164 and the Building 116 (Main Guard Gate) septic tank were not yet installed.

Figure B.5 **WSTF 100 Area (1971) – view to the east**

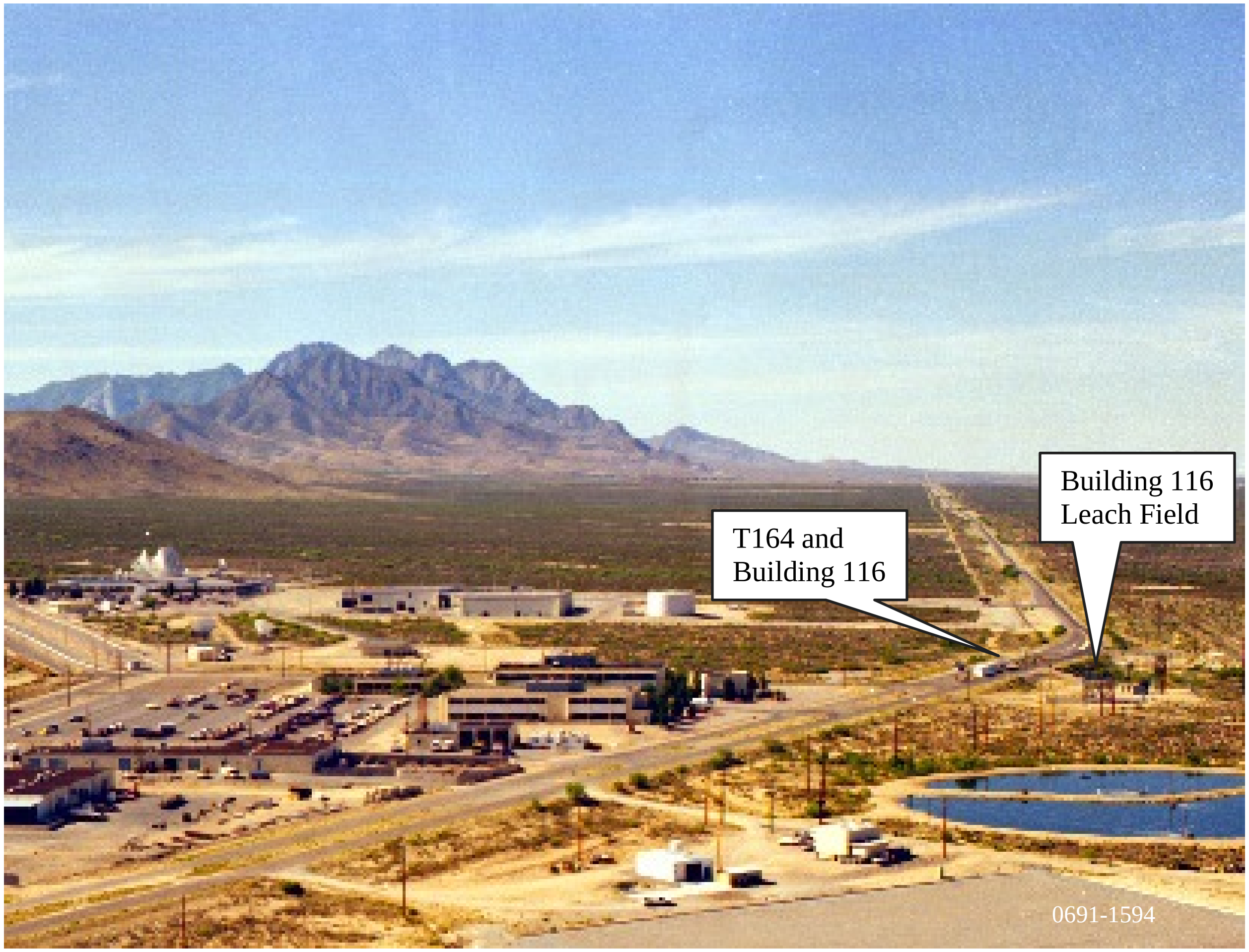


This photograph shows the 100 Area in May 1971. The temporary trailer T164 has been installed to the north of Building 116 (Main Guard Gate), and vegetation has begun to grow where the Building 116 leach field is located.

Figure B.6 WSTF Building 116 (Main Guard Gate) Area (1976) – view to the north

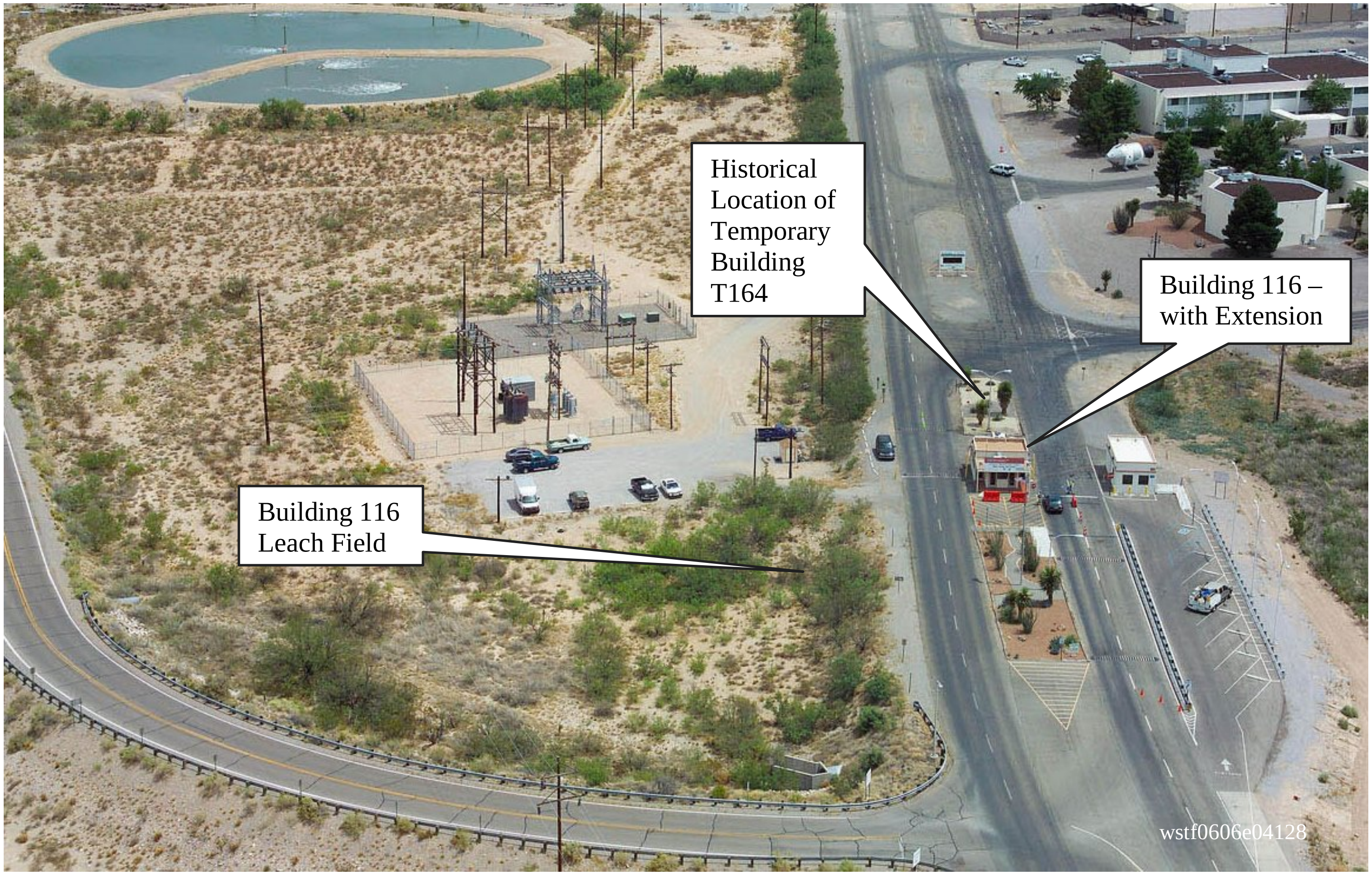


This photograph shows the Building 116 (Main Guard Gate) Area in April 1976. The temporary trailer T164 is present. Increased vegetation indicates where the Building 116 (Main Guard Gate) septic tank leach field is located. There is also a drain to grade located east of Building T164, where effluent from vehicle washing was historically discharged.



This photograph is of the WSTF 100 Area showing Building 116 (Main Guard Gate) in June 1991. Temporary trailer T164 is still located at Building 116. (It was removed in 1999.) Vegetation growth where the Building 116 leach field is located has increased.

Figure B.8 WSTF Building 116 (Main Guard Gate) Area (2006) – view to the north

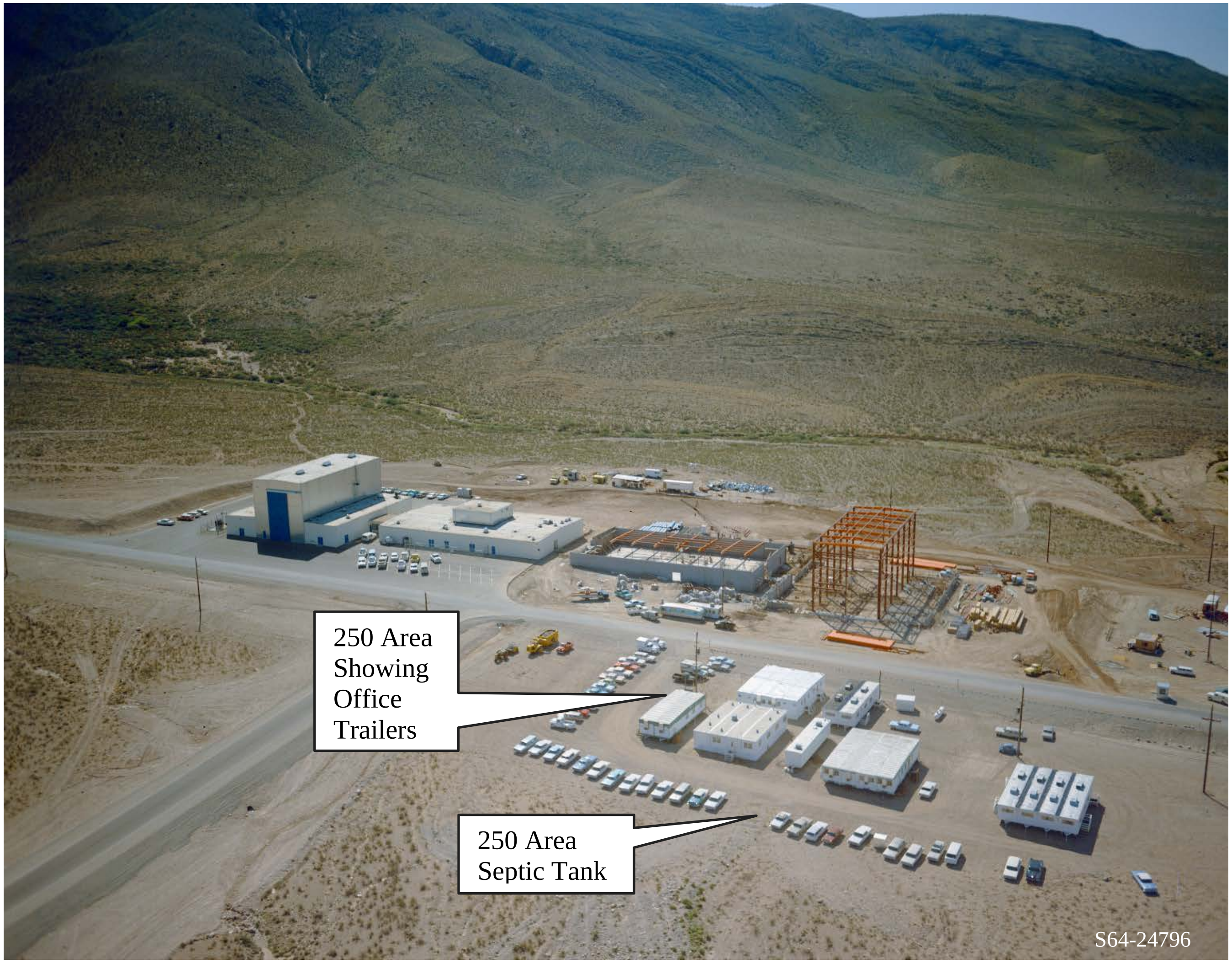


This photograph shows the Building 116 (Main Guard Gate) Area in June 2006. The large size of the vegetation in the septic tank/leach field area may indicate this tank has likely never been pumped out.

Figure B.9 **WSTF Building 117 (Forward Guard Gate) Area (2006) – view to the northeast**

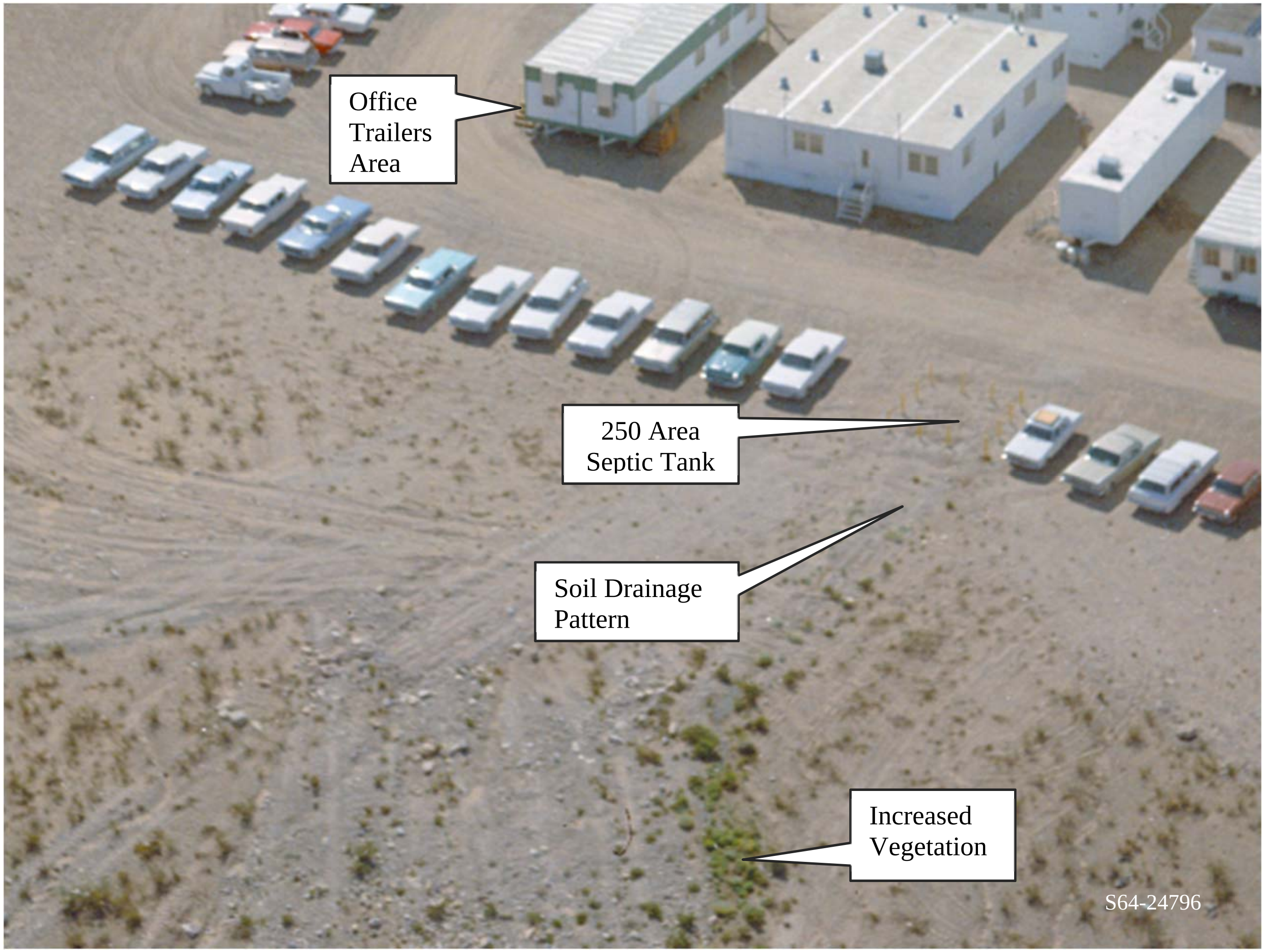
This photograph shows the WSTF Building 117 (Forward Guard Gate) Area in June 2006, during construction of the area. The Building 117 septic tank and leach field were installed adjacent to the road under construction in this photograph.

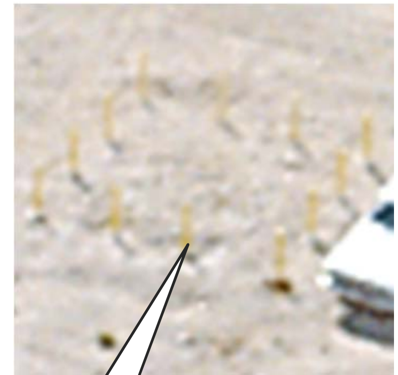
Figure B.10 WSTF 200 Area in Construction (1964) – view to the east



This photograph shows the WSTF 200 Area circa 1964, prior to completion of Building 201 and the South Highbay. There are temporary trailers located in the 250 Area.

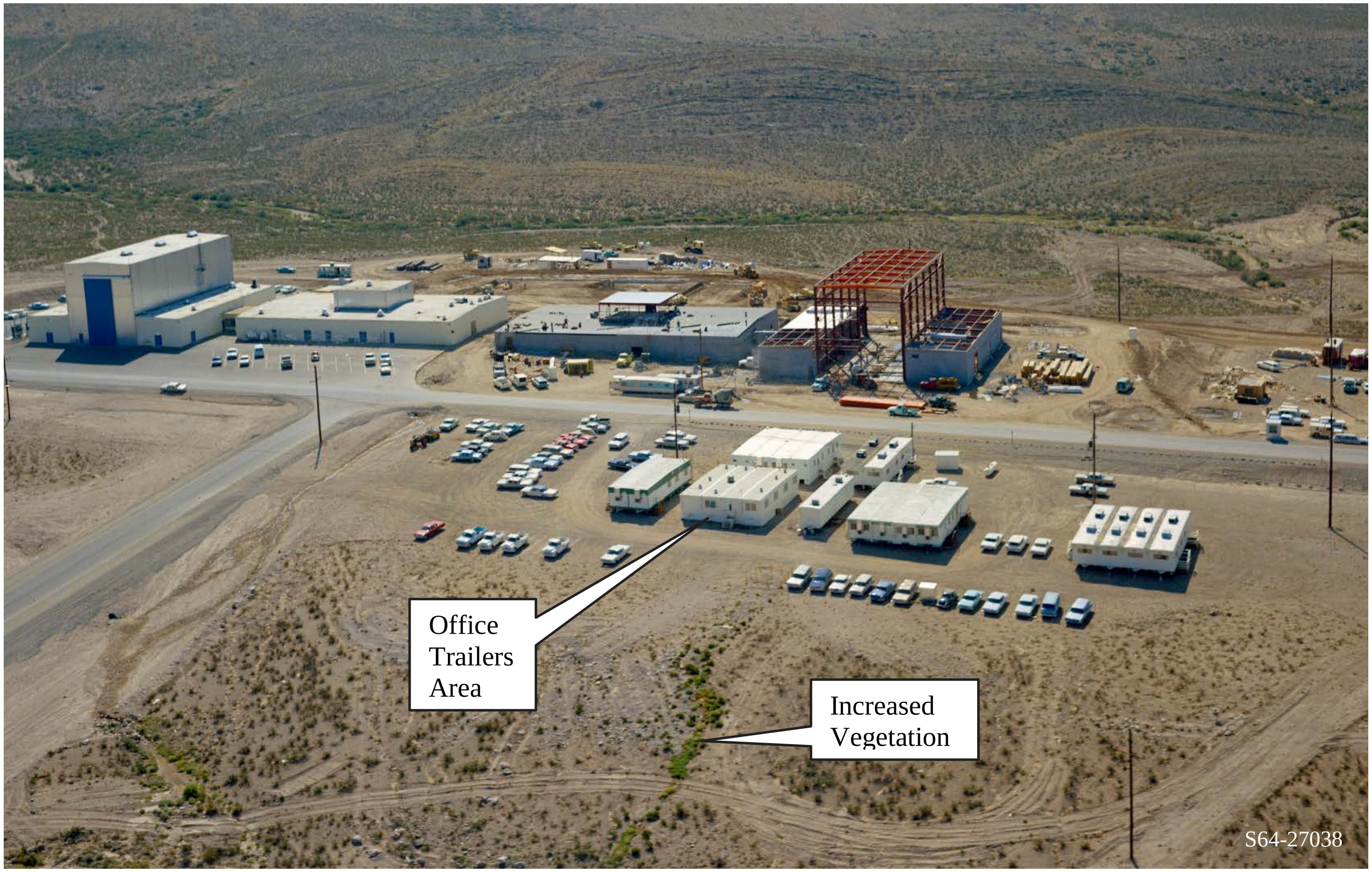
Figure B.11 **WSTF 250 Area Septic Tank (1964) – view to the east**





Close-up view of the WSTF 250 Area septic tank circa 1964. Yellow bollards surround the septic tank location. The drainage pattern in the soil and the increased vegetation growth downslope of the septic tank indicate the location of the leach field.

Figure B.12 WSTF 200 Area in Construction (1964) – view to the east

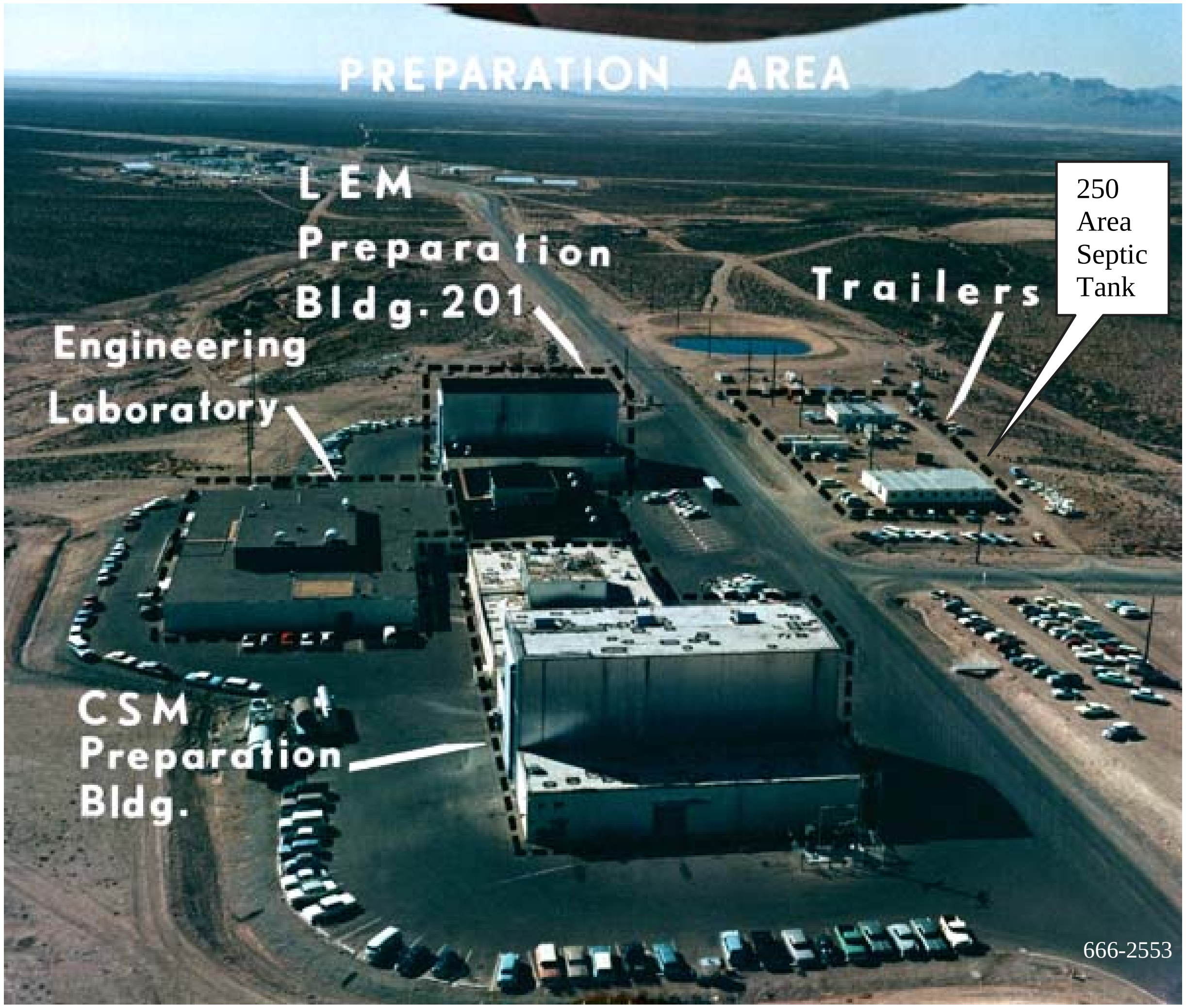


This photograph shows the 200 Area under construction circa 1964. Building 201 is almost completed, showing this photograph was taken at a later date than the previous photograph. The 250 Area is at the bottom of the photograph. The vegetation growth downslope from the 250 Area septic tank has increased since the previous photograph.

Figure B.13 **WSTF 200 Area (1965) – view to the west**

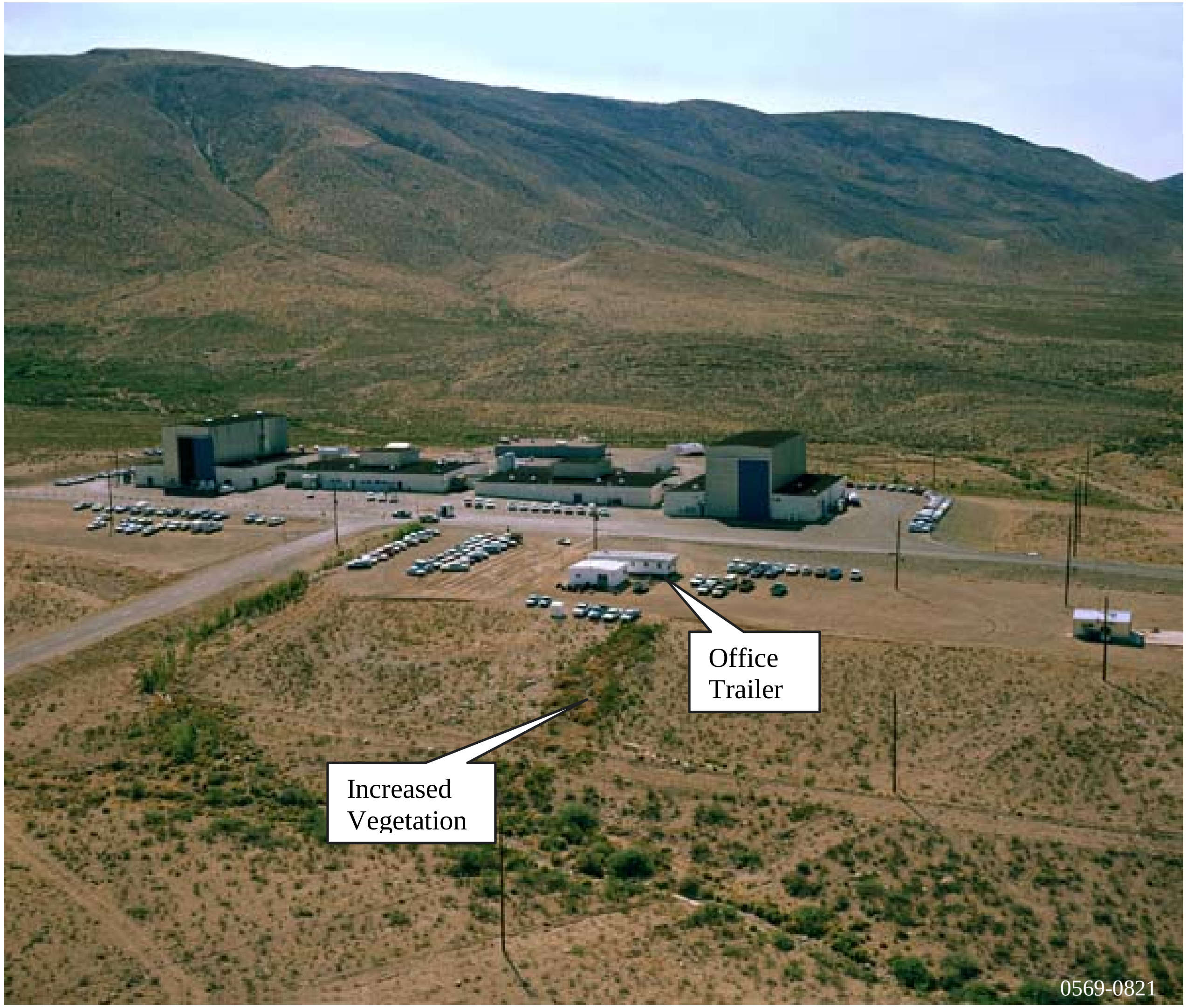
This photograph shows the 200 Area circa 1965. Building 201, the South Highbay, and Building 203 have been completed and there are fewer trailers located in the 250 Area.

Figure B.14 **WSTF 200 Area (June 1966) – view to the southwest**



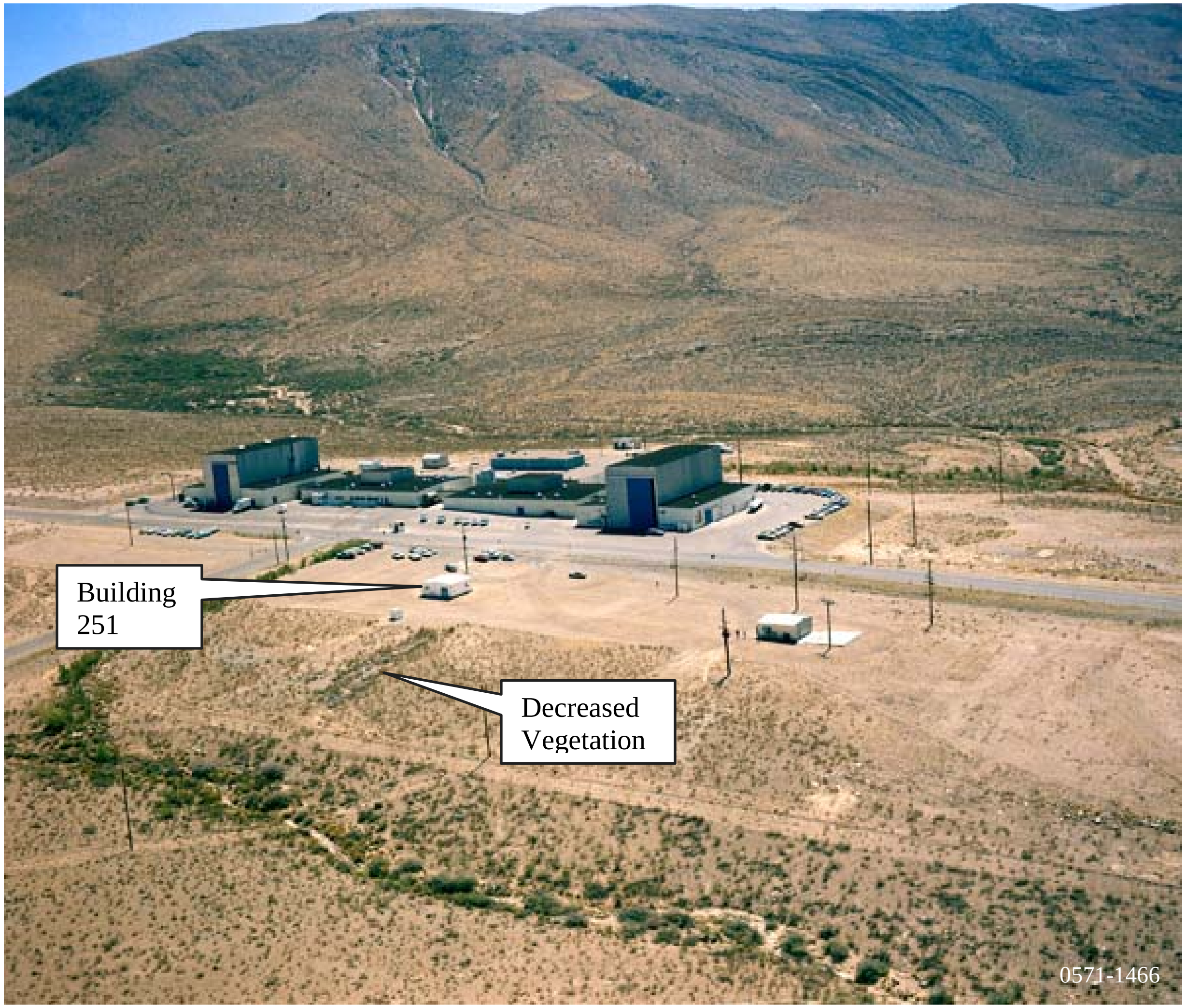
This photograph shows the 200 Area in June 1966. The 250 Area is at the right of the photograph. The number of office trailers located in the 250 Area has increased again compared to the 1965 photograph, indicating that use of the 250 Area continued after completion of the 200 Area main complex.

Figure B.15 **WSTF 250 Area (May 1969) – view to the east**



This photograph shows the 250 Area in May 1969. The large amount of vegetation located downslope from the septic tank indicates the tank was still active.

Figure B.16 **WSTF 250 Area (May 1971) – view to the east**



This photograph shows the 250 Area in May 1971. There are no longer any office trailers located in the 250 Area and the decreased vegetation indicates the 250 Area septic tank was no longer active at this time. Building 251, believed to have no septic connections is still present in this photograph.

Figure B.17 **WSTF 250 Area (June 1977) – view to the east**

This photograph shows the 250 Area in June 1977. The 250 Area septic tank appears to be uncovered. It is unknown if this tank was excavated or if the soil collapsed above the tank. Also notice Building 251 has been removed. This building was later moved between Buildings 250 and 252.

Figure B.18 WSTF 300 Area Main Septic Tank (1966) – view to the northwest

This photograph shows the WSTF 300 Area in April 1966. The discolored rectangular area indicates where the 300 Area main septic tank leach field was installed.

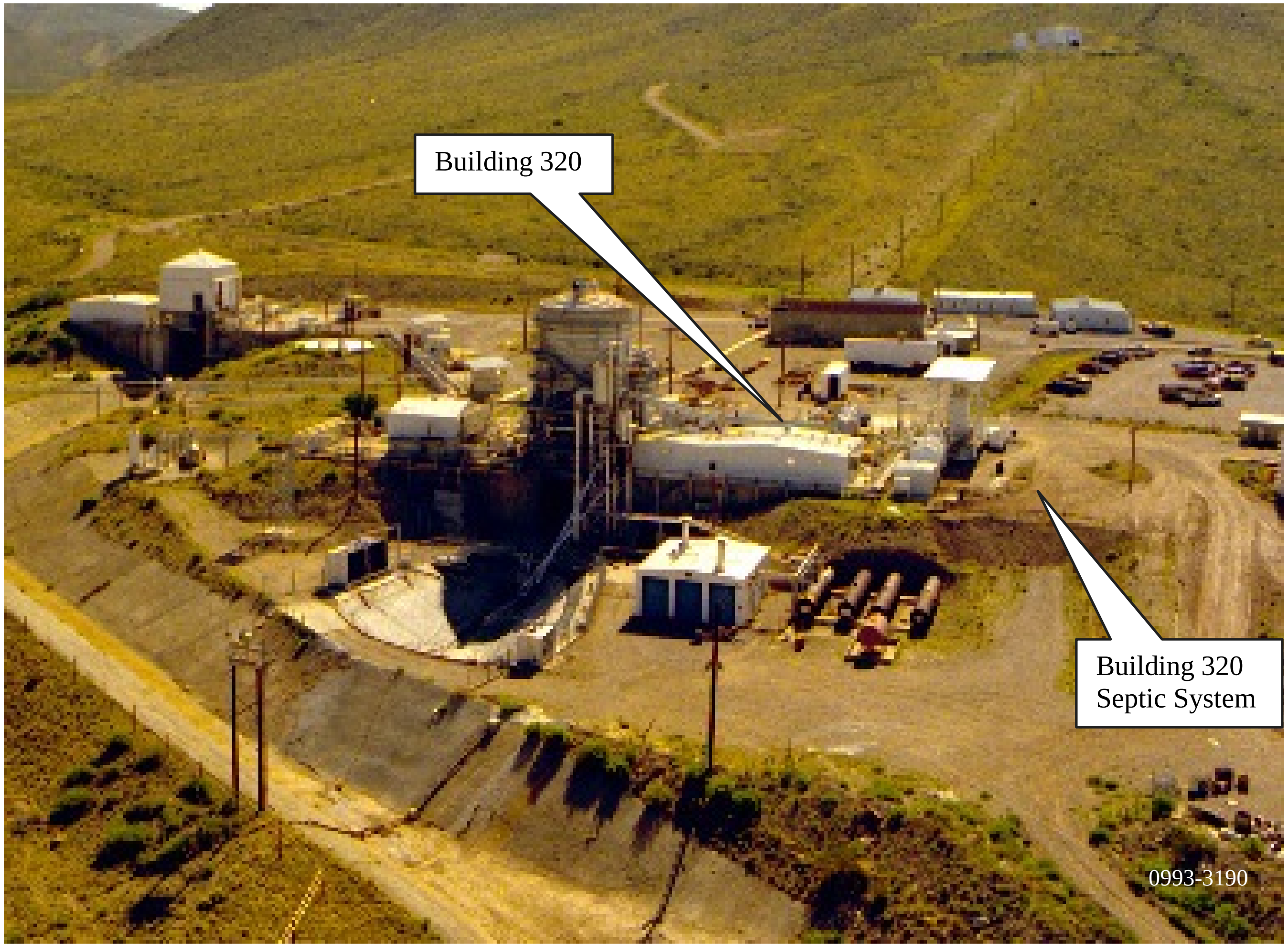
**Figure B.19	WSTF 300 Area Main Septic Tank Area (1971) – view to the west**

This photograph shows the WSTF 300 Area in May 1971. The rectangular area with increased vegetation growth illustrates the location of the 300 Area main septic tank leach field.

Figure B.20 WSTF 300 Area Main Septic Tank Area (1982) – view to the southwest

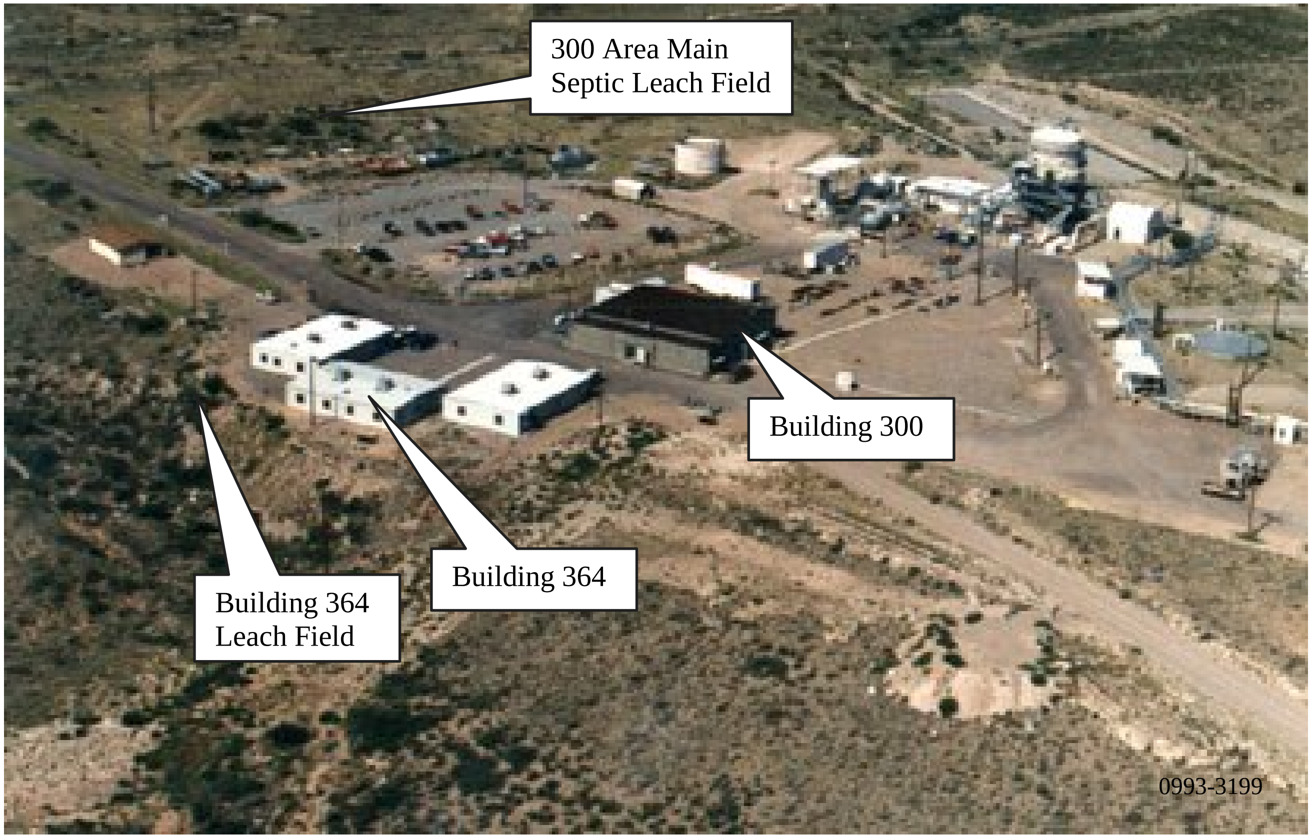
This photograph shows the WSTF 300 Area in August 1982. The rectangular area with increased vegetation growth illustrates the location of the 300 Area main septic tank leach field.

Figure B.21 **WSTF Building 320 Area (1993) – view to the east**



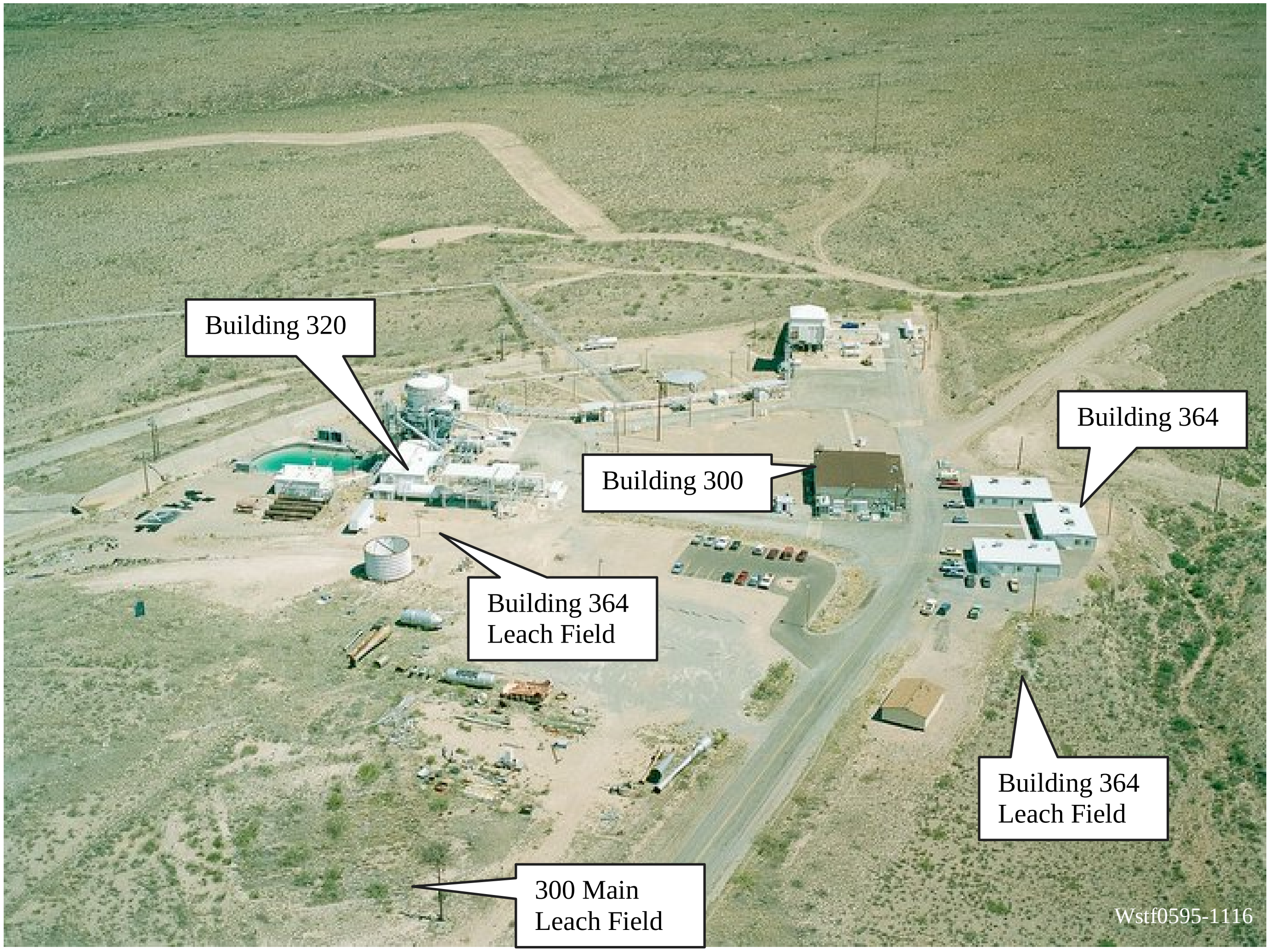
This photograph shows the WSTF 320 Area one month following the installation of the Building 320 septic tank system (in September 1993).

Figure B.22 **WSTF 364 Area (1993) – view to the west**



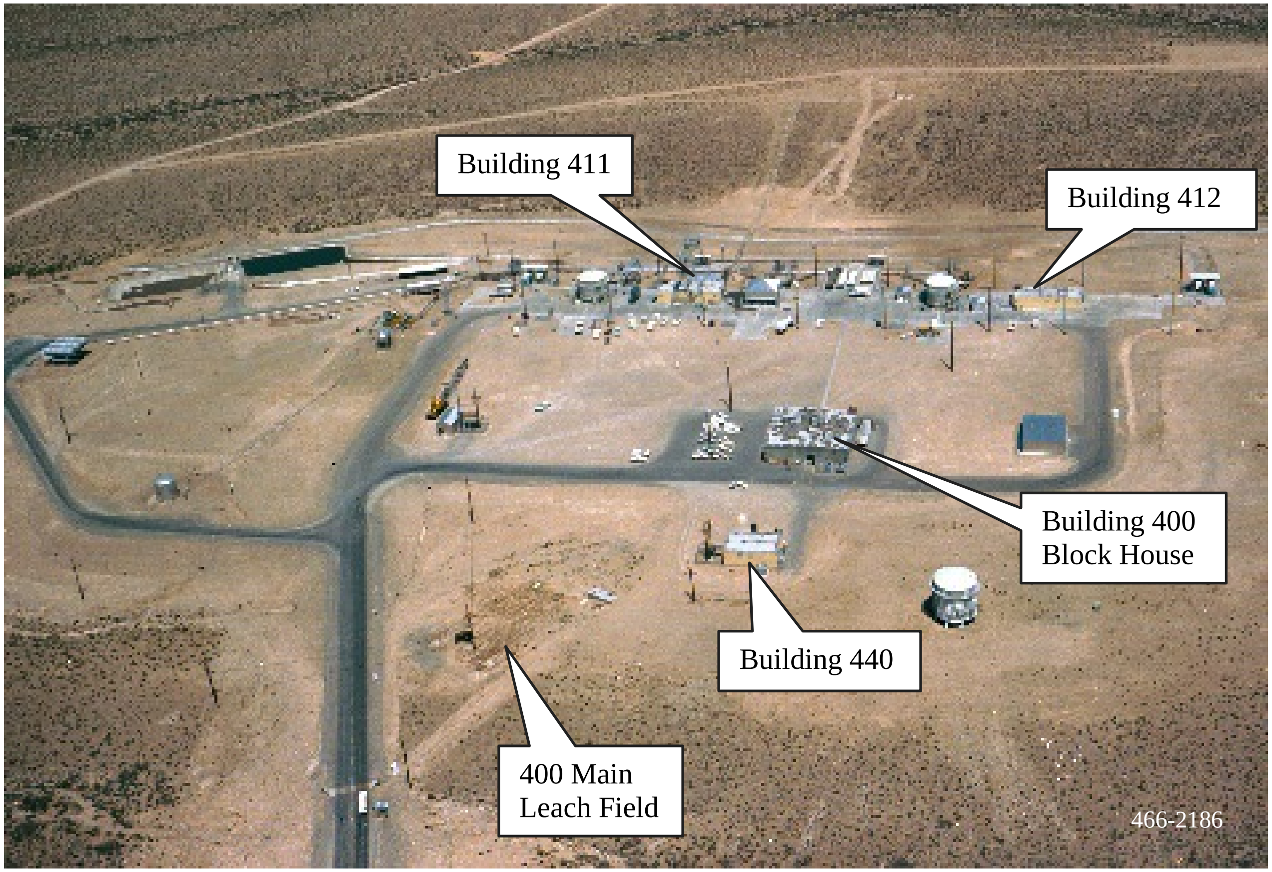
This photograph shows the WSTF 364 Area in September 1993. The increased vegetation growth is associated with the Building 364 septic system. [The Building 364 septic tank system was installed in November 1991.]

Figure B.23 **WSTF 300 Area (1995) – view to the north**



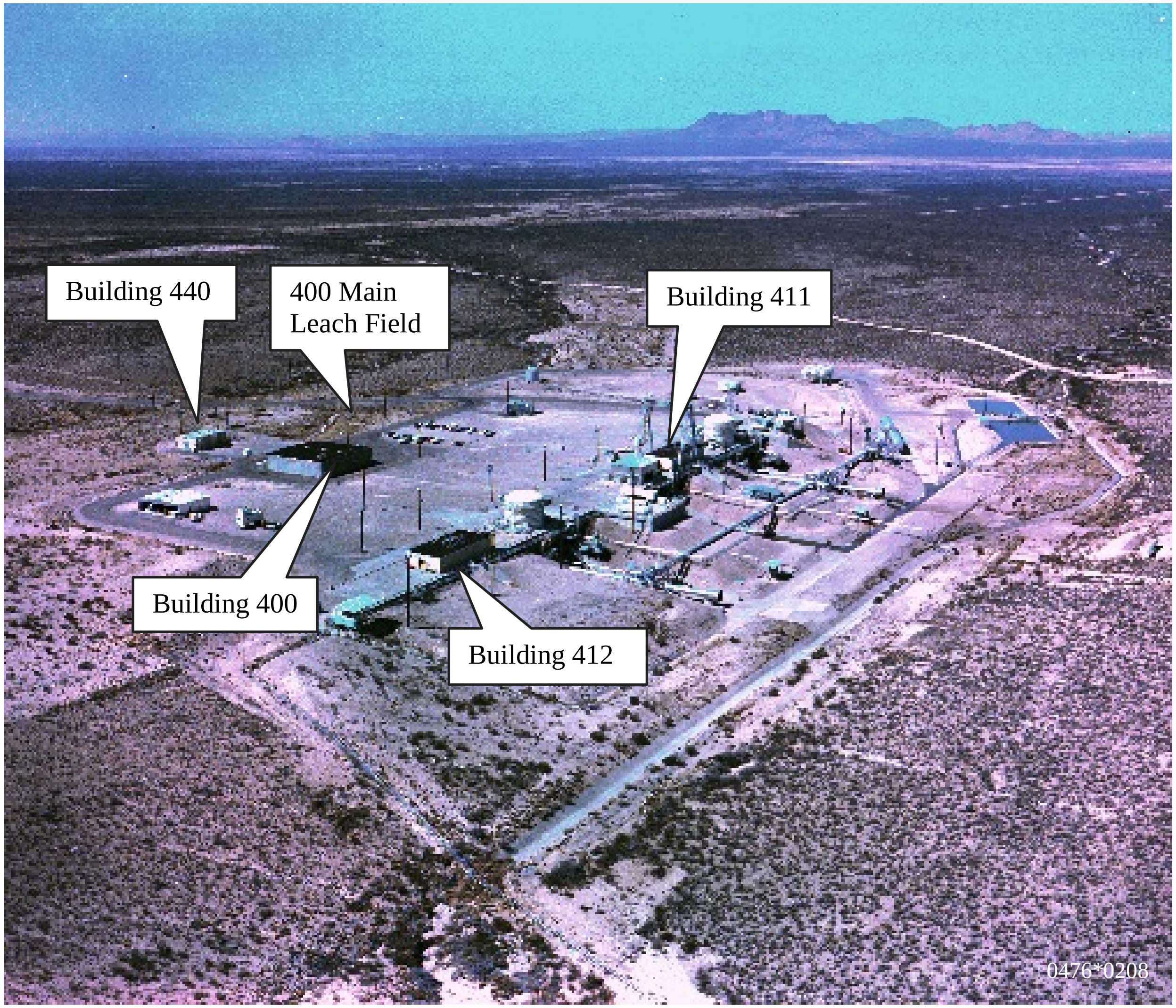
This photograph shows all the WSTF 300 Area septic tank systems in May 1995. Notice no increased vegetation growth is present for the Building 364 septic system. This is due to WSTF site maintenance keeping active areas free of vegetation.

Figure B.24 **WSTF 400 Area (1966) – view to the north**



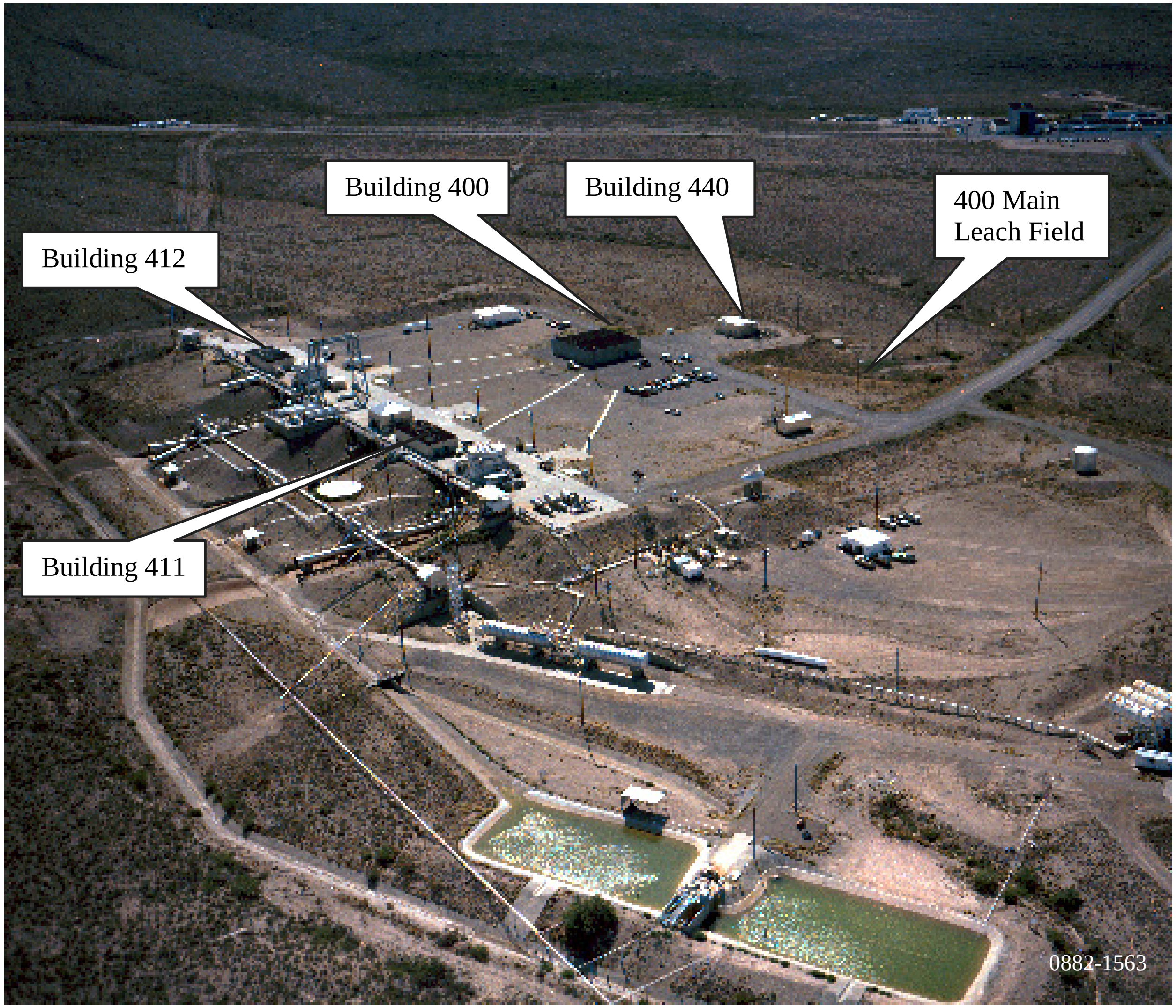
This photograph shows the WSTF 400 Area in April 1966. The rectangular shaped increased vegetation growth indicates the location of the 400 Area main septic tank leach field.

Figure B.25 **WSTF 400 Area (1976) – view to the southwest**



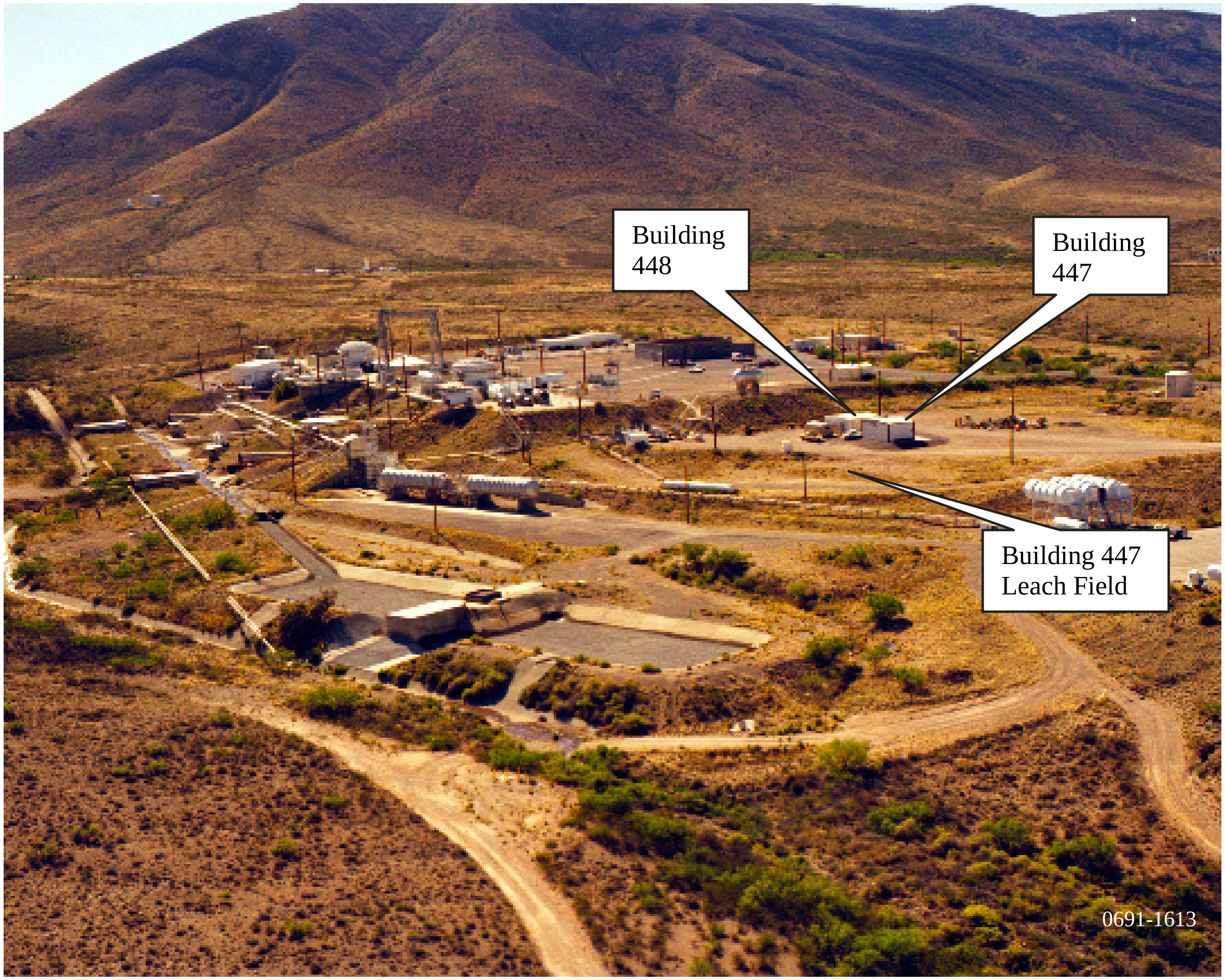
This photograph shows the WSTF 400 Area in April 1976. The increased vegetation growth illustrates the location of the 400 Area main septic tank leach field.

Figure B.26 **WSTF 400 Area (1982) – view to the southeast**



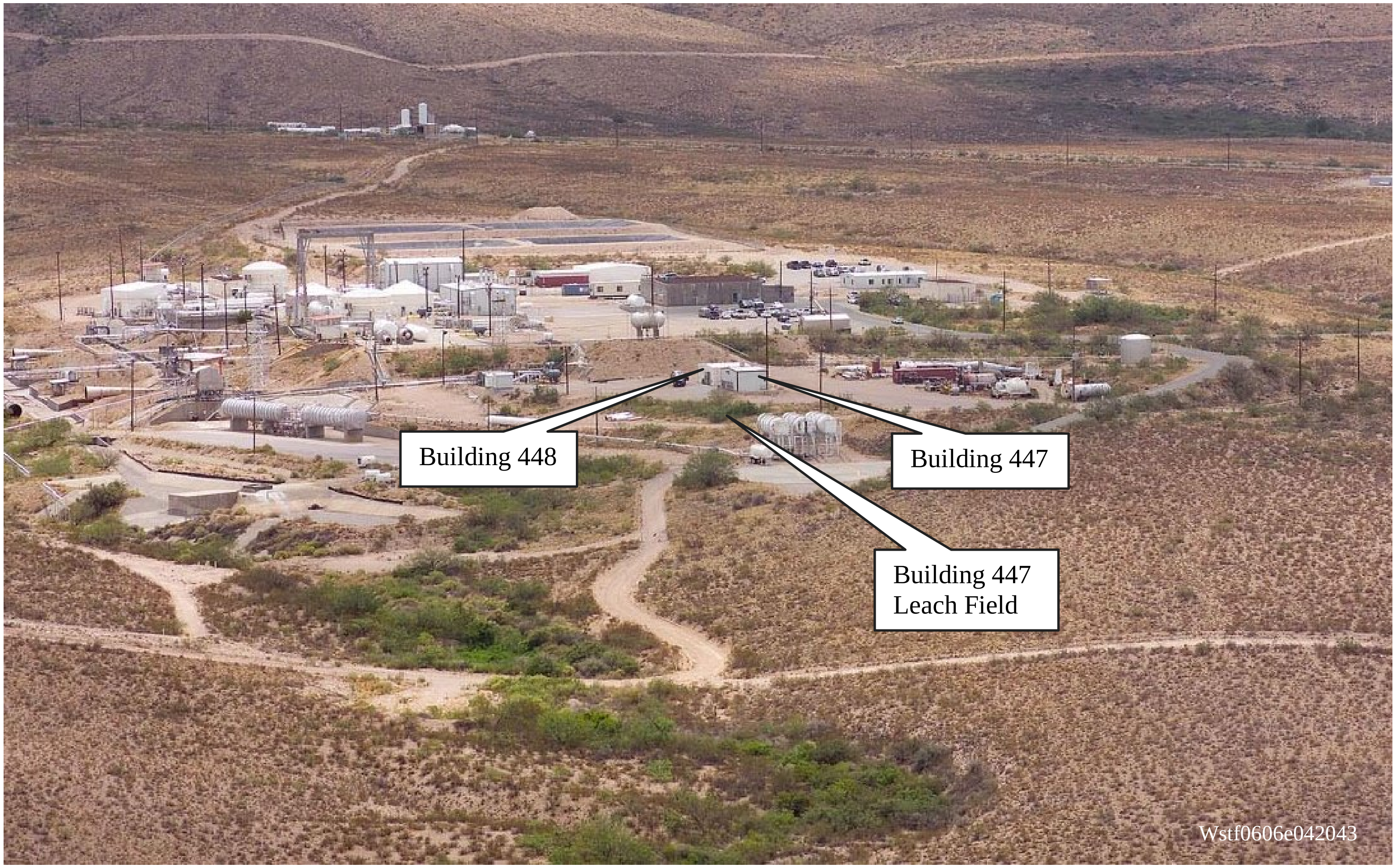
This photograph shows the WSTF 400 Area in August 1982. Buildings 400, 411, 412, and 440 contained sewer connections to the 400 Area main septic tank system.

Figure B.27 WSTF Building 447 Area (1991) – view to the east



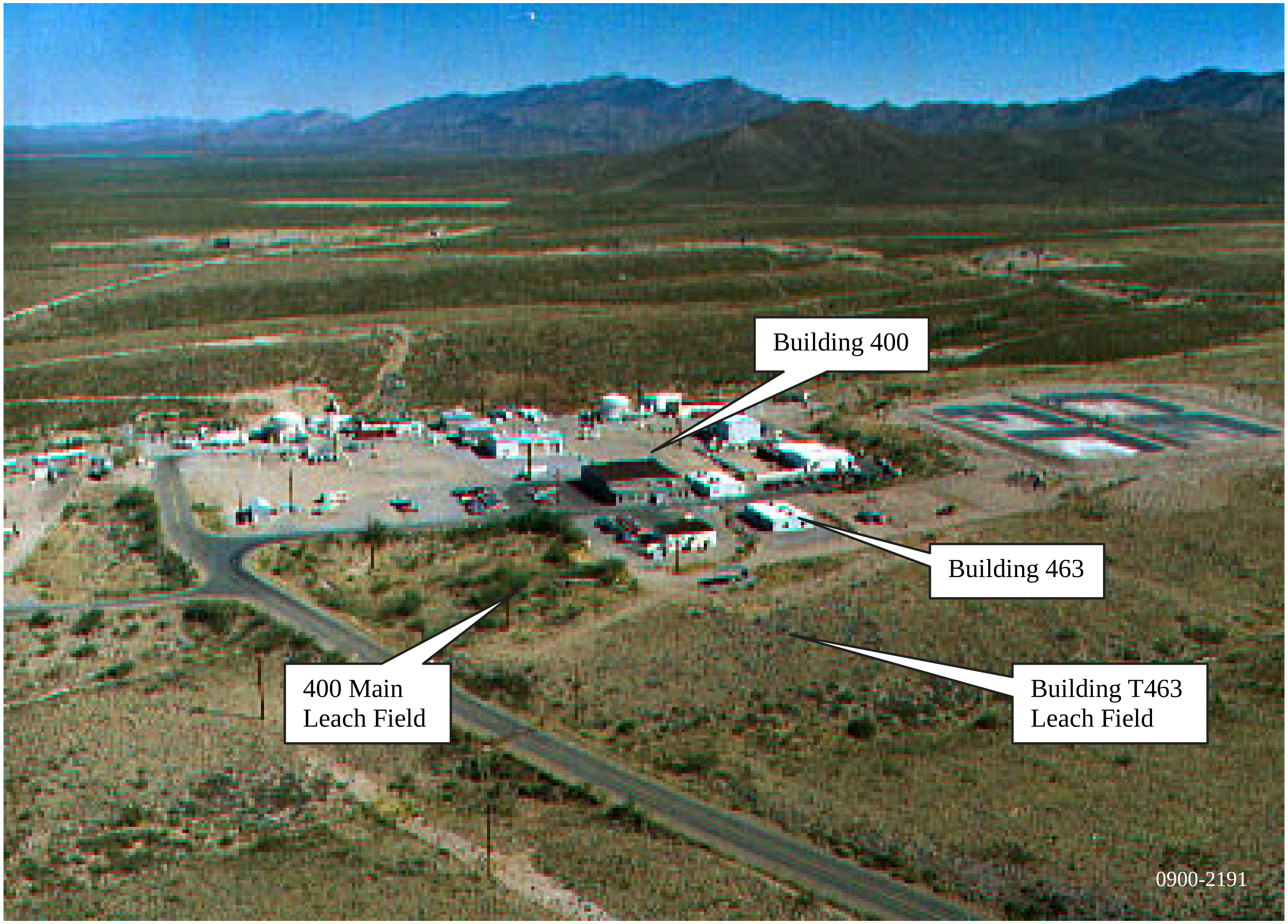
This photograph shows the 400 Area and the Building 447 septic tank system area in June 1991. [The Building 447 septic tank system was installed in June 1990.]

Figure B.28 **WSTF Building 447 Area (2006) – view to the southeast**



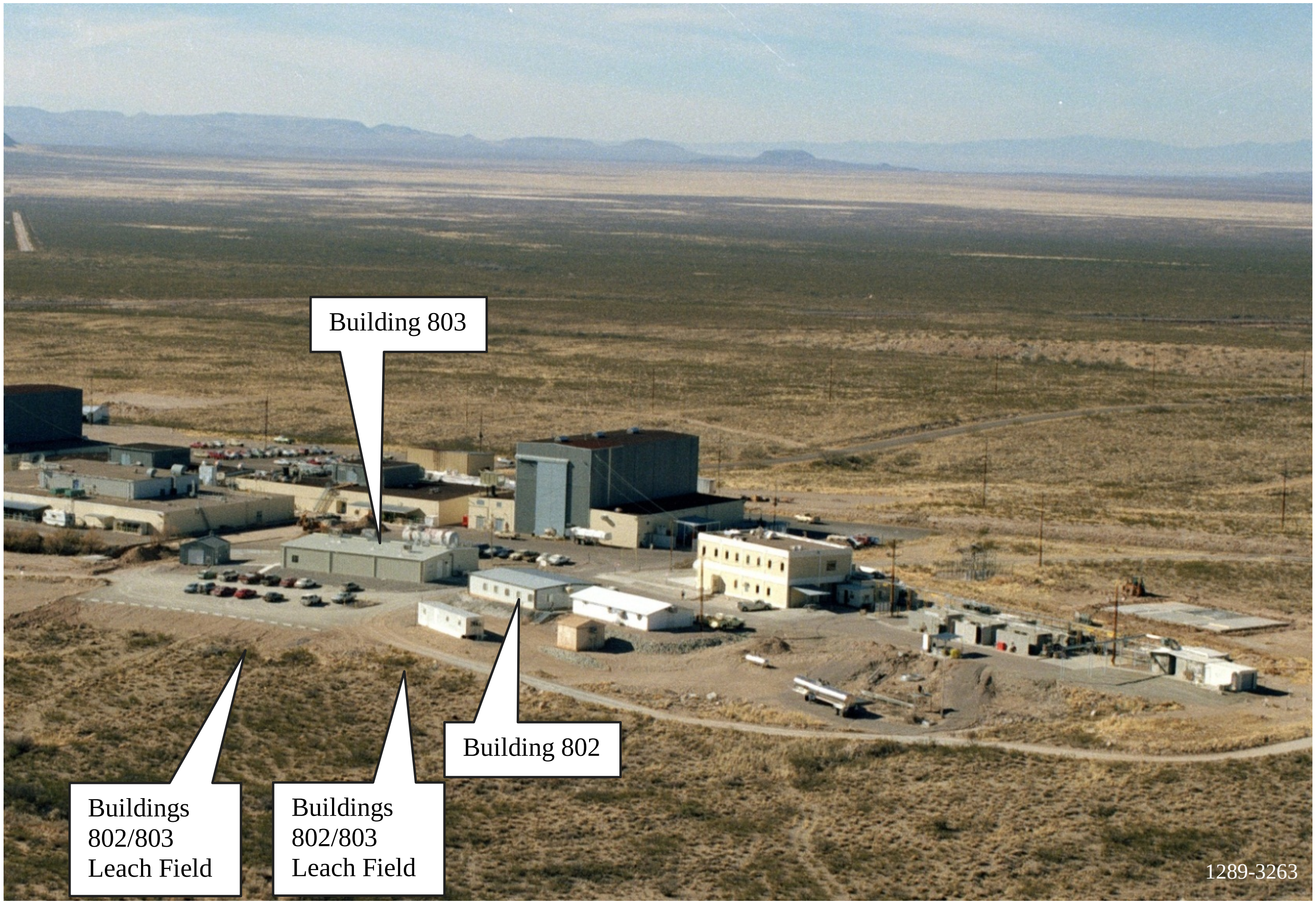
This photograph shows the 400 Area and the Building 447 septic tank system area in June 2006. Buildings 447 and 448 contain sewer connections to the Building 447 septic tank system.

Figure B.29 **WSTF 400 Area (2000) – view to the north**



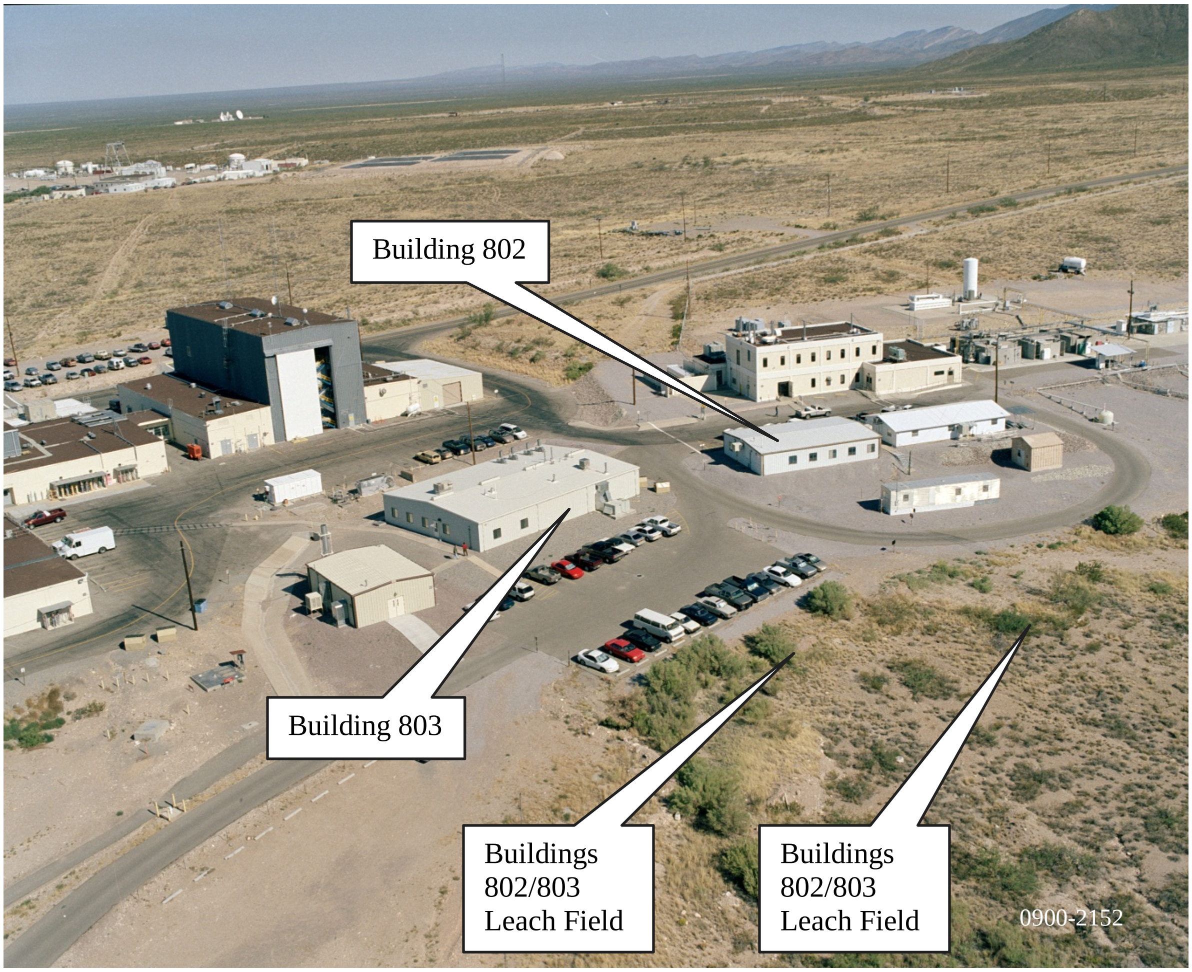
This photograph shows the 400 Area main and the temporary Building T463 septic tank systems in September 2000. Building T463 (not shown in this photograph) was in use from June 1992 to April 1994, when the temporary trailer was removed.

Figure B.30 **WSTF Buildings 802/803 Area (1989) – view to the west**



This photograph shows the Buildings 802/803 septic tank system area in December 1989. The septic system was installed in April 1987. There are two separate leach field areas due to the design of the septic system, with one line extending southwest and three lines extending to the northeast. Refer to Figure 7.2 for the configuration of the Buildings 802/803 septic tank and leach field.

Figure B.31 WSTF Buildings 802/803 Area (2000) – view to the north

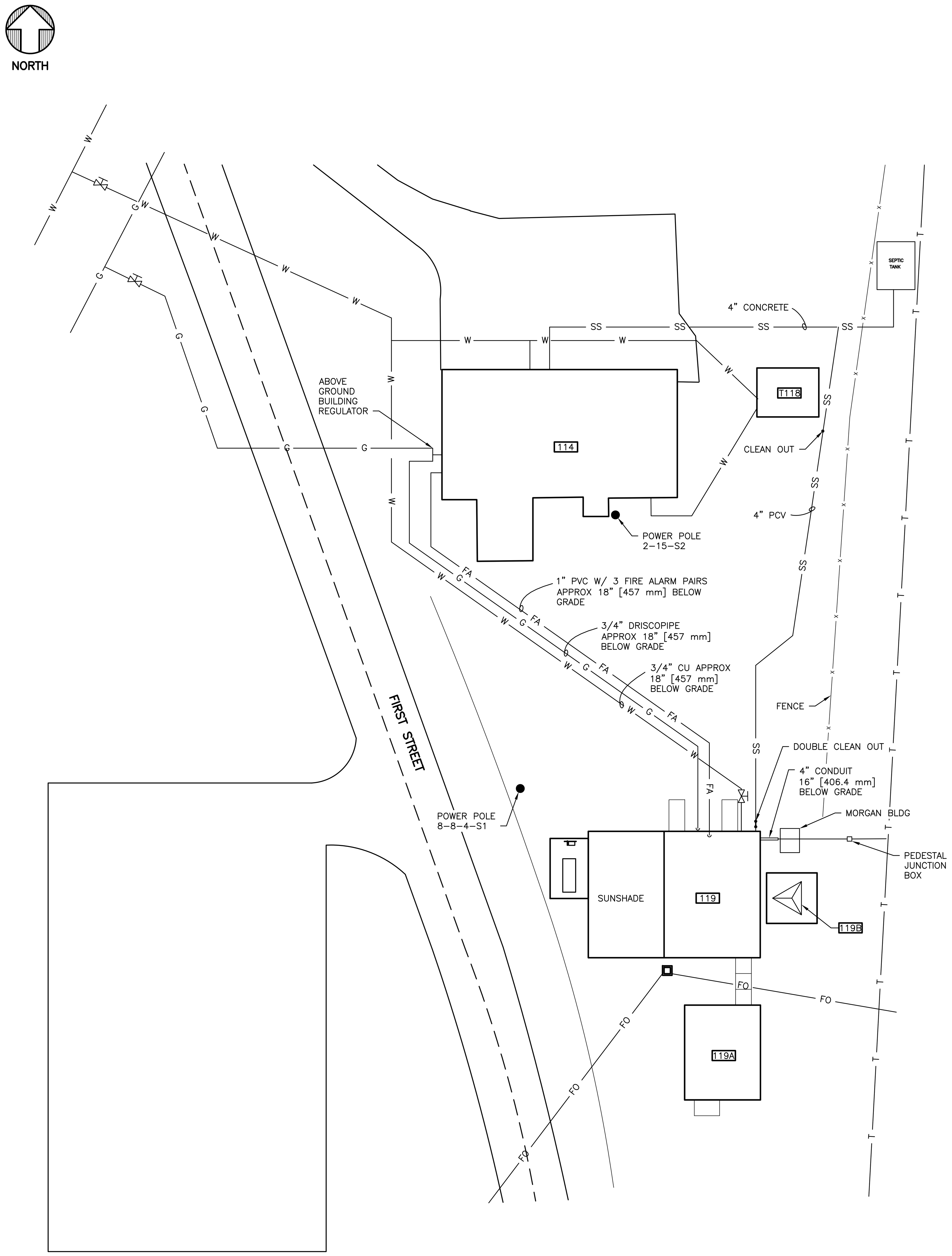


This photograph shows the Buildings 802/803 septic tank system area in September 2000.

Figure B.32 **STGT Area (1995) – view to the southeast**

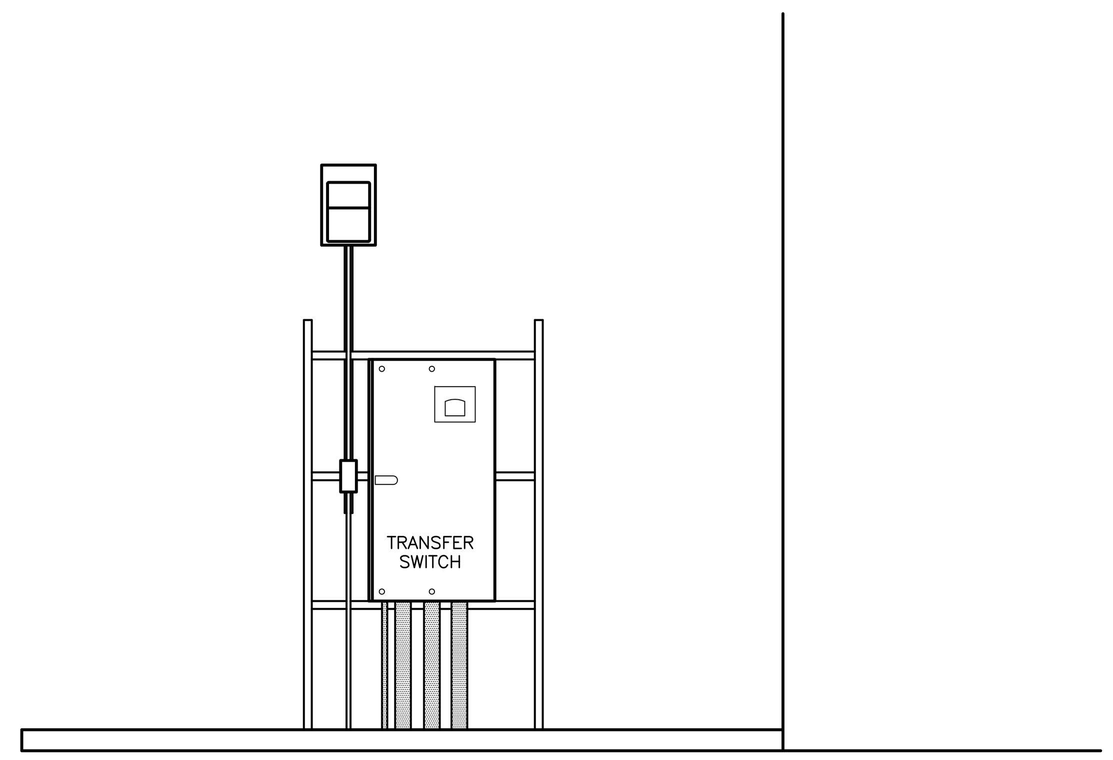
This photograph shows the STGT area in May 1995. A photograph could not be located of the STGT septic tank area during use of the septic tank system. (The STGT septic system was in use from 1989 to 1991).

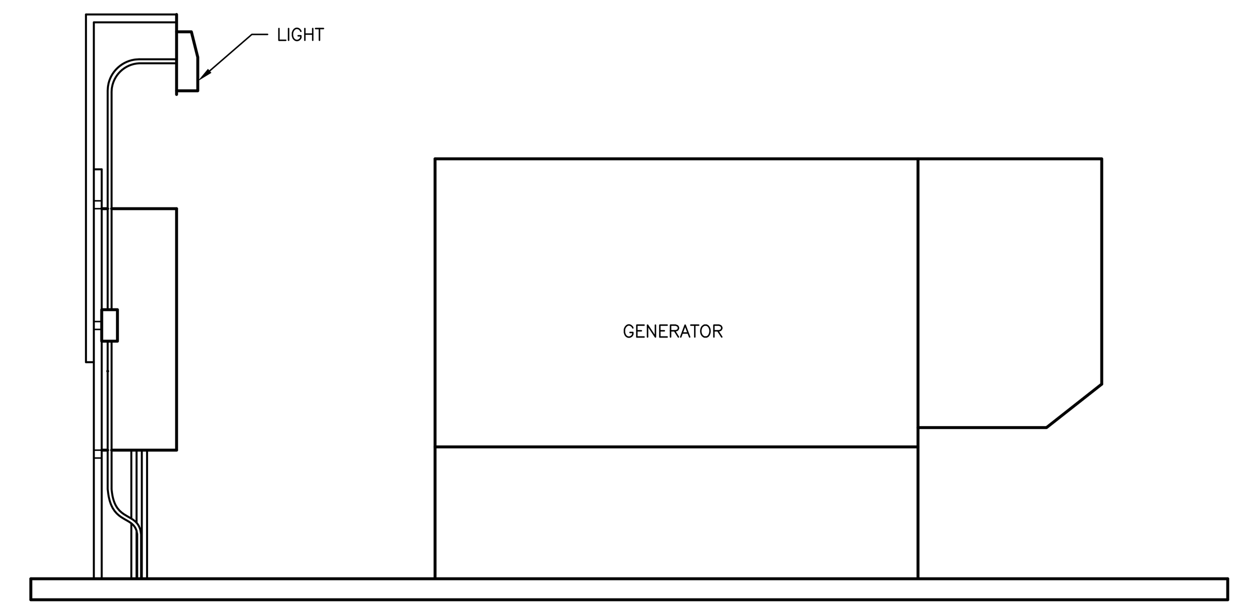
Appendix C WSTF Septic Tank As-Built Drawings



SITE PLAN

SCALE: 1"=20'-0"





SYMBOL	LETTER	ZONE	DESCRIPTION	DATE	APPROVAL

REQ'D PER ASS'Y	ITEM NO.	PART NO.	DESCRIPTION	MATERIAL	SPECIFICATION	SHT. NO.

NEXT ASS'Y / RELATED DWG'S

DIMENSIONAL TOLERANCE UNLESS NOTED OTHERWISE
.0± ANGLES ±
.00± FRACTIONS ±
.000±
DIMENSIONS ARE IN INCHES.
SURFACE FINISH IN MICRO INCHES RMS UNLESS OTHERWISE NOTED. √
UNLESS NOTED OTHERWISE REMOVE ALL SHARP EDGES AND BURRS.

DRAWN BY	R. KEENE	2/6/96
CHECKED BY	D. DAY	2/12/97
DESIGN ENGINEER	J. McCULLOUGH	2/6/96
PROJECT LEAD		
SAFETY OFFICER		
ENVIRONMENTAL		
INDUSTRIAL HYGIENIST		
FACILITY HSE		
NASA PM	C. MADRID	2/13/97
RELEASE	A. SILVA	2/21/97

National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
White Sands Test Facility

100 AREA
BUILDING 119
NSCAT CALIBRATION GROUND STATION
SITE PLAN

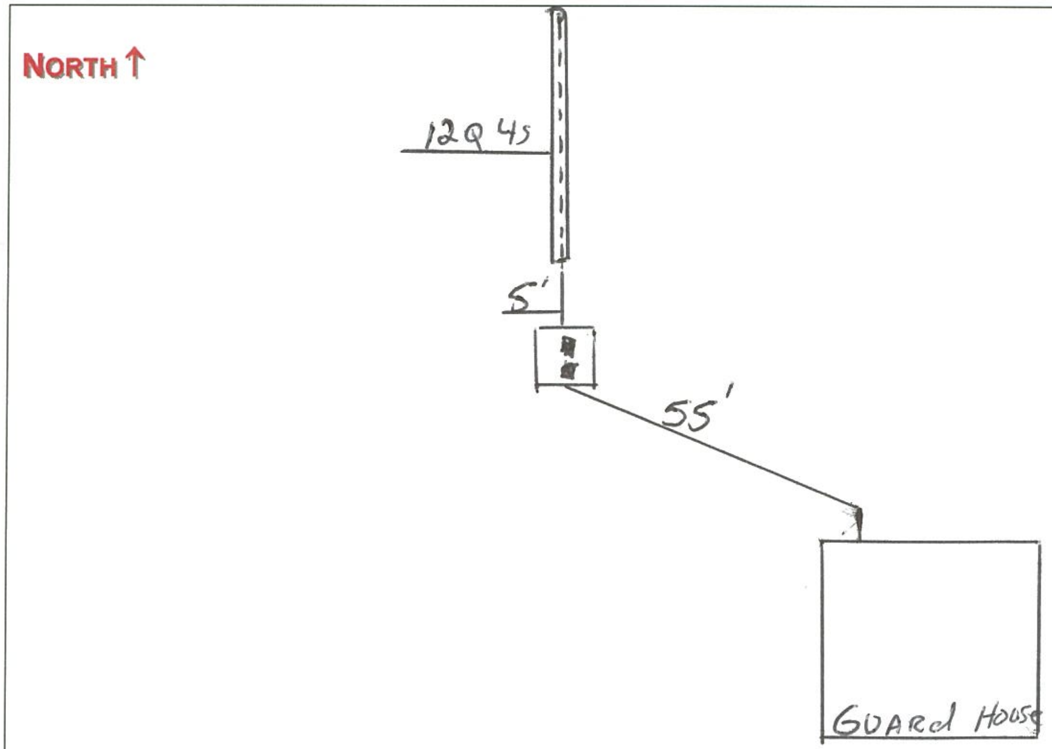
A.B. DWG. NO. | SCALE AS SHOWN | SHEET 1 OF 1
CODE IDENT. | SIZE F | DWG. NO. 5175

JOHNNY'S
Since 1950 Las Cruces, N.M.
SEPTIC SYSTEMS & EXCAVATING

"AS BUILT"

V. Site Plan: Sketch the lot. Show features such as the tank, the drainage field, any wells, property lines, residence and other structures, other septic systems. Be as accurate as possible. Show the distances between the (tank "treatment unit" and the drain field "disposal system") to the features listed on the form. These distances can be no closer to the system than listed in Table 301.1 on page 35 of the Liquid Waste Regulations.

Treatment Unit to: (Tank)	Features	Disposal System to: (Drain Field)
>20' ft.	Property line	>20' ft.
>20' ft.	Property line	>20' ft.
>20' ft.	Buildings	>25' ft.
NA ft.	Structures	NA ft.
NA ft.	Wells	NA ft.
NA ft.	Irrigation	NA ft.
>100' ft.	Arroyos	>100' ft.
20' ft.	Surface water	20' ft.



Tank Depth: 30" Risers 30" Leachfield Depth: 4' Soil Type: SANDY LOAM

Permit #: ____________ Date: 4/17/06

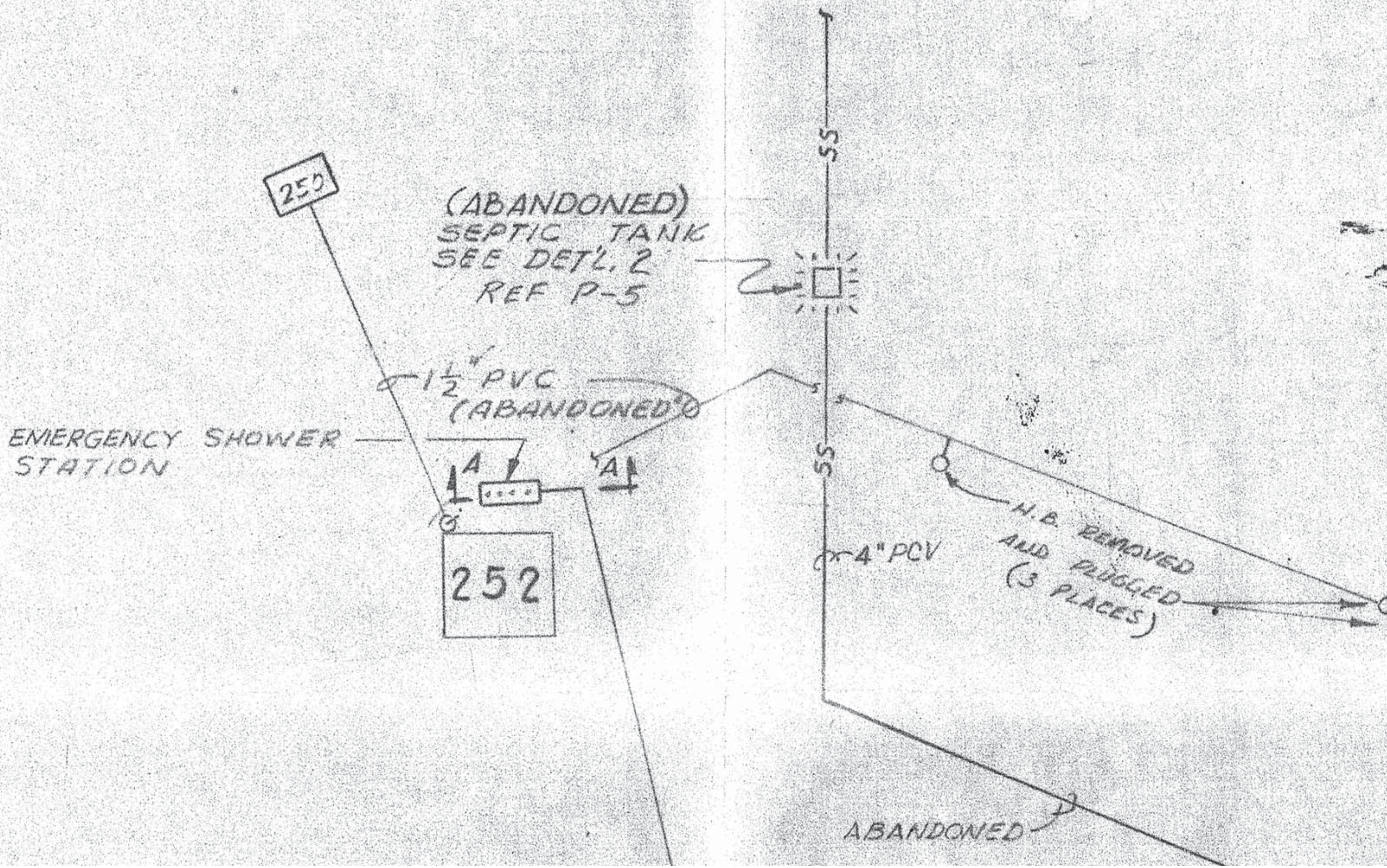
Name on permit: SANDOVAL CONST. Submitted by: Johnny's Septic Tank Co.

Address: NASA GUARD SHACK

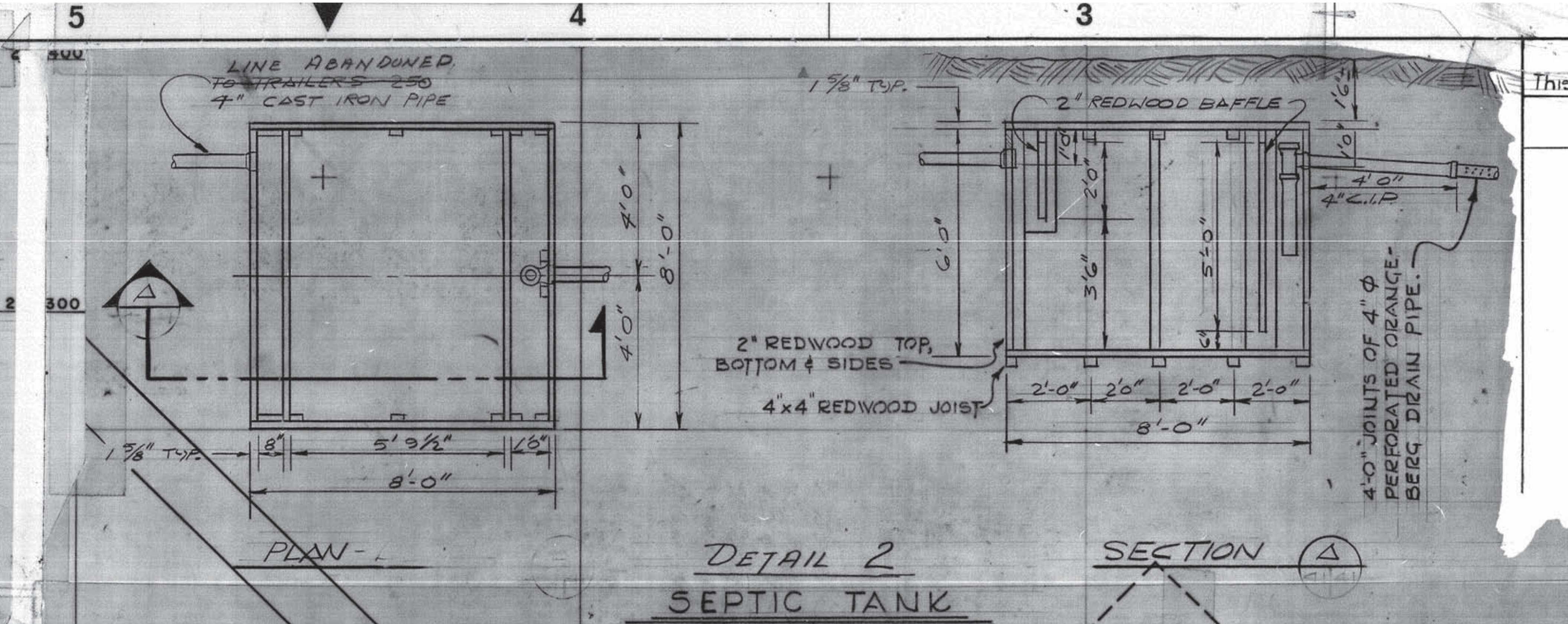
Subdivision: ____________ Township ______ Range ______ Section ______

Affidavit of installation signature Danny Borla Attached Photos: ______

I certify that the methods and materials used for installation comply with 20 NMAC 7.3



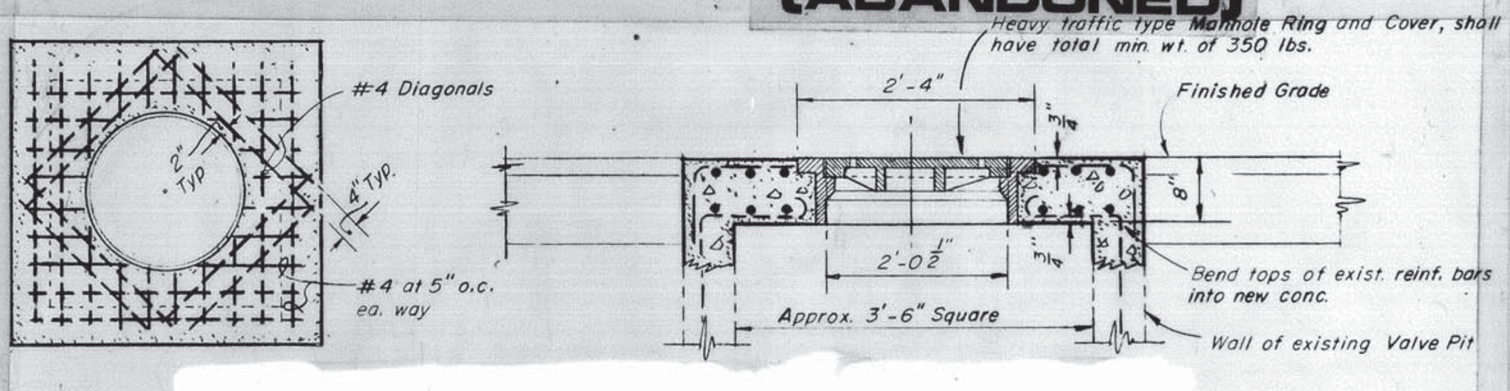
250
(ABANDONED)
SEPTIC TANK
SEE DET'L. 2
REF P-5
SS
1½" PVC
(ABANDONED)
EMERGENCY SHOWER
STATION
A
A
252
SS
4" PCV
H.B. REMOVED
AND PLUGGED
(3 PLACES)
ABANDONED



DETAIL 2

SEPTIC TANK

(ABANDONED)



PLAN　　　　SECTION　　　　△1 3

TOP & COVER N_2 VALVE PIT (SEE P-1)　　No Scale

JOHNNY'S SEPTIC TANK CO.
2155 Dona Ana Road
526-5442

Message phone:

E.I.D. permit # LC910939

Lockheed REQUESTED COMPLETION DATE

Hm Phone: Wk Phone: Billing Address

****

Legal Description 270 Area Hypervelocity Facility Plat date

Directions to Property
PO# 03004-76845

****

Mobile Hm No.of bdrms Name of
House No. of bdrms * Water supply * Lot size * new or replacement

Tank Size Drainfield feet Soil Water Table Tax: DA LC EXEMPT

Any other dwellings or structures on property Is any part irrigated

Other needed

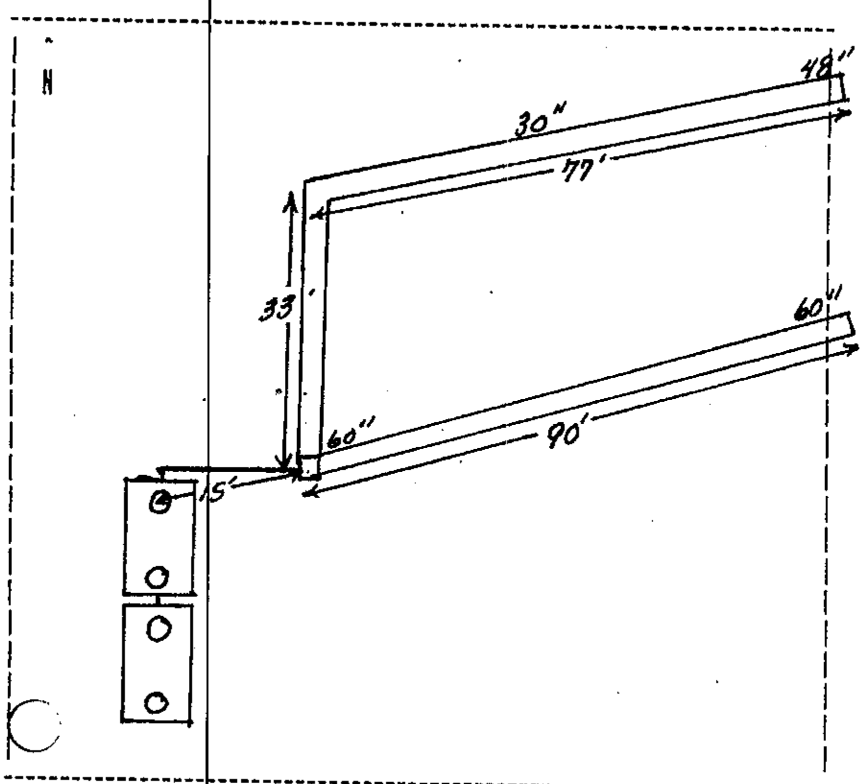
****

Price quote$

Unless this account is paid in full within 30 days, the undersigned agrees to finance charges at the rate of 18% per annum. If this account becomes delinquent, the undersigned agrees to pay any collection fees charged to enforce payment.

Customer Signature date

****



Materials

Date completed 12/19/91

Invoice # 9163

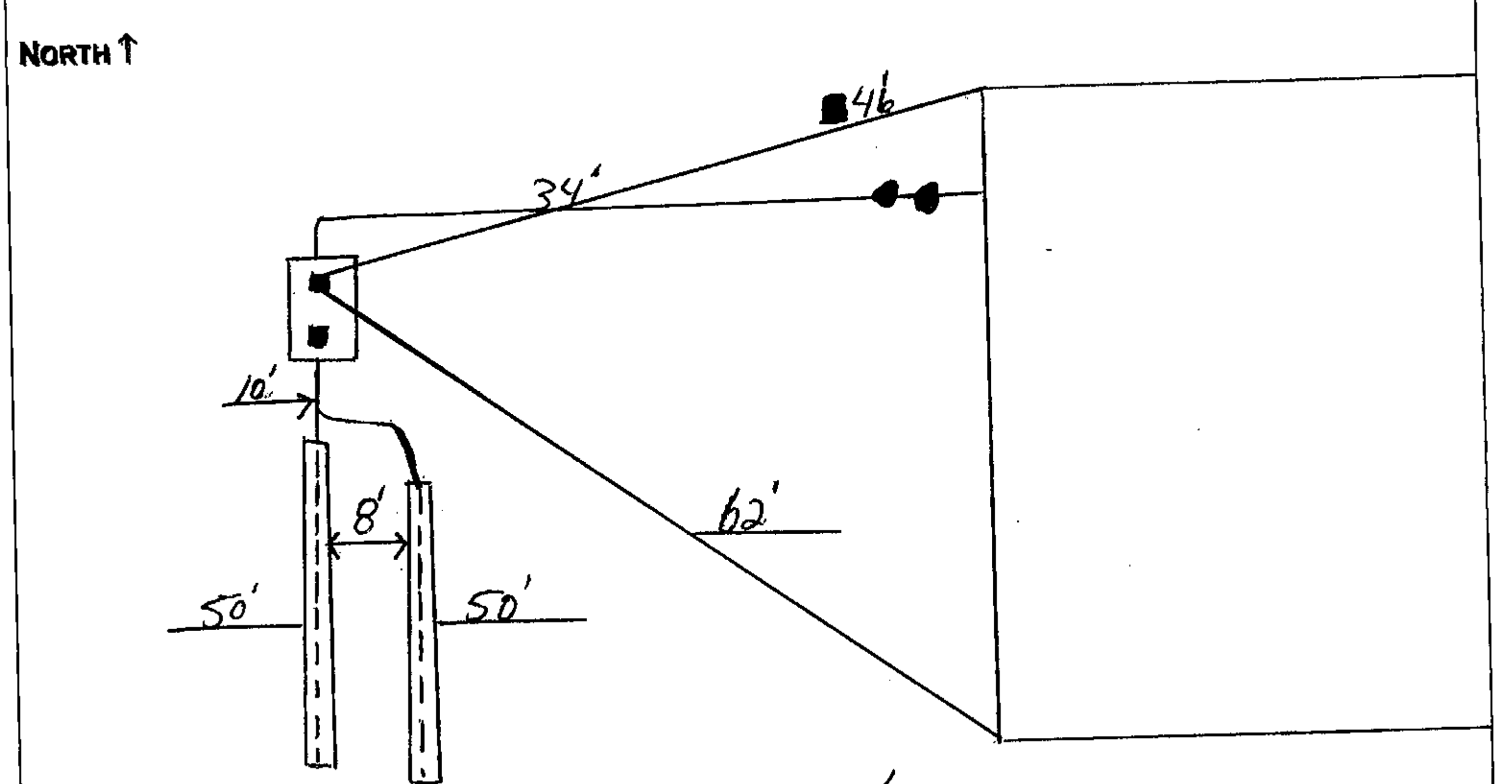
Tank depth 48" leachfield depth 60"-30"

JOHNNY'S
SEPTIC SYSTEMS & EXCAVATING

"AS BUILT"

...e Plan: Sketch the lot. Show features such as the tank, the drainage field, any wells, property lines, residence and ...her structures, other septic systems. Be as accurate as possible. Show the distances between the (tank "treatment unit" and the drain field "disposal system") to the features listed on the form. These distances can be no closer to the system than listed in Table 301.1 on page 35 of the Liquid Waste Regulations.

Treatment Unit to: (Tank)	Features	Disposal System to: (Drain Field)
>20' ft.	Property line	>20' ft.
>20' ft.	Property line	>20' ft.
34' ft.	Buildings	>20' ft.
ft.	Structures	ft.
ft.	Wells	ft.
>50' ft.	Irrigation	ft.
ft.	Arroyos	>70' ft.
ft.	Surface water	ft.



Tank Depth: 12" Risers ________ Leachfield Depth: 3 1/2 Soil Type: Red Dirt & Rocks

Date: 4/15/05

Permit #: ________

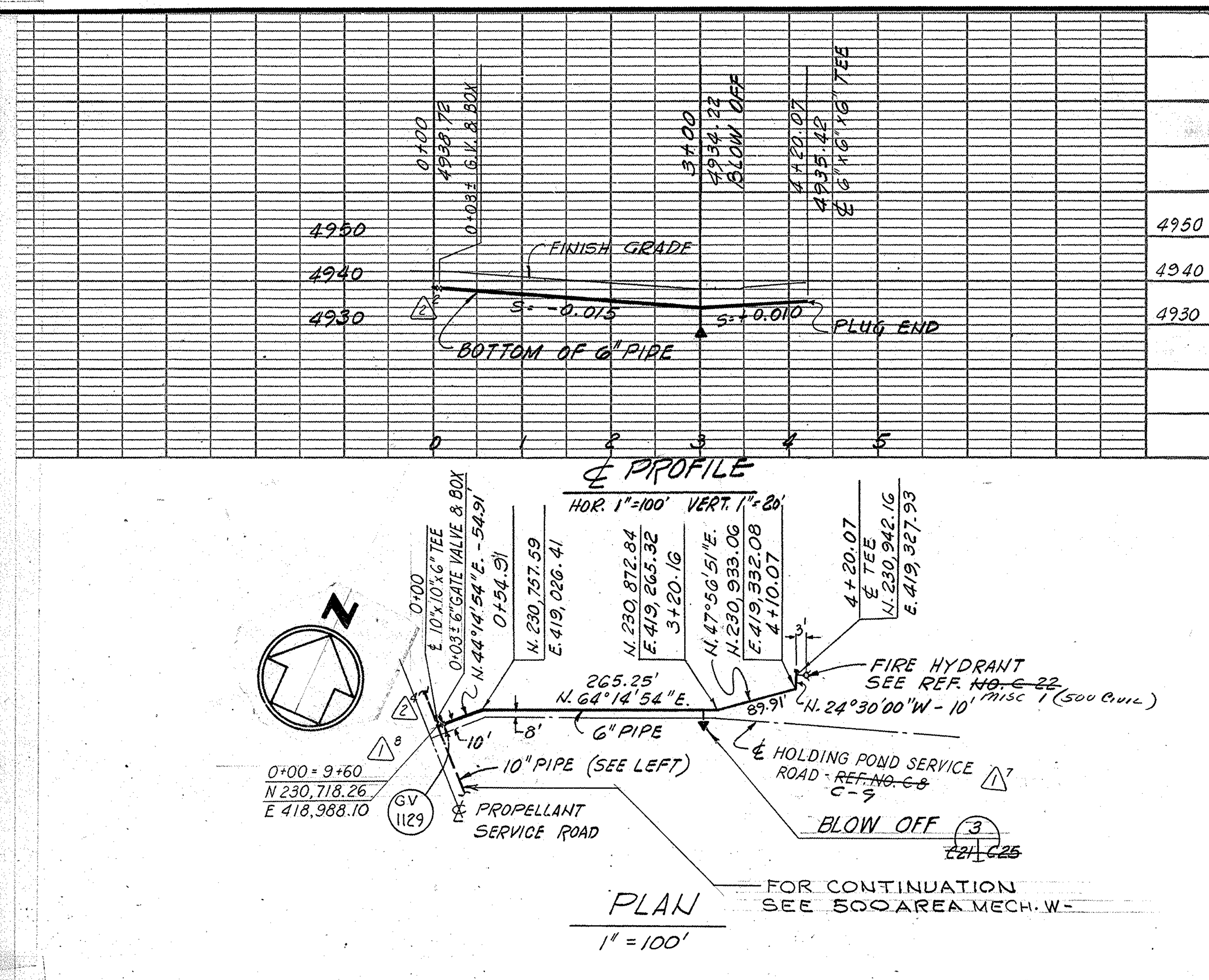
Name on permit: Brewbaker General Contractors Submitted by: Johnny's Septic Tank Co.

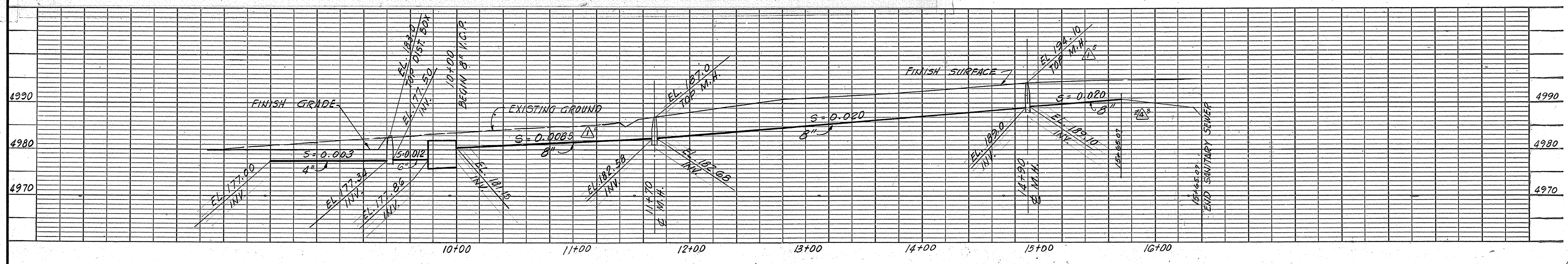
Address: Bldg. 272 Nasa

Subdivision: ________ Township________ Range ________ Section ________

Affidavit of installation signature [signature] Attached Photos: ________

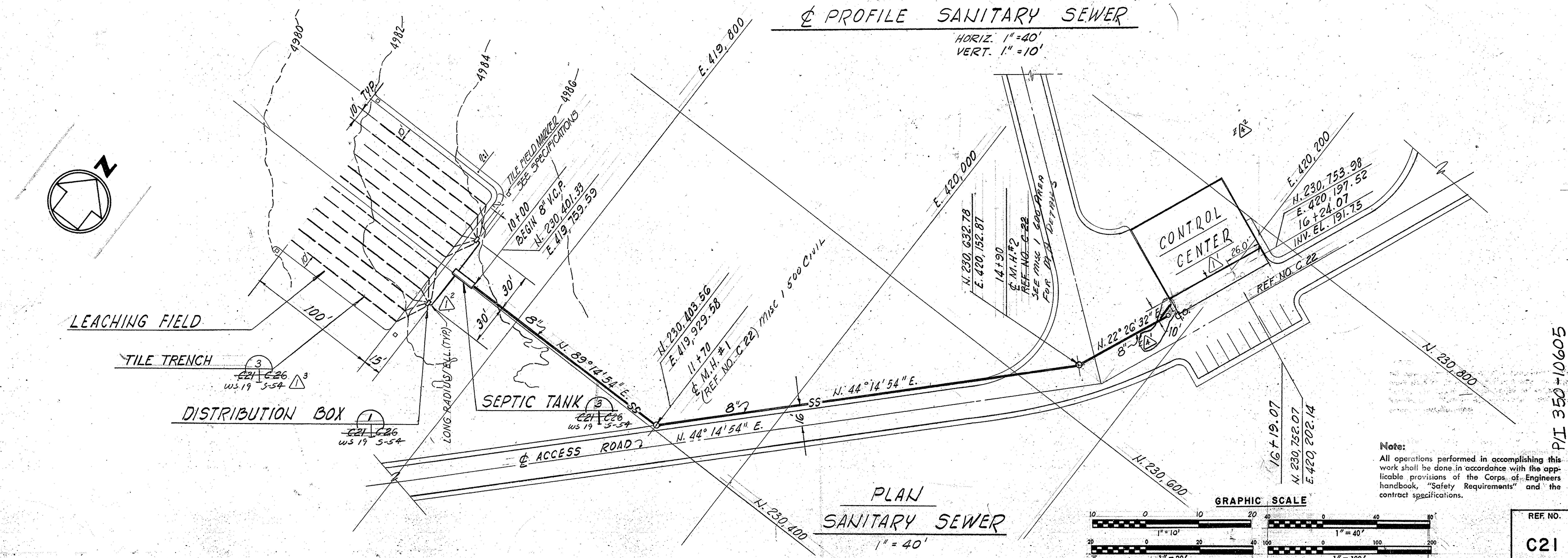
... that the methods and materials used for installation comply with 20 NMAC 7.3





NOTE 13

ADD 4800 FT. TO ALL FINISH ELEVATION FOR SANITARY SEWER LINE



P/I 350-10605

Note:
All operations performed in accomplishing this work shall be done in accordance with the applicable provisions of the Corps of Engineers handbook, "Safety Requirements" and the contract specifications.

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
5	MOVED TO 500 MECH. ℞ W-3	6-9-70	V.V.
4	REVISED SEWER LINE ON PLAN & PROFILE; ADDED CONTROL CENTER ADDITION, ADDED NOTE ON 10" LINE	12-22-65	
3	REVISED AS BUILT.	2 JULY '64	
2	ADDED GATE VALVES & BOXES	7-26-63	
1	ADD DIMENSION; ADD DIMENSION, CALLOUT & GRADING; REVISE CALLOUT; REVISE ELEV.; REVISE ELEV.; REVISE SLOPE; REVISE CALLOUT; ADD COORDINATES & STA.; ADD STATION; REVISE CALLOUT; ADD CALLOUT & STATION; REVISE SLOPE; ADD NOTE.	6/11/63	

REVISIONS

THE RALPH M. PARSONS COMPANY
ARCHITECTS — ENGINEERS
617 WEST SEVENTH STREET LOS ANGELES 17, CALIFORNIA

U.S. ARMY ENGINEER DISTRICT, ALBUQUERQUE
CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO

DESIGN BY T. MITCHELL
DRAWN BY BELLEMARE
CHECKED BY
PREPARED BY ARCHITECT - ENGINEER
SUBMITTED BY CHIEF MILITARY BRANCH
RECOMMENDED CHIEF ENGINEERING DIVISION

MSC TEST AREA - WSMR NEW MEXICO
APOLLO PSDF - TEST COMPLEX I
SITEWORK AND UTILITIES
CIVIL - 300

WATER AND SANITARY SEWER PLAN, PROFILE AND DETAILS

SCALE: AS NOTED
ENG. (NASA) 29-005-63-6

REF. NO. C21
NASA-MSC/WSMR APPROVED BY
DATE
DATE JUN 1963
APPROVED
COLONEL, CORPS OF ENGINEERS DISTRICT ENGINEER

DRAWING NUMBER AS-BLT 60-08-88
SHEET 19
PLATE 21

DRAWING OF WORK AS-BUILT

DISTRICT FILE NO. WS-LG-2/19.5

300 AREA MECH.

WS-19

EID PERMIT #

PERMIT #

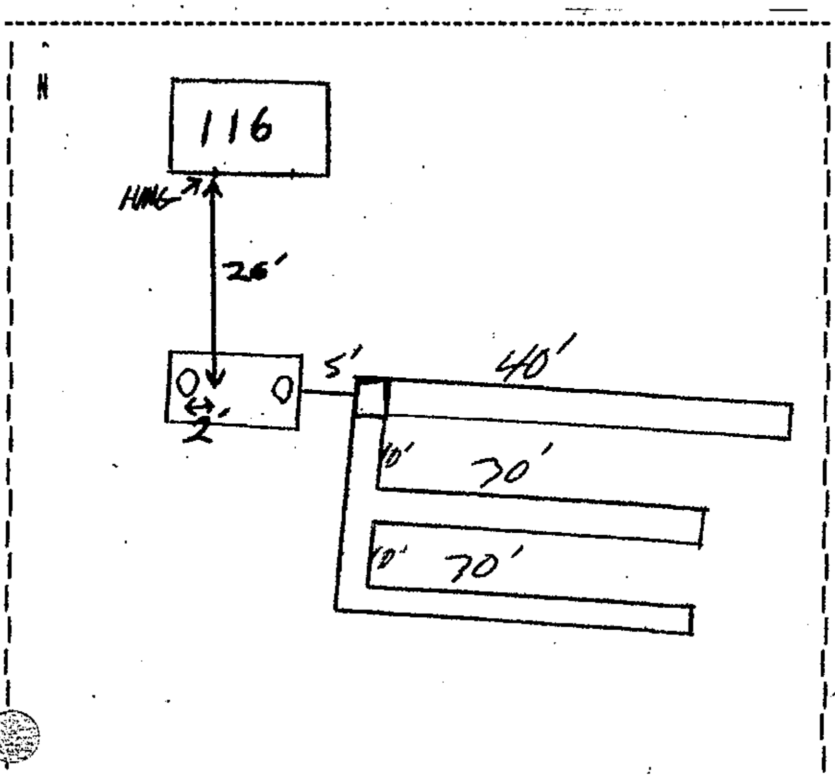
NAME:

OWNER Lockheed

HM PHONE: WK PHONE: BILLING ADDRESS

ADDRESS

As-Built Diagram



TANK DEPTH 12" LEACHFIELD DEPTH 24" to 36" SOIL TYPE loamy

EID PERMIT #

permit # LC910918

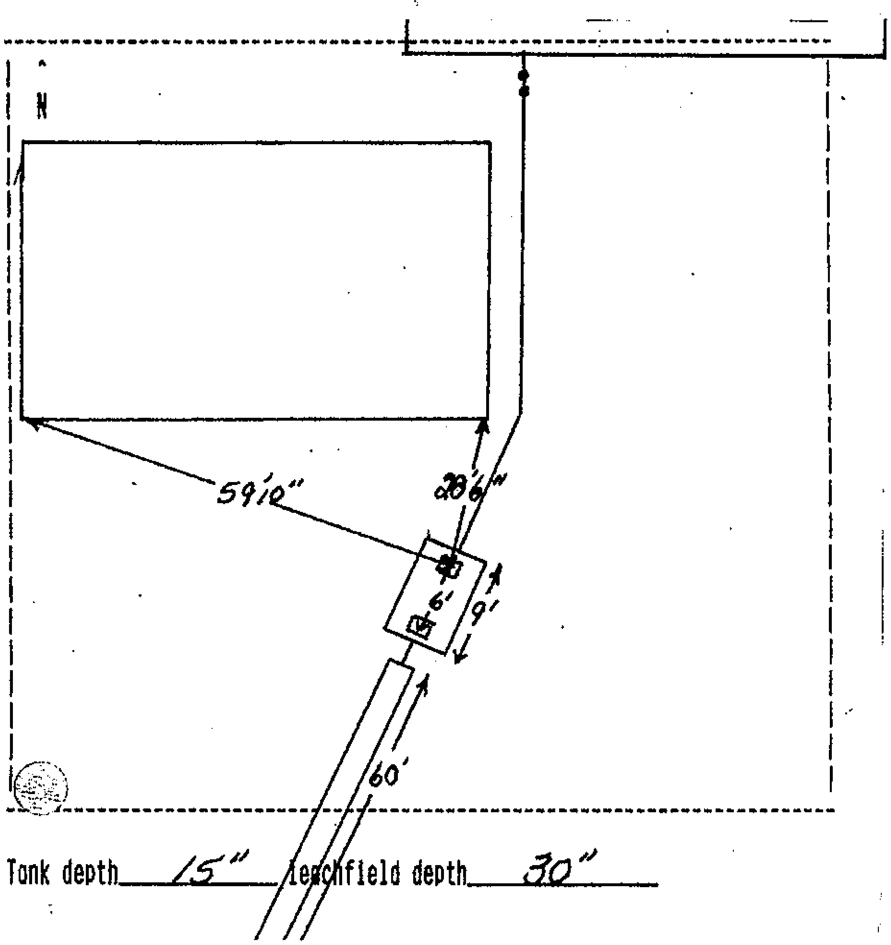
NAME:

OWNER Lockheed REQ

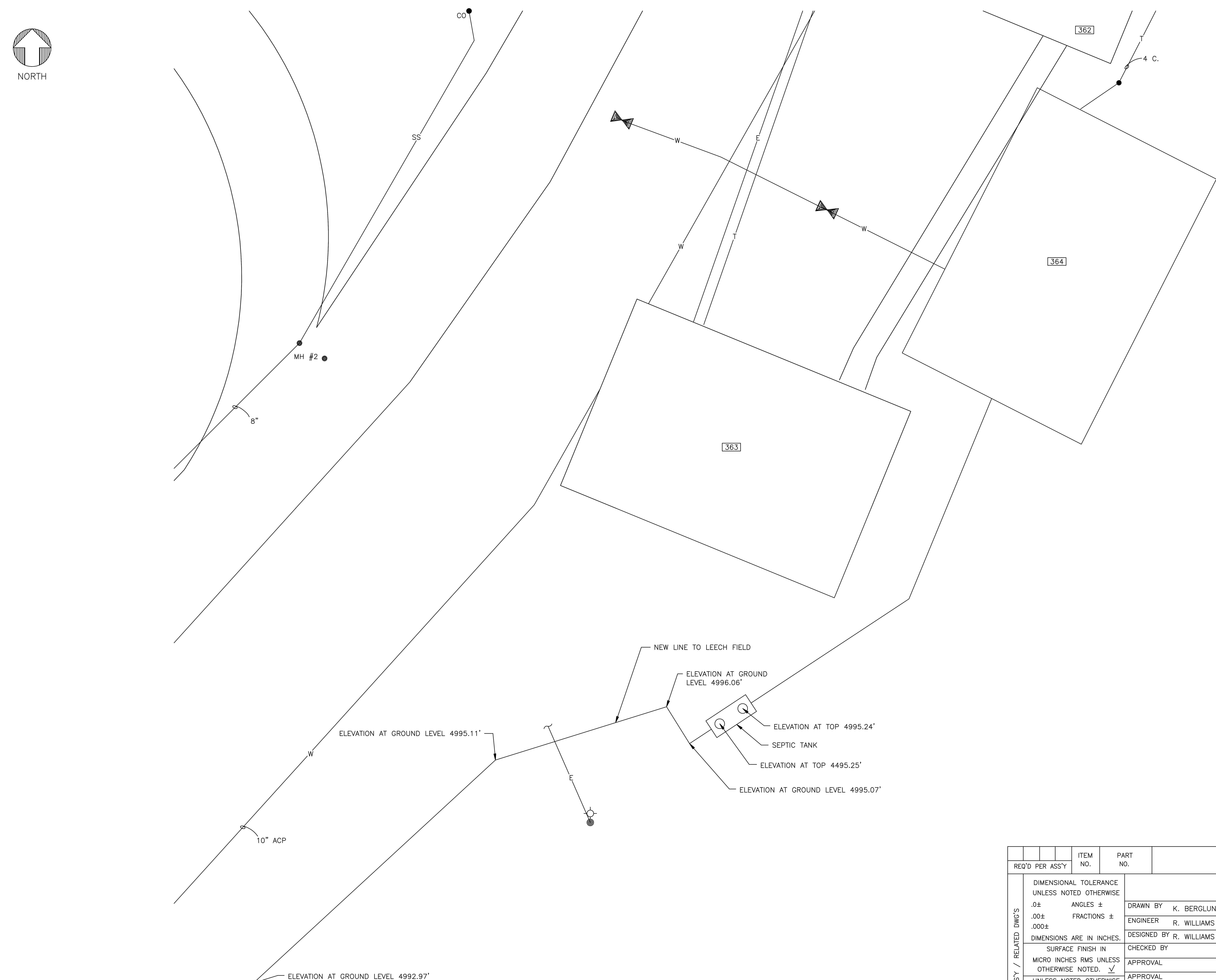
Phone: Wk Phone: Billing Address

ADDRESS 300 Area B 364

As-Built Diagram



Tank depth 15" leachfield depth 30"



SYMBOL	LETTER	ZONE	DESCRIPTION	DATE	APPROVAL

REQ'D PER ASS'Y	ITEM NO.	PART NO.	DESCRIPTION	MATERIAL	SPECIFICATION	SHT. NO.

NEXT ASS'Y / RELATED DWG'S

DIMENSIONAL TOLERANCE UNLESS NOTED OTHERWISE
.0± ANGLES ±
.00± FRACTIONS ±
.000±
DIMENSIONS ARE IN INCHES.
SURFACE FINISH IN MICRO INCHES RMS UNLESS OTHERWISE NOTED. √
UNLESS NOTED OTHERWISE REMOVE ALL SHARP EDGES AND BURRS.

DRAWN BY	K. BERGLUND	07/08/08
ENGINEER	R. WILLIAMS	07/08/08
DESIGNED BY	R. WILLIAMS	07/08/08
CHECKED BY		
APPROVAL		
APPROVAL		
AUTHORIZED		
RELEASE		

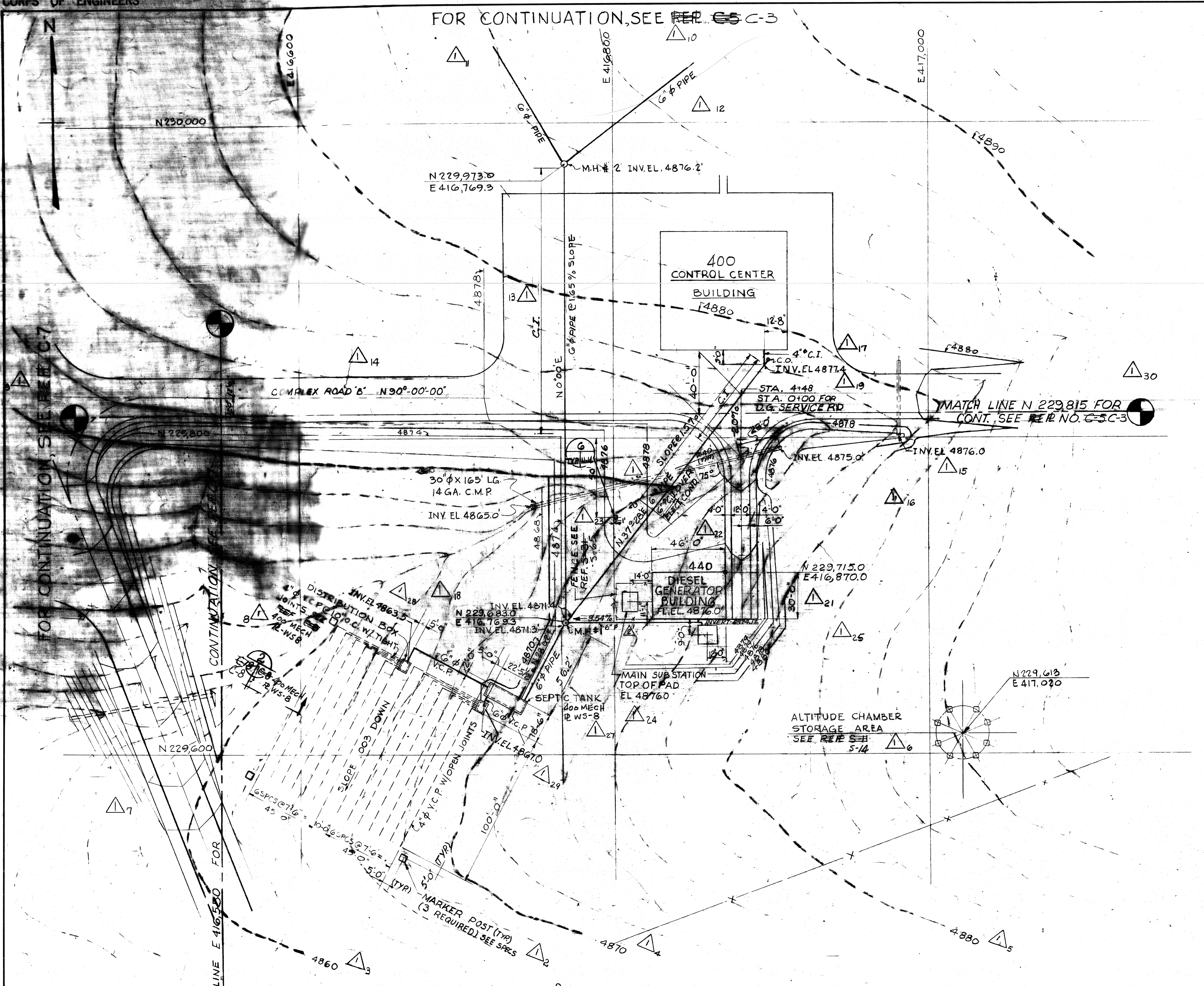
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
White Sands Test Facility

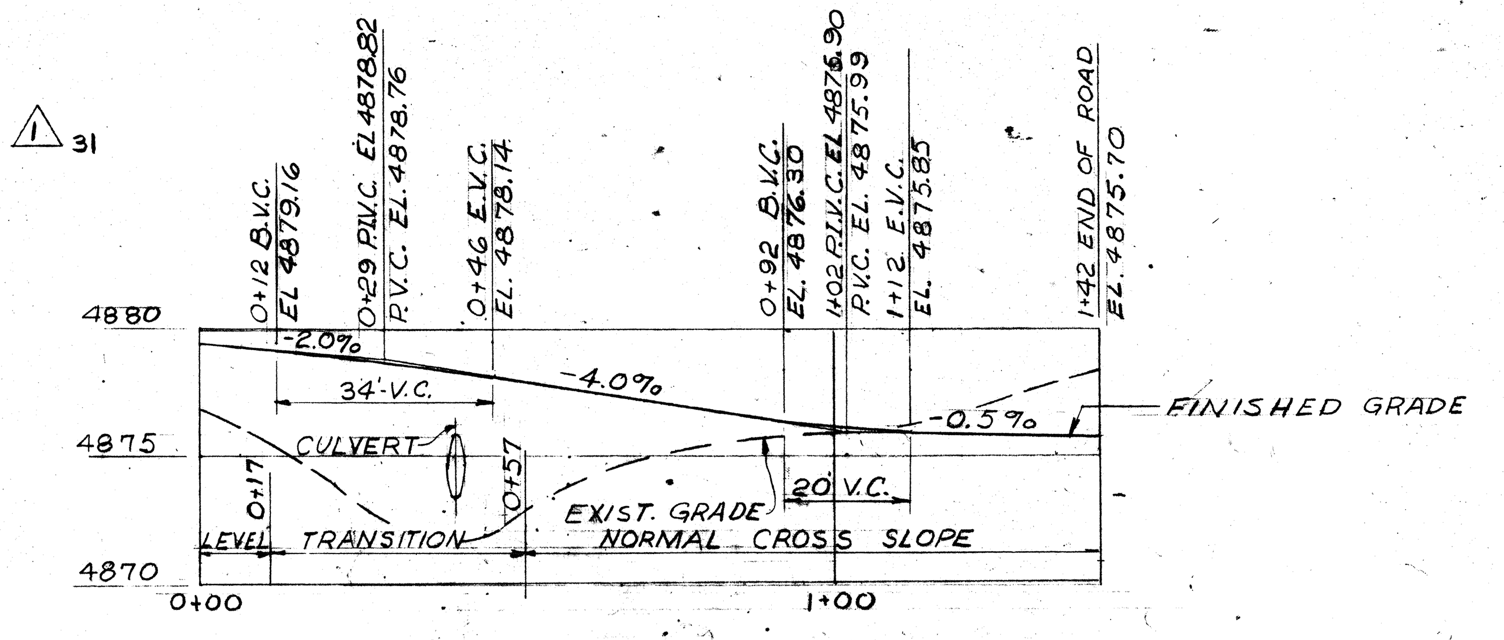
300 AREA
BUILDING 364
LEECH FIELD

CODE IDENT.	A.B. DWG. NO.	SCALE	SHEET	OF
		1"=10'-0"	1	1

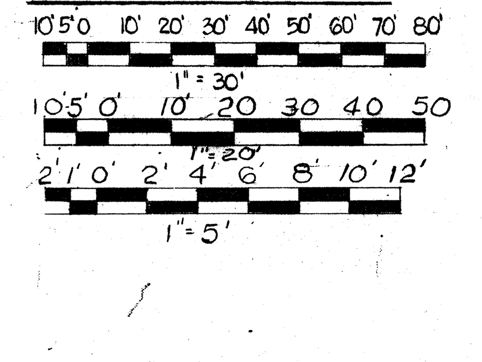
SIZE	DWG. NO.	REV.
D	4660	

CORPS OF ENGINEERS | U. S. ARMY





PROFILE - DIESEL GENERATOR SERVICE ROAD
SCALE: 1" = 20' HORIZ.
1" = 5' VERT.



NOTES:

1. FOR DIESEL GENERATOR SERVICE ROAD DETAILS SEE REF. ~~C-10~~ MISC. 12
2. FOR DIESEL GENERATOR BLDG. & ADJ. PADS SEE REF. ~~S-31~~ S-65
3. FOR FENCE LOCATION & DETAILS SEE REF. ~~C-2~~, ~~C-3~~ & ~~C-14~~ MISC. 3
4. FOR GENERAL NOTES SEE REF. ~~C-3~~ (OBSOLETE)
5. FOR CULVERT DETAILS SEE REF. ~~C-10~~ MISC. 12

DRAWING OF WORK AS BUILT

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
A	INCORPORATED DCN A-1	10-2-86	
2	REVISED AS-BUILT	17 JAN 66	
1	GENERAL REVISIONS	12/21/63	DF

REVISIONS

BURNS AND ROE, INC.
ARCHITECT — ENGINEER
NEW YORK, N. Y.

US ARMY ENGINEER DISTRICT, ALBUQUERQUE
CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO

DRAWN BY MK
CHECKED BY S.M. Friedman
REV. BY CH. DRAFT
APPROVED BY DF — CHIEF ENGINEER 12/27/63 DATE
SUBMITTED BY — CHIEF MILITARY BRANCH
RECOMMENDED B.C. Woodson — CHIEF ENGINEERING DIVISION

MSC TEST AREA-WSMR NEW MEXICO
LEM TEST FACILITIES
SITEWORK & UTILITIES
CIVIL

DIESEL GENERATOR BUILDING
PLOT AND GRADING PLAN

SCALE: 1" = 30'
ENG. (NASA) 29-005-64-3

P/I 450-10608

Note:
All operations performed in accomplishing this work shall be done in accordance with the applicable provisions of the Corps of Engineers handbook, "Safety Requirements" and the contract specifications.

REF. NO. ~~C-18~~
B&R DWG. NO. 4017

NASA-MSC/WSMR APPROVED BY
DATE
DATE DEC 1963
APPROVED
COLONEL, CORPS OF ENGINEERS DISTRICT ENGINEER

DRAWING NUMBER AS-BLT 60-08-95
SHEET 14 B
PLATE ~~16B~~

DRAWING OF WORK AS BUILT

DISTRICT FILE NO. WS-LQ-2/14B.2

REV A 400 AREA ARCH, & STRUCT, & CIVIL C-8

JOHNNY'S SEPTIC TANK CO.
2155 Dona Ana Road
526-5442

Nasa (Lockheed) REQUESTED COMPLETION DATE 5/8/90

Hm Phone: ______ Wk Phone: 524-5269 Mail Address ______

****

Legal Description ______

Directions to Property ______

______

****

House or Mobile Home * No. of bdrms ___ * Water supply ___ * Lot size ___ * other ______

Tank Size ___ Drain field feet ______ Soil ___ Water Table ___ Tax: DA __ LC __ EXEMPT __

Other needed ______

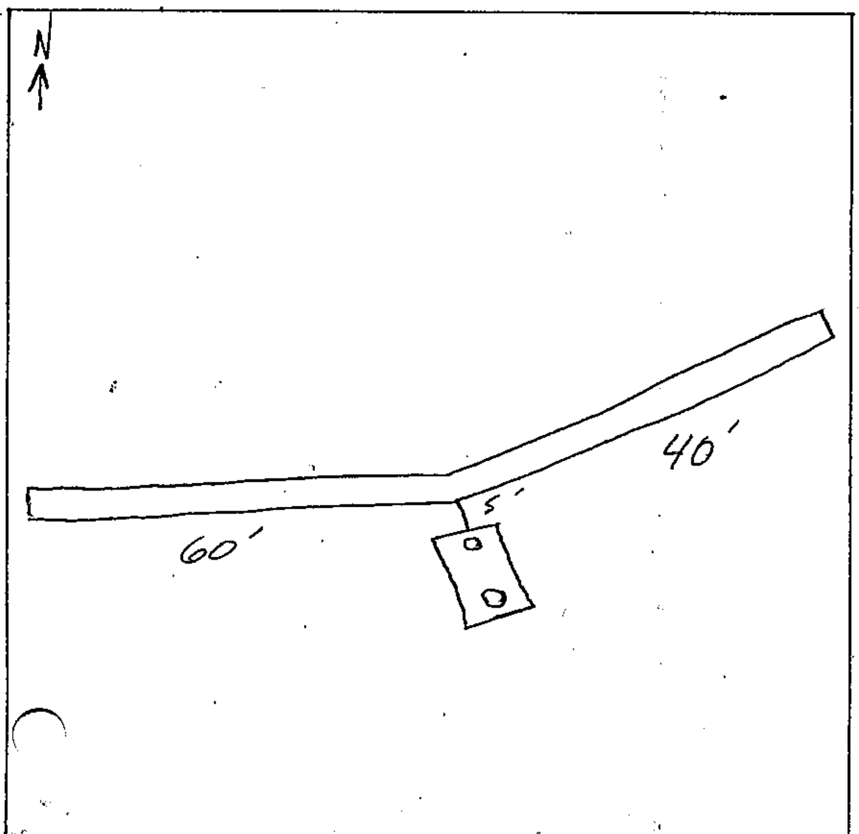
****

Price quote$ ______

Unless this account is paid in full within 30 days, the undersigned agrees to finance charges at the rate of 18% per annum. If this account becomes delinquent, the undersigned agrees to pay any collection fees charged to enforce payment.

Customer Signature ______ date ______

****



Materials 1200,100

DATE COMPLETED May 8, 90

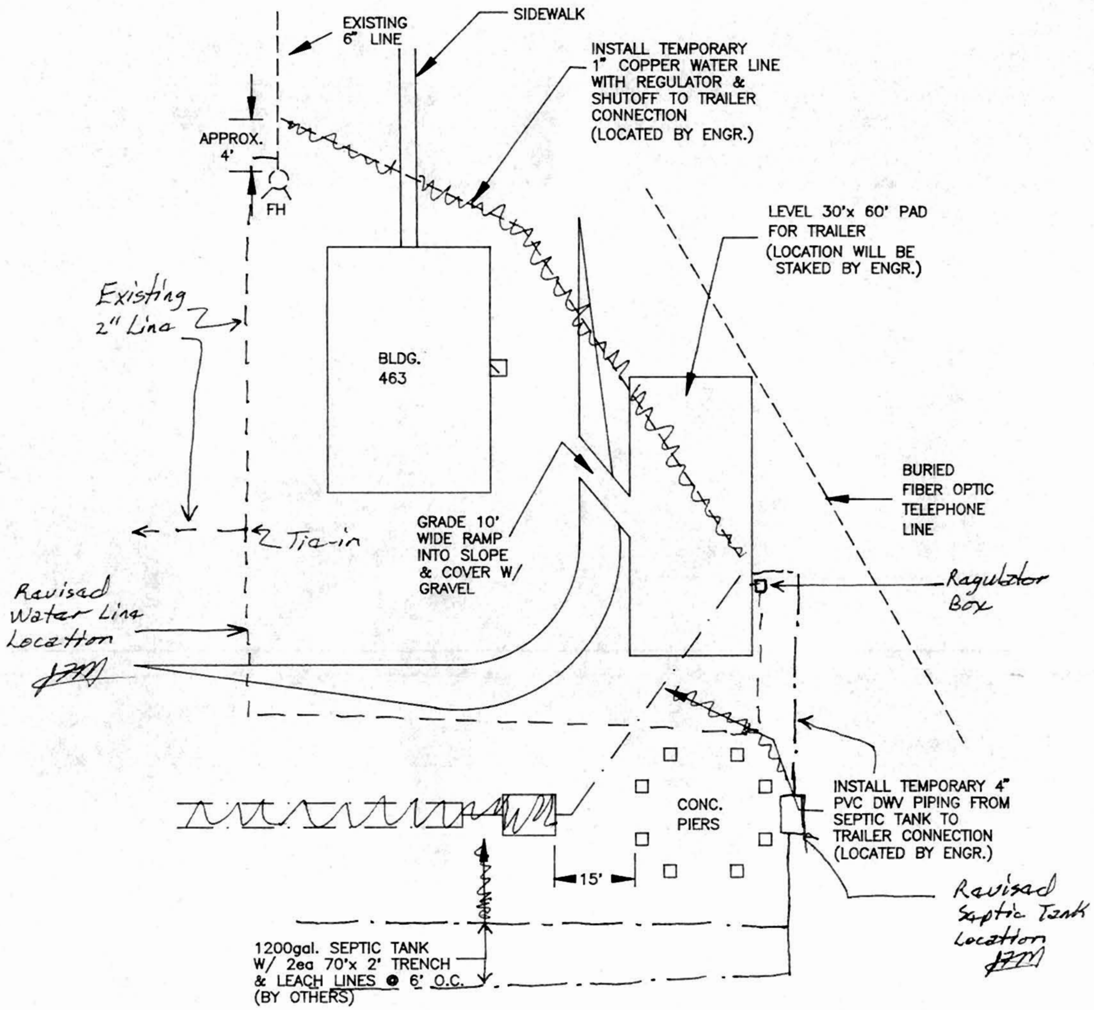
Invoice # 4 Well

TANK DEPTH: ___ LEACHFIELD DEPTH: ___

DATE	CHANGE DESCRIPTION	REV.

4-FAC-922768

15 MAY 1992



CONSTRUCTION NOTES

1. TEMPORARY WATER LINE
   - INSTALL MANUAL SHUTOFF VALVE NEXT TO TAPPING SADDLE
   - BURY LINE 12" DEEP
   - TUNNEL UNDER EXISTING SIDEWALK
   - CLEAR AWAY GRAVEL AROUND BLDG 463 WHEN TRENCHING AND REPLACE AFTER BACKFILLING
   - INSTALL PRESSURE REGULATING VALVE NEAR TRAILER IN A PVC OR CMP VALVE BOX WITH COVER
   - INSULATE THE EXPOSED PIPING BETWEEN GROUND & TRAILER
2. TEMPORARY SANITARY SEWAGE PIPING
   - INSTALL WITH A MINIMUM 1/4" PER FT. SLOPE FROM TRAILER TO TANK
3. TRAILER PAD
   - TRAILER WILL BE SET UP AND TIED DOWN BY OTHERS
   - AFTER TRAILER IS IN PLACE, SPREAD A 2" THICK GRAVEL LAYER, 4' WIDE, AROUND BOTH SETS OF STEPS AND DOWN THE GRADED SLOPE TO BLDG 463.

NASA Lyndon B. Johnson Space Center White Sands Test Facility		TEST PREPARATION SHEET		SHEET 5 OF 5
ORIGINATOR F. Mathis	5/14/92	NASA APPROVAL [signature]	5/14/92	TITLE MDSSC Office Trailer
ORGANIZATION LESC		CONTRACTOR APPROVAL J.F. Mathis	5/14/92	SKETCH NO. / REV.

Name:

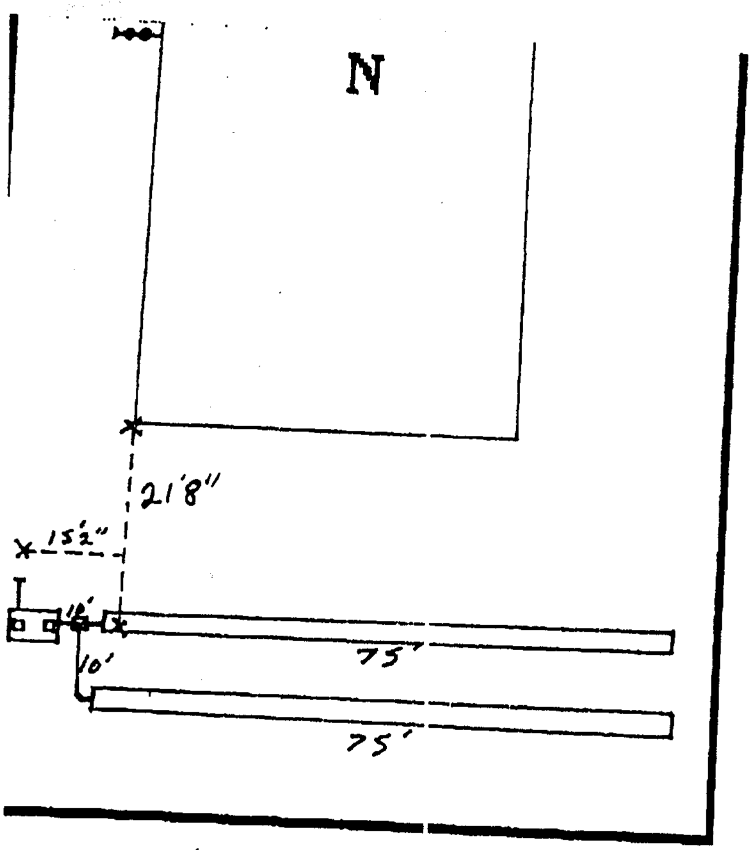
EID Permit #

Honeywell

Address:

Legal or Address: MA

As-Built Diagram



K DEPTH 12" LEACHFIELD DEPTH 39" SOIL TYPE

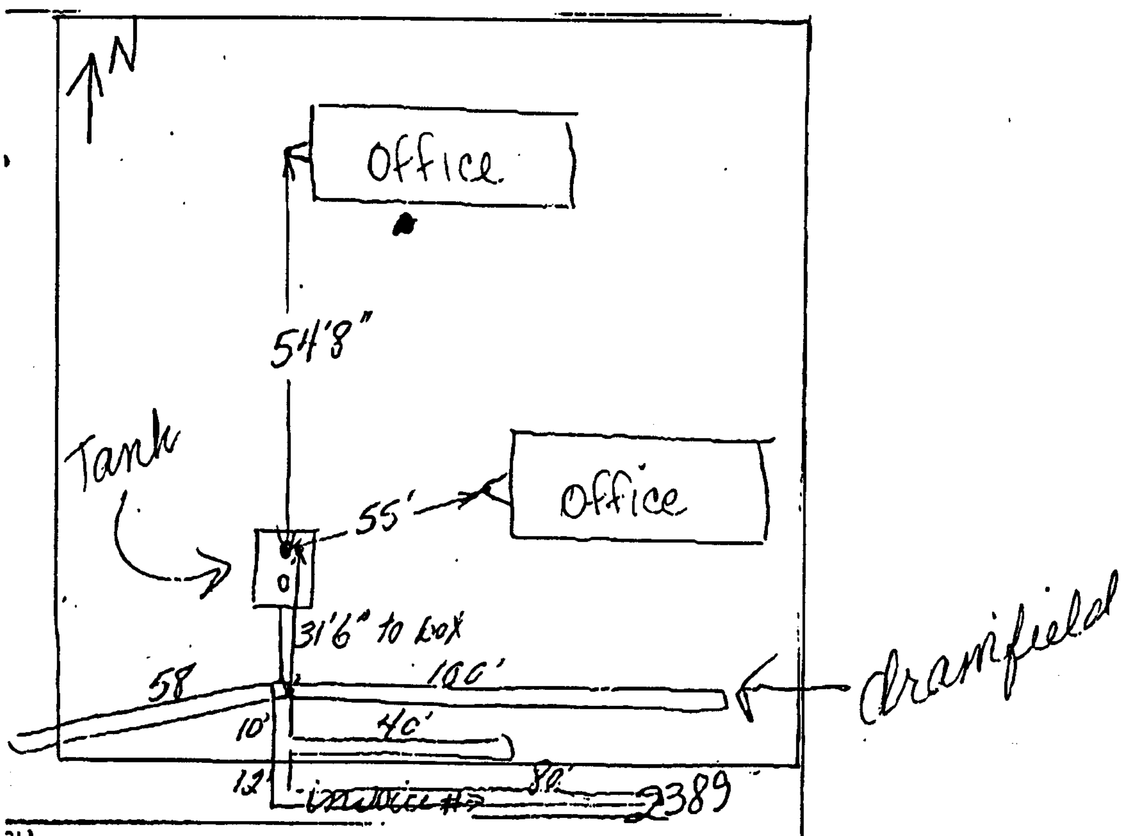
NAME

LOCATION

2 - modular for office spac

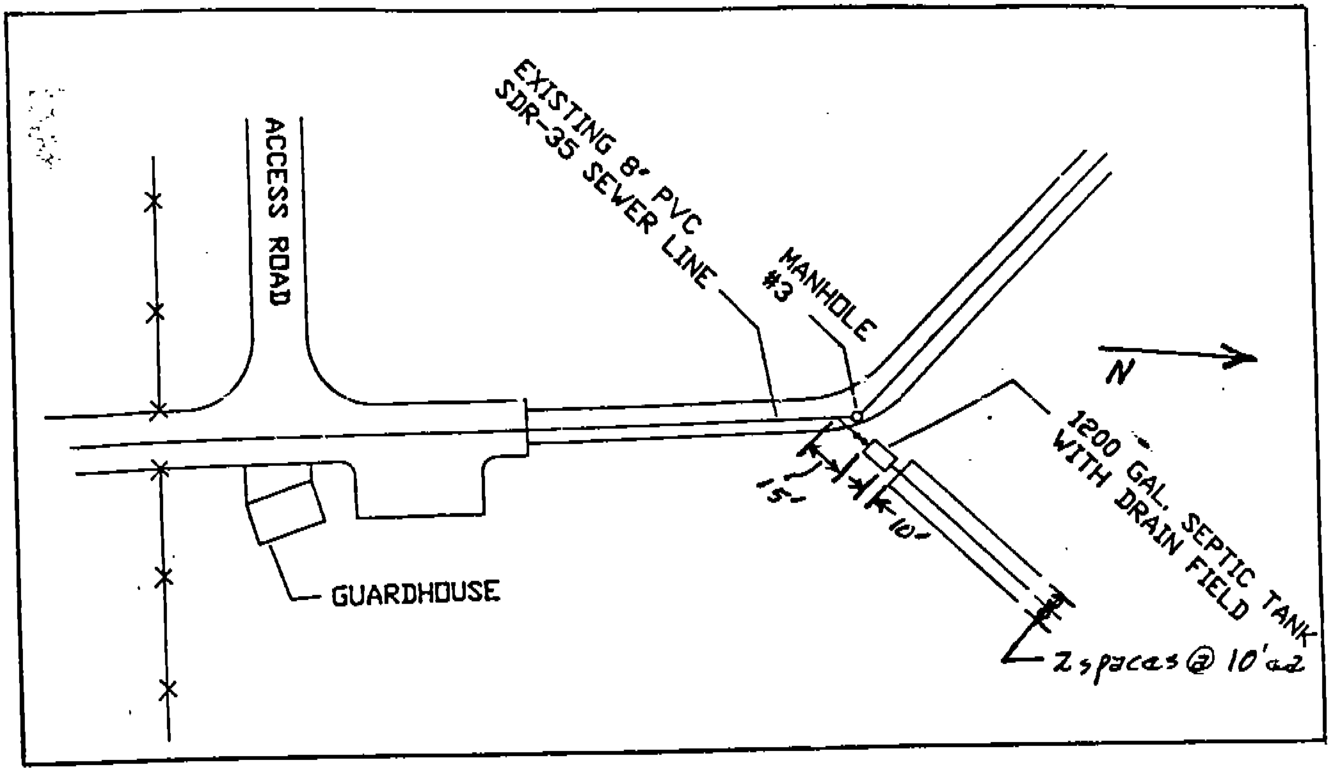
Buildings
802
&
803

AS-BUILT DIAGRAM



31)

PLOT PLAN. Diagram the liquid waste system (birdseye view). Show setback distances to any objects in Table 3. Include the following landmarks within 200 feet of the system:
a) proposed and/or existing buildings, driveways, water lines and wells, other liquid waste systems, and space for a replacement field;
b) direction of groundwater movement, any surface water, irrigated areas, arroyos, rock outcrops or sloping area;
c) property lines and dimensions of the parcel where the system is to be located.



V. **APPLICATION.** The foregoing information is correct and true to the best of my knowledge. I understand that the issuing of the permit does not relieve me from the responsibilities of complying with all applicable provisions of the New Mexico Uniform Plumbing Code and the New Mexico Liquid Waste Disposal Regulations.

[X] OWNER [ ] CONTRACTOR ____ 10-17-89
Signature Rob R. Tillett, Manager Date
NASA White Sands Test Facility

VI. **EID PERMIT.** A permit for construction of the liquid waste disposal system described herein is hereby:

[X] GRANTED [ ] GRANTED SUBJECT TO CONDITIONS [ ] DENIED ____ 10-19 89
EID Signature Date

CONDITIONS. Failure to meet the conditions of this section invalidates the permit, and is subject to enforcement.

*Call for an installation inspection by EID prior to system cover-up if the following box is checked [ ]. Phone No.____

VII. **CID PERMIT.** A permit for construction of the liquid waste disposal system described herein is hereby:

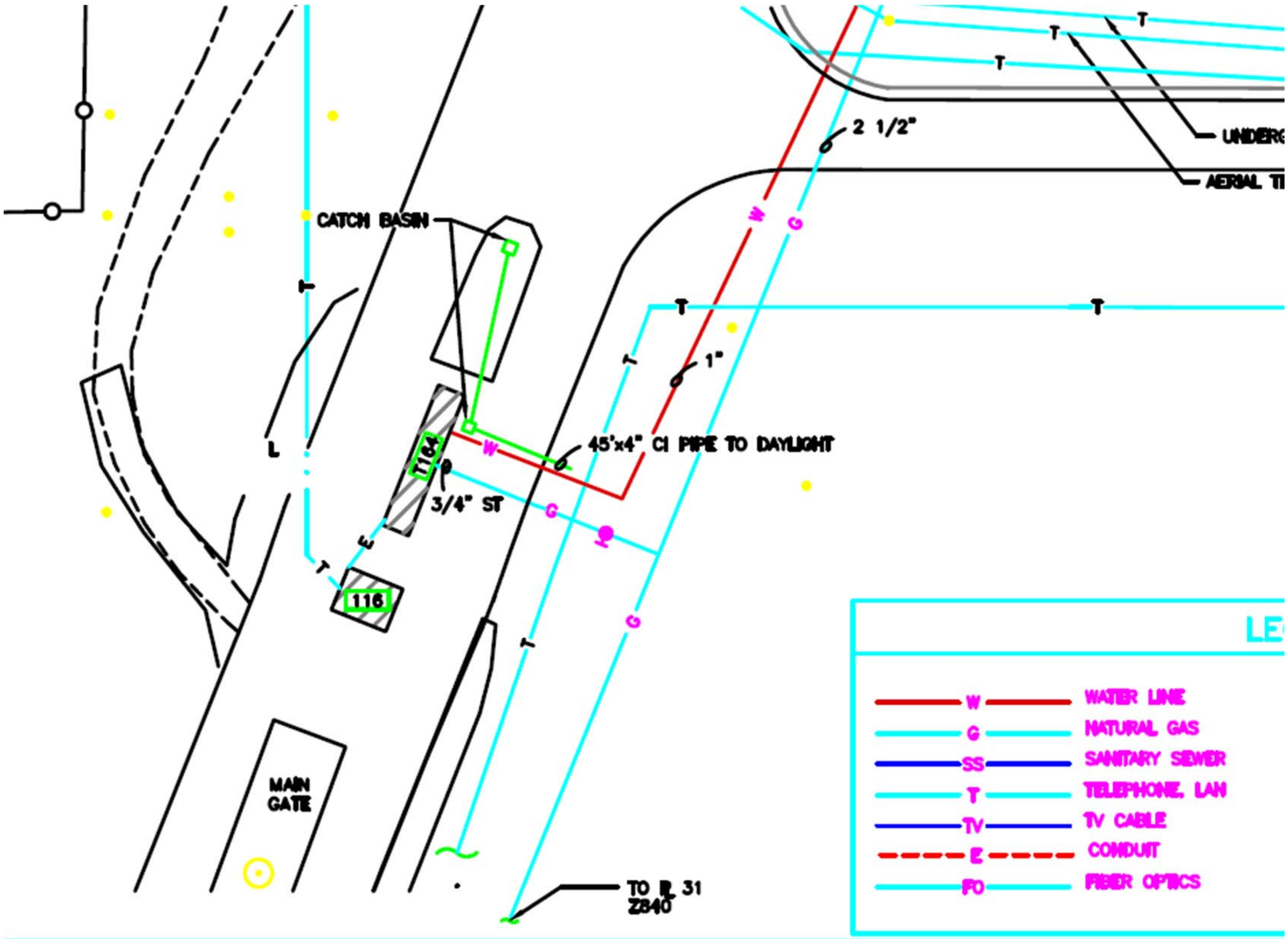
[ ] GRANTED [ ] GRANTED SUBJECT TO CONDITIONS [ ] DENIED ____
CID Signature Date

CONDITIONS. Failure to meet the conditions of this section invalidates the permit, and is subject to enforcement.

VIII. **INSPECTION.** The private sewage disposal system described herein [ ] meets [ ] does not meet the design and construction requirements of the Construction Industry Commission's New Mexico Uniform Plumbing Code.

CID Signature Title Date

Drain to Grade Near B116



Appendix D MSDSs

Electrostatic Process Chemicals MSDS

(Provided by Presstek)

---------- 000139.MSD
96.35.139

TRADE NAME: Electrostatic Solution DATE: May 2013 (REVISED)

I. PRODUCT IDENTIFICATION

Part Numbers: 83-2-105159
83-9-105160
83-8-105161

Name/Synonym: Conversion Solution

Manufactured/Distributed by:

Mark Andy, Inc.
18081 Chesterfield Airport Rd.
Chesterfield, MO 63005

Company Phone: (US)800-225-4835 (CAN)800-387-3143
Emergency Phone: Chemtrec (800)424-9300

II. INGREDIENTS - Confidential Information for Safety/Health Use Only
(ALL EXPOSURE LIMITS ARE PPM UNLESS OTHERWISE NOTED)

Chemical Name	CAS#	OSHA PEL	ACGIH, TLV, TWA	NIOSH EXPOSURE LIMITS STEL	NTP, IARC OSHA Carcinogen	WT %
*potassium hexacyanoferrate	13943-58-3	N/E	N/E	N/E	No	2-5
**glycerine	56-81-5	10mg/m3 B		N/E	No	8-12
*ammonium phosphate	7722-76-1	N/E	N/E	N/E	No	8-10
*CMC gum	9000-11-7	N/E	N/E	N/E	No	1-2
*water	7732-18-5	N/E	N/E	N/E	No	74-79

* non-hazardous as defined by 29CFR 1910.1200. ** as mist only.

III. PHYSICAL PROPERTIES

Boiling Point (°F): 212°F
Specific Gravity (H2O=1): 1.08
Vapor Pressure (mmHg): 15@25°C
Melting Point: N/A
Vapor Density (Air=1): N/E
Evaporation Rate (butyl acetate=1): slower than water
Solubility in Water: 100 %
Appearance/Odor: Yellow green liquid, slight almond odor
pH: 4.5

IV. FIRE AND EXPLOSION HAZARD

Flash Point: None
Flammable Limits: LEL: N/A UEL: N/A
Extinguishing Media: None
Special Fire Fighting Procedure: None
Unusual Fire/Explosion Hazards: Catastrophic accidents, involving large amounts of product and accompanied by fire or contact with large amounts of strong acid, response personnel are required to wear NIOSH approved self-contained breathing apparatus dependent upon the quantities of cyanide.

N/A = Not Applicable
N/E = Not Established

V. REACTIVITY DATA

Stability: Stable Conditions to Avoid: Strong light & heat.
Incompatibility, Materials to Avoid: Chlorine bleach, strong acids.
Hazardous Decomposition Products: Product will slowly decompose and form hydrocyanic acid, complex cyanoferrates and cyanides.
Hazardous Polymerization: Will not occur.

VI. SPILL OR LEAK PROCEDURE/WASTE DISPOSAL

Disposal: Small quantities such as employed in normal use may be flushed with water to drain. Do not mix with acid wastes. Larger quantities should not be dumped into waterways, check local, state and federal regulations regarding disposal of hexacyanoferrate salts (Generally 2 ppm maximum in streams and lakes).

VII. HEALTH HAZARD DATA

A) Routes of entry, signs and symptoms of overexposure, acute and chronic effects.
   Eye: May cause eye irritation.
   Skin: Prolonged contact may cause skin irritation.
   Inhalation: Not a normal route of entry.
   Ingestion: Large doses may cause intestinal irritation.
   Target Organs: None known
B) Carcinogenicity: Ingredients not found in NTP, OSHA or IARC.
C) Medical conditions generally aggravated by normal exposure: None. Hexacyanoferrate salts are considered slightly toxic to humans, regardless if exposure is acute dermal, acute ingestion or chronic systemic. Any effect on the human body is slight, temporary and reversible and the effect disappears following termination of exposure.
D) Emergency and First Aid
   Eye: Flush with water for 15 minutes. Get medical aid.
   Skin: Wash with soap and water.
   Inhalation: Not a normal route of entry.
   Ingestion: Induce vomiting, get medical aid immediately.

VIII. SPECIAL PROTECTION INFORMATION

Respiration Protection: N/A
Ventilation: Normal air conditioning.
Protective Gloves: Not required Eye Protection: optional
Other Protection: N/A

IX. SPECIAL PRECAUTIONS

Handling and Storage: Store in a cool, dark place, away from strong acids and fire hazards. Wash thoroughly after handling.
Other: Read label precautions. Do not reuse container.
For Commercial use only. Keep from reach of children.

X. ENVIRONMENTAL DATA

Hazardous Substance (40 CFR 372: SARA Sec. 313)
None
Reportable Quantity (40 CFR 355: SARA Sec. 302)
None
Hazardous Substance (40 CFR 302: CERCLA Table 302.4)
None
RCRA Waste Number
None
Volatile Organic Compounds
None
SARA Hazard Class
Acute: no Chronic: no Fire: no Pressure: no Reactivity: no

HMIS Rating
Health: 1 Flammability: 0 Reactivity: 0 Personal Protection: A

XI. DOT SHIPPING INFORMATION

Surface: Not Regulated Air: Not Regulated

Proper Shipping Name: N/E

UN N/E Class: N/E Labels: None Required

NOTE:

The chemicals in this product are listed on the TSCA inventory.

XII. DISCLAIMER

The information contained in this Material Safety Data Sheet is furnished without warranty of any kind. Mark Andy, Inc. believes that the information contained herein is current as of the revision date of this MSDS. Since the conditions of use of this product are beyond the control of Mark Andy, Inc., it is the obligation of the user to determine the conditions for safe use.

---------- 000001.MSD
96.35.001

TRADE NAME: Electrostatic Dispersant DATE: May 2013 (Revised)

I. PRODUCT IDENTIFICATION

Synonym: Liquid Developer Diluent/Cleaner Part Number: 83-4-104416

Distributed by:
Mark Andy, Inc.
18081 Chesterfield Airport Rd.
Chesterfield, MO 63005

Company Phone: (US)800-225-4835 (CAN)800-387-3143
Emergency Phone: Chemtrec (800)424-9300

II. INGREDIENTS - Confidential Information for Safety/Health Use Only

(ALL EXPOSURE LIMITS ARE PPM UNLESS OTHERWISE NOTED)

Chemical Name	CAS#	OSHA PEL	ACGIH, NIOSH TLV, EXPOSURE LIMITS		NTP, IARC OSHA	WT %
			TWA	STEL	CARCINOGEN	
Isoparaffinic Hydrocarbons	64742-48-9	300	400	400	No	100

This product is an OSHA Class II combustible liquid as per 29 CFR 1910.106.

III. PHYSICAL PROPERTIES

Boiling Range (°F): 313-348
Vapor Pressure (mmHg): 4.8
Vapor Density (Air=1): 5.0
Solubility in Water: 0.01%
Appearance/Odor: Clear Liquid, Slight Odor

Specific Gravity (H2O=1): 0.750
Melting Point: N/E
Evaporation Rate (butyl acetate=1): 0.3
pH: N/A

IV. FIRE AND EXPLOSION HAZARD

Flash Point: 105°°F TCC Flammable Limits: LEL: 0.8 UEL: 7.0
Extinguishing Media: CO2, Foam, Dry Chemical
Special Fire Fighting Procedure: Use self-contained breathing mask.
Unusual Fire/Explosion Hazards: None.

N/A = Not Applicable
N/E = Not Established

V. REACTIVITY DATA

Stability: Stable
Conditions to Avoid: None
Incompatibility, Materials to Avoid: Very strong oxidants like chromic acid or liquid chlorine.
Hazardous Decomposition Products: None
Hazardous Polymerization: Will not occur.

VI. SPILL OR LEAK PROCEDURE/WASTE DISPOSAL

Remove ignition sources. Collect on inert absorbent material. Place in waste container for combustible waste. Disposal: Treat as hazardous waste and dispose in accordance with local environmental regulations. DO NOT pour down common drain.

VII. HEALTH HAZARD DATA

A) Routes of entry, signs and symptoms of overexposure, acute and chronic effects.
Eye: Irritant to eye - may cause conjunctivitis.
Skin: Prolonged contact causes de-fating, drying, cracking and dermatitis.
Inhalation: Not an inhalation hazard, overexposure may cause headache, nausea and respiratory irritation.
Ingestion: Nausea and possible gastro-intestinal irritation.
Target Organs: Eyes, skin, respiratory system.

B) Carcinogenicity: Not found in NTP, IARC or OSHA.

C) Medical conditions generally aggravated by normal exposure: Dermatitis. Repeated inhalation exposure to rats of a similar hydrocarbon at concentrations > or = 300ppm in air caused low grade (mild) anemia and kidney effects.

D) Emergency and First Aid
Eye: Flush with large amounts of water, including under eyelids.
Skin: Wash with soap and water. Remove contaminated clothing.
Inhalation: Move to fresh air; if breathing difficulty, give oxygen and get medical help.
Ingestion: Do NOT induce vomiting. Give a few ounces of USP white mineral oil to drink.

VIII. SPECIAL PROTECTION INFORMATION

Respiration Protection: Not required.
Ventilation - Local Exhaust: General is adequate. Other: N/A
Protective Gloves: Nitrile NBR
Protection: Safety glasses
Other Protection: None.

IX. SPECIAL PRECAUTIONS

Handling and Storage: Store in closed, cool, well ventilated area, away from heat and flame.
Other: Read and follow label precautions. Do not reuse container. For Commercial use only. Keep from the reach of children.

X. ENVIRONMENTAL DATA

Hazardous Substance (40 CFR 372: SARA Sec. 313)
None
Reportable Quantity (40 CFR 355: SARA Sec. 302)
None
Hazardous Substance (40 CFR 302: CERCLA Table 302.4)
None
RCRA Waste Number
D001
Volatile Organic Compounds
6.3 lbs./gallon or 754.9 grams/liter (calculated)
SARA Hazard Class
Acute: no Chronic: no Fire: yes Pressure: no Reactivity: no

HMIS Rating
Health: 1 Flammability: 2 Reactivity: 0 Personal Protection: B

XI. SHIPPING INFORMATION

SURFACE Transportation: Not regulated by DOT nor restricted by UPS.

VESSEL Transportation:

Proper Shipping Name: Flammable Liquid,n.o.s.,(Naphtha),3,UN1993,III,
FP 105oF.

Labeling: Vessel; None - (LTDQTY)
Air; "Flammable Liquid" label required on over-pak.

NOTE:

The chemicals in this product are listed on the TSCA inventory.

XII. DISCLAIMER

The information contained in this Material Safety Data Sheet is furnished without warranty of any kind. Mark Andy, Inc. believes that the information contained herein is current as of the revision date of this MSDS. Since the conditions of use of this product are beyond the control of Mark Andy, Inc., it is the obligation of the user to determine the conditions for safe use.

MATERIAL SAFETY DATA SHEET

38414 ITEK PREMIUM PLATE TONER — Revision Date:5/1/13

Section I - Product Identification

Manufacturer's Name Mark Andy, Inc	Emergency Phone Number (24 Hours) CHEMTREC @ (800) 424-9300
Street Address 18081 Chesterfield Airport Road	MSDS access online at: https://shop.markandy.com/msds
City,State,Zip Code Chesterfield, MO 63005 General Phone: 636-532-4433	Customer Service: (US) 800-225-4835 (CAN) 800-387-3143 Date Prepared: February 14, 1995
Product Use: OFFSET PRINTING.	Prepared By: Kenneth W. Pinter

Chemical Name, Trade Name, Synonyms: MIXTURE.

HMIS RATING

2 - Health 2 - Flammability 0 - Reactivity B - Personal Protection

Section II - Hazardous Ingredients

Hazardous Components	CAS NO.	% WT.	Exposure Limits OSHA PEL	ACGIH TLV	OTHER
ISOPARAFFINIC HYDROCARBON	64742-48-9	85-98	NOT ESTABLISHED.	NOT ESTABLISHED.	300PPM
LAURYL METHACRYLATE/VINYL ACETATE/BUTYL ACID MALEATE POLYMER	68214-93-7	0.5-5	NOT ESTABLISHED.	NOT ESTABLISHED.	
ADDITIVE	PROPRIETARY	N.D.	5 mg/M3.	5 mg/M3.	

Section III - Physical Data

Boiling POINT(F): 313-380	pH: N.A.
Vapor Pressure(mm Hg): 30-36	Freezing Point(F): N.A.
Vapor Density (AIR = 1): 5.0-5.3	VOC: 6.34 LBS/GAL
Specific Gravity (H2O=1): 0.74-0.76	Color And Odor: BLACK / PETROLEUM
Odor Threshold: 50 PPM.	Physical State: LIQUID

Evaporation Rate (Butyl Acetate = 1): 0.1-0.5

Solubility in Water: NEGLIGIBLE.

Section IV - Fire and Explosion Hazard Data

FLASH POINT (METHOD USED): 102-128 (F) T.C.C.	Flammable Limits: LEL: 0.7%	UEL: 7.0%

Auto-ignition Temperature: 560 (F).

Extinguishing Media: WATER FOG / FOAM / CO2 / DRY CHEMICAL.

Special Fire Fighting Procedures: WATER SPRAY SHOULD BE USED TO COOL FIRE EXPOSED CONTAINERS, AND/OR DISPERSE UNIGNITED VAPORS. USE NIOSH/MSHA APPROVED POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS WHEN ANY MATERIAL IS INVOLVED IN FIRE.

Unusual Fire And Explosion Hazards: NONE.

Section V - Reactivity Data

Stability Unstable : | Conditions to Avoid:

Stable : X | SOURCES OF IGNITION. DO NOT SMOKE WHILE USING.

Incompatibility (Materials to Avoid): STRONG OXIDIZING MATERIAL.

Hazardous Decomposition Products: CO / CO2.

Hazardous Polymerization	May Occur: Will Not Occur: X	Conditions to Avoid: SOURCES OF IGNITION.

Section VI - Health Hazard Data (Acute and Chronic)

Primary Route(s) of Entry: SKIN AND EYE CONTACT, INHALATION, INGESTION.

Oral Ingestion: MAY CAUSE GASTROENTERITIS WITH ANY OR ALL OF THE FOLLOWING SYMPTOMS: NAUSEA, LIGHT-HEADNESS, DIARRHEA AND VOMITING. ASPIRATION INTO LUNGS MAY CAUSE PULMONARY (LUNG) EDEMA, CONGESTION, PNEUMONITIS AND MAY BE FATAL.

Eye Contact: CONTACT OR HIGH VAPOR CONCENTRATIONS MAY CAUSE SLIGHT REVERSIBLE IRRITATION WITH SYMPTOMS OF TEARING AND ITCHING.

Skin Contact: MAY CAUSE SLIGHT TO MODERATE IRRITATION WITH REDNESS AND DRYING OF THE CONTACTED AREA. PROLONGED OR REPEATED CONTACT MAY RESULT IN DEFATTING OF THE SKIN LEADING TO DERMATITIS.

Inhalation: EXPOSURE AT CONCENTRATIONS GREATER THAN 100 PPM IN MAY CAUSED SLIGHT MUCOUS MEMBRANE IRRITATION. AT HIGHER CONCENTRATIONS, MAY CAUSE HEADACHE, DIZZINESS, AND NAUSEA. INHALATION EXPOSURES IN RATS OF A SIMILAR HYDROCARBON AT CONCENTRATIONS GREATER THAN OR EQUAL TO 300 PPM IN AIR CAUSED MILD KIDNEY EFFECTS AND A LOW GRADE (MILD) ANEMIA. THE SIGNIFICANCE OF THESE EFFECTS FOR HUMAN HEALTH IS QUESTIONABLE.

Effects of Overexposure: SKIN, EYE AND MUCOUS MEMBRANE IRRITATION. MAY CAUSE DIZZINESS, LIGHTHEADNESS, NAUSEA, CNS DEPRESSION. MAY CAUSE DERMATITIS AND MILD KIDNEY AND MILD ANEMIA EFFECTS.

Medical Conditions Generally Aggravated by Exposure | PSORIASIS AND OTHER SKIN DISORDERS.

Carcinogenicity: NOT KNOWN TO BE CARCINOGENIC.

Mutagenicity: NOT KNOWN TO MUTAGENIC.

Teratogenicity: NOT KNOWN TO BE TERATOGENIC.

Reproductive Toxicity: NOT KNOWN TO HAVE REPRODUCTIVE TOXICITY.

FIRST AID PROCEDURES

Ingestion: DO NOT INDUCE VOMITING. IMMEDIATELY DRINK WATER TO DILUTE. CALL A PHYSICIAN.
Eye: FLUSH WITH WATER FOR 15 MINUTES. CALL A PHYSICIAN.
Skin: WASH AFFECTED AREA WITH SOAP AND WATER. IF IRRITATION DEVELOPS CALL A PHYSICIAN.
Inhalation: REMOVE AFFECTED PERSON TO FRESH AIR. CALL A PHYSICIAN.

Section VII - Toxicology Information

Ingredient	Inhalation LC50	Oral LD50(RATS)	Dermal LD50(RABBITS)
ISOPARAFFINIC HYDROCARBON	500 PPM(4HRS)	5 g/KG	2 g/KG
LAURYL MATHACRYLATE/...	N.D.	N.D.	N.D.
ADDITIVE	N.D.	N.D.	N.D.

Section VIII - Spill or Leak Procedure

MATERIAL SAFETY DATA SHEET

38414 ITEK PREMIUM PLATE TONER Revision Date:5/1/13

Steps to be taken in case material is released or spilled:
REMOVE ALL SOURCES OF IGNITION. WEAR NIOSH/MSHA APPROVED ORGANIC VAPORE RESPIRATORS. FOLLOW OSHA REGULATIONS FOR RESPIRATOR USE. WEAR GOGGLES, COVERALLS, NITRILE GLOVES AND BOOTS. ADD NON-COMBUSTIBLE DRY ABSORBENT. CLEAN-UP AND PLACE IN AN APPROPRIATE CONTAINER.

Disposal Method: DISPOSE OF CONTAMINATED PRODUCT , EMPTY CONTAINERS AND MATERIALS USED IN CLEANING UP SPILLS OR LEAKS IN A MANNER APPROVED FOR THIS MATERIAL. CONSULT APPROPRIATE FEDERAL , STATE AND LOCAL REGULATORY ABENCIES TO DETERMINE PROPER DISPOSAL PROCEDURES.

Section IX - Special Protection Information

Ventilation	Local Exhaust: N.A.	Special: N.A.
	Mechanical(General): ACCEPTABLE.	Other: N.A.

Respiratory Protection: NOT NORMALLY REQUIRED WHEN USED AS INTENDED.

Protective Clothing: IMPERMEABLE GLOVES.

Eye Protection: SAFETY GLASSES WITH SIDE SHIELDS.

Other Protective Equipment: IMPERMEABLE GLOVES, BOOTS, APRON OR PROTECTIVE SUITS.

Section X - Special Precautions

Precautions to be taken in Handling and Storing: AVOID CONTACT WITH SKIN, EYES OR CLOTHING. DO NOT TAKE INTERNALLY. UPON CONTACT WITH SKIN OR EYES WASH OFF WITH WATER. STORE IN A COOL DRY WELL-VENTILATED PLACE AWAY FROM ALL SOURCES OF IGNITION. AVOID CONTACT WITH STRONG OXIDANTS. AVOID BREATHING MIST OR VAPOR

Other Precautions: DO NOT STORE AT TEMPERATURES ABOVE: 102 DEG.F.

Section XI - Transportation Information

Hazard Class: N.A.
DOT PROPER Shipping Name: NOT REGULATED

Section XII - Regulatory Information

CERCLA/SUPERFUND,40 CFR 117,302: THIS PRODUCT DOES NOT CONTAIN ANY REPORTABLE QUANTITY (RQ) SUBSTANCE.

SARA(TITLE III) - Sections 302, 311, 312, and 313:

Section 302 Extremely Hazardous Substances (40 CFR 355): THIS PRODUCT DOES NOT CONTAIN ANY INGREDIENTS LISTED AS AN EXTREMELY HAZARDOUS SUBSTANCE.

Section 311 and 312 MSDS Submission and Inventory Reporting (40 CFR 370): THIS PRODUCT CONTAINS MATERIALS THAT MAY REQUIRE REPORTING UNDER 311 & 312 IF STORED IN LARGE ENOUGH QUANTITIES.
Section 313 Toxic Chemical Release Reporting (40 CFR 372): THIS PRODUCT DOES NOT CONTAIN ANY INREDIENTS ON THE LIST OF TOXIC CHEMICALS.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
This product complies with rules and regulations of TSCA.

California Proposition 65: THIS PRODUCT DOES NOT CONTAIN ANY MATERIALS, THAT ARE LISTED BY THE STATE OF CALIFORNIA UNDER PROPOSITION 65.

Section XIII - Addition Information

COEFFICIENT WATER/OIL DISTRIBUTION: N.D.
SENSITIVITY TO MECHANICAL IMPACT: NO
SENSITIVITY TO STATIC DISCHARGE: YES

N.D. = No Data N.A. = Not Applicable
The information herein given in good faith but no warranty, express or implied, is made.

Electrostatic Process Chemicals MSDS

(from 1991 WIWPS)

WSTF Individual Waste Profile Sheet (WIWPS)

Date of Review FEB 10 2000

WIWPS # 10-07-01

Facility Area 100 **Work Area** REPRODUCTION SHOP **Responsible Section** 4052

Name of Waste SPENT PRINTING SOLUTIONS

Describe the Process Generating the Waste

PRINTING MACHINES MUST HAVE SOLUTIONS CHANGED PERIODICALLY. SOME EXCESS PRODUCT IS ALSO GENERATED.

List of Known Hazardous Constituents and their Concentrations

PETROLEUM SOLVENTS

Waste Description **Physical State** LIQUID **pH**

Spec Grav .75 **Flash Point** 104

Other Comments: (phases, clarity, color, consistency, etc)

BLACK LIQUID

Annual Quantity Generated 0.5 **Units** GALLONS

MSDS# 4507 **Task Order(s)**

Form Completed By JIM HENDERSON **Date Completed** 9/14/89

Hazard Class 1 **(1 = Hazardous, 2 = Hazardous Constiuent, 3 = Nonhazardous)**

Status I **(a = Active, i = Inactive)**

Environmental Department's Representative HFH

Accumulate Waste in Container Labeled SPENT PRINTING SOLVENT

If Nonhazardous, Disposal Method

EPA Waste ID Number(s) D001

Waste Collection Method (at the point of generation)

SAFETY CAN

Waste/Satellite Accumulation Area PRINTS **On-site Storage Area** CSU

Evap Tank waste that requires Subpart CC compliance? NO **Has Process or Concentration Changed?** NO

Recycled? NO **Disposal Method** INCIRERATION

Comments **Vendor Profile Number** WMDS 657996

ACTIVE WIWPS. UPDATED BY T. DAVIS ON 02/17/94. CALL ENVIRONMENTAL SECTION FOR TRANSFER AND DISPOSAL. INACTIVE AS OF 10/96. REACTIVATED TO DISPOSE OF 0.5 GALLONS OF OFF-SPEC SOLVENT 8/19/99. THIS WIWPS WAS DEACTIVATED 2/08/00 AFTER REVIEW.

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-01

MAR 24 1993

Facility Area 100 Work Area REPRODUCTION SHOP Responsible Section 4052

Name of Waste SPENT PRINTING SOLUTIONS

Describe the Process Generating the Waste:
PRINTING MACHINES MUST HAVE SOLUTIONS CHANGED PERIODICALLY. SOME EXCESS PRODUCT IS ALSO GENERATED.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
PETROLEUM SOLVENTS

Waste Description: Physical State LIQUID pH -0-
Specific Gravity .75 Flash Point 104

Other Comments: (phases, clarity, color, consistency, etc.)
BLACK LIQUID

Quantity expected to be generated annually: 2. Units: GALLONS

Material Safety Data Sheet Number (if applicable): MANY MSDS'

Task Order associated with waste stream (if applicable): -0-

Form Completed By: JIM
Date: 09/14/89

Hazard Classification 1 If Nonhazardous, Disposal Method -0-
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: SPENT PRINTING SOLVENT

Environmental Section Representative's Initials: JEH

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
D001

Describe how the waste is collected at the point of generation:
SAFETY CAN

Waste Accumulation Area, if applicable: PRINTS

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: DSF

Is this waste recycled? NO

List the offsite disposal method for this waste: WMDS 101863
(Incineration, Landfill, Treatment, etc.)

Comments:
< THAN 5 GALLONS GENERATEDIN 1991 BEFORE THE OLD MACHINE WAS REPLACED.
REVISED 8-1-91 pkm

Inactive 3/25-93

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-01

APR 1 1991

Facility Area 100 Work Area REPRODUCTION SHOP Responsible Section 4052

Name of Waste SPENT PRINTING SOLUTIONS

Describe the Process Generating the Waste:
PRINTING MACHINES MUST HAVE SOLUTIONS CHANGED PERIODICALLY. SOME EXCESS PRODUCT IS ALSO GENERATED.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
PETROLEUM SOLVENTS

Waste Description: Physical State LIQUID pH -0-
Specific Gravity .75 Flash Point 104

Other Comments: (phases, clarity, color, consistency, etc.)
BLACK LIQUID

Quantity expected to be generated annually: 2 35. Units: GALLONS

Material Safety Data Sheet Number (if applicable): MANY MSDS'

Task Order associated with waste stream (if applicable): -0-

Form Completed By	Date
JIM	09/14/89

Hazard Classification 1 If Nonhazardous, Disposal Method -0-
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: SPENT PRINTING SOLVENT

Environmental Section Representative's Initials: JEH

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
D001

Describe how the waste is collected at the point of generation:
SAFETY CAN

Waste Accumulation Area, if applicable: PRINTS

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: DSF

Is this waste recycled? NO

List the offsite disposal method for this waste: INCINERATION
(Incineration, Landfill, Treatment, etc.)

Comments:
< THAN 5 GALLONS GENERATEDIN 1991 BEFORE THE OLD MACHINE WAS REPLACED.

10-07-01

LAND BAN WASTE DATA

1. **BAN CITATION:**

   40 CFR 268.35

2. **SITE HANDLING:**

   Waste is drained to the 200 Area Evaporation Tanks

3. **CONSTITUENTS:**

   Ignitability

4. **RECORDKEEPING:**

   (a) **UHWM NO.:** NONE

   (b) **USEPA I.D. NO.:** D001

   (c) **TREATMENT STANDARD:** 40 CFR 268.42

   (d) **PROHIBITIONS:** Land Disposal

   (e) **WASTE ANALYSIS:** Process Knowledge

MATERIAL SAFETY DATA SHEET

10-… 975

(APPROVED BY THE U.S. DEPARTMENT OF LABOR AS - "essentially similar" to form OSHA-20 (former LSB-OSS-4)
FOR HAZARDOUS PRODUCTS USED IN PLACES OF EMPLOYMENT

Section 1 NAME AND PRODUCT 4-3794 Offset Toner Solution

MANUFACTURER'S NAME
(a) A.B.DICK COMPANY

EMERGENCY PHONE NO.: 24 HOURS
(b) 312-647-8800

STREET ADDRESS
(c) 5700 WEST TOUHY AVENUE

For latest data, consult manufacturer.

DATE THIS FORM WRITTEN
(d) July 2, 1985

CITY, STATE, ZIP CODE
(e) CHICAGO, ILLINOIS 60648

SIGNATURE
(f) Kenneth W. Pinter Kenneth W. Pinter

CHEMICAL NAME, TRADE NAME, AND SYNONYMS
(g)

HAZARD CLASSIFICATION FOR DEPARTMENT OF TRANSPORTATION (DOT)

Flammable Liquid ☐ Combustible Liquid ☒ Corrosive Material ☐ ________ ☐

DOT Shipping Name Not regulated. UN#

Section 2 HAZARDOUS INGREDIENTS

1.		CAS Reg. No.	% Wt.	TLV (units)
Petroleum Distillate	(Z-1)	68551-16-6	99	300 ppm
Resin treated Carbon Black	(Z-1)	1333-86-4	1	

Section 3 PHYSICAL DATA pH FREEZING POINT (°F)

2. BOILING POINT (°F.)	313 - 348	6. SPECIFIC GRAVITY ($H_2O = 1$)	0.75
3. VAPOR PRESSURE (mmHg at 20°C)	36 @ 25°	7. % VOLATILE BY VOLUME	100
4. VAPOR DENSITY (air=1)	5.0	8. COLOR AND ODOR	Black - Petroleum
5. SOLUBILITY IN WATER	Insoluble	9. PHYSICAL STATE	Liquid

Section 4 FIRE AND EXPLOSION HAZARD DATA

10. FLASH POINT (AND METHOD USED)
102-104°F T.O.C., T.C.C., C.O.C.

11. FLAMMABLE LIMITS (STP)
L.F.L. 0.8% U.F.L. 7%

12. EXTINGUISHING MEDIA:
☒ WATER FOG ☒ FOAM ☐ ALCOHOL FOAM ☒ CO_2 ☒ DRY CHEMICAL
☐ OTHER

13. SPECIAL FIRE FIGHTING PROTECTIVE EQUIPMENT
Use air-supplied breathing equipment in enclosed areas.

14. UNUSUAL FIRE AND EXPLOSION HAZARDS
None

Section 5 REACTIVITY DATA

15. STABILITY			16. CONDITIONS TO AVOID
	NORMAL CONDITIONS	OK	DO NOT smoke. Avoid any ignition sources.
	FIRE CONDITIONS	OK	

17. INCOMPATIBILITY (Materials to avoid)
☐ WATER ☐ ACID ☐ BASE ☐ CORROSIVE ☒ Strong OXIDIZING MATERIAL
☐ OTHER

18. HAZARDOUS DECOMPOSITION PRODUCTS
Fumes, smoke and carbon monoxide.

19. HAZARDOUS POLYMERIZATION			20. CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

(FRONT)

Section 6 HEALTH HAZARD DATA

21. ORAL INGESTION

DO NOT induce vomiting; call a physician.

22. EYE CONTACT

Flush with water for 15 minutes or until irritation subsides.

23. SKIN CONTACT

Mild irritant; wash with soap and warm water.

24. SKIN ABSORPTION

Mild irritant; limit is 300 ppm for 8 hour period.

25. INHALATION (TLV OR SUGGESTED CONTROL FIGURE)

Recommended limit is 300 ppm for 8 hour period.

26. EFFECTS OF OVEREXPOSURE

Dizziness and headache to unconsciousness.

27. FIRST AID PROCEDURES

If by vapor, remove from exposure immediately; call a physician. If breathing is irregular or stopped, start resuscitation, administer oxygen. If ingested, DO NOT induce vomiting; call a physician. In case of skin contact, remove any contaminated clothing, and wash skin with soap and water. If splashed into the eyes, flush eyes with clean water for 15 minutes or until irritation subsides.

Section 7 SPILL OR LEAK PROCEDURES

28. STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all ignition sources. Wipe up or use absorbent material.

29. DISPOSAL METHOD

In accordance with all applicable regulations for combustible solvents or incinerate.

Section 8 SPECIAL PROTECTION INFORMATION

30. VENTILATION		
	LOCAL EXHAUST Face velocity > 60 fpm.	SPECIAL Use only with adequate ventilation.
	MECHANICAL (General) Explosion proof if used.	OTHER

31. RESPIRATORY PROTECTION (Specify Type)

None

32. PROTECTIVE CLOTHING

None

33. EYE PROTECTION

- [X] NOT NORMALLY NECESSARY
- [ ] GAS TIGHT GOGGLES OR EQUIVALENT
- [ ] OTHER
- [ ] SAFETY GLASSES WITHOUT SIDE SHIELDS
- [ ] SAFETY GLASSES WITH SIDE SHIELDS
- [ ] CHEMICAL WORKERS GOGGLES

34. OTHER PROTECTIVE EQUIPMENT

None

Section 9 SPECIAL PRECAUTIONS OR OTHER COMMENTS

35. PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep container closed when not in use. DO NOT store near ignition sources or strong oxidants such as liquid chlorine or concentrated oxygen.

36. OTHER PRECAUTIONS

If a large quantity is spilled on clothing; remove contaminated clothing and wash before reuse. See Item #23.

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-02

MAR 24 1993

Facility Area 100 Work Area REPRODUCTION Responsible Section 4052

Name of Waste SPENT E-STAT ETCH

Describe the Process Generating the Waste:
THIS SOLUTION IS MIXED WITH WATER (15:1) AND USED IN OFFSET PRESS. ALSO, IT IS USED AS AN ETCHING SOLUTION AT FULL STRENGTH. mACHINE WAS REPLACED IN MARCH 1991 AND THE WASTE STREAM ONLY PRODUCED APPROX. 5 GALLONS.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
-0-

Waste Description: Physical State LIQUID pH -0-
Specific Gravity -0- Flash Point -0-

Other Comments: (phases, clarity, color, consistency, etc.)
-0-

Quantity expected to be generated annually: 40. Units: GALLONS

Material Safety Data Sheet Number (if applicable): -0-

Task Order associated with waste stream (if applicable): N/A

Form Completed By -0-
Date -0-

Hazard Classification 2 If Nonhazardous, Disposal Method -0-
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: WASTE ETCH

Environmental Section Representative's Initials: JEH

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
-0-

Describe how the waste is collected at the point of generation:
CONTAINER #31

Waste Accumulation Area, if applicable: N/A

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: -0-

Is this waste recycled? NO

List the offsite disposal method for this waste: WMDS 101863
(Incineration, Landfill, Treatment, etc.)

Comments:
< THAN 5 GALLONS WERE GENERATED IN 1991 BEFORE THE MACHINE WAS REPLACED.

Inactive 3/25/93

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-02

Facility Area 100 Work Area REPRODUCTION Responsible Section 4052

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List known Hazardous Constituents in Waste Stream and Their Concentrations:
-0-

Waste Description: Physical State LIQUID pH -0-
Specific Gravity -0- Flash Point -0-

Other Comments: (phases, clarity, color, consistency, etc.)
-0-

Quantity expected to be generated annually: 40. Units: GALLONS

Material Safety Data Sheet Number (if applicable): -0-

Task Order associated with waste stream (if applicable): N/A

Form Completed By	Date
-0-	-0-

Hazard Classification 2 If Nonhazardous, Disposal Method -0-
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: WASTE ETCH

Environmental Section Representative's Initials: JEH

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
-0-

Describe how the waste is collected at the point of generation:
CONTAINER #31

Waste Accumulation Area, if applicable: N/A

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: -0-

Is this waste recycled? NO

List the offsite disposal method for this waste: WMDS 101863
(Incineration, Landfill, Treatment, etc.)

Comments:
< THAN 5 GALLONS WERE GENERATED IN 1991 BEFORE THE MACHINE WAS REPLACED.

Facility area: 100
Work area: REPRODUCTION
Responsible area: 40-52
Name of waste generated: SPENT E-STAT ETCH
Process Description: THIS SOLUTION IS MIXED WITH WATER (15:1) AND USED IN OFFSET PRESS. ALSO, IT IS USED AS AN ETCHING SOLUTION AT FULL STRENGTH.
Waste Characteristics:
Description: LIQUID pH -0- Spec. grav. -0- FP -0-
Quantity generated yearly: -0-
MSDS #, or attach copy: -0-
Task order: N/A
Hazard clasification: 2
Non-hazardous waste disposal method: N/A

The following information is only completed if the waste is hazardous

Waste handling, pt. of gen: CONTAINER #31
Is waste stored in a satellite area: YES
Describe the satellite area: N/A
EPA waste ID numbers? -0-
Is the waste stored elsewhere onsite? NO
Storage unit: -0-
Unit location: -0-
Is the waste recycled? NO
Hazardous waste disposal method: EVAP TANKS
Facility name: NASA WSTF
Comments: N/A

Entered 5/3/88 KS8

Review Date ______________ Waste Stream ID No. 10-07-02

WHITE SANDS TEST FACILITY
INDIVIDUAL WASTE STREAM PROFILE

KNOWLEDGEABLE AREA REPRESENTATIVE:

A. Facility area: 100
Resp Sect: 40-52

B. Work area: REPRODUCTION

C. Name of waste stream generated: SPENT E-STAT ETCH

D. Describe the process(es) and the associated chemicals involved in the generation of this waste:

THIS SOLUTION IS MIX WITH WATER (15:1) AND USED IN OFFSET PRESS. ALSO IT IS USED AS AN ETCHING SOLUTION AT FULL STRENGTH

E. Project name generating waste stream (if applicable):

N/A

F. Task order associated with waste stream (if applicable):

N/A

G. Waste Characteristics:

1. Physical state (liquid, solid, gas, slurry, sludge):

LIQUID

2. Quantity generated yearly? 12 GALS

3. Is a chemical analysis or MSDS available? Which? MSDS #?

YES MSDS # 1439 ATTACHED

H. How is the waste handled at point of generation?

1. Describe the storage unit (container, tank, impoundment):

   CONTAINER # 31

2. Unit location: BLD 101 Rm

3. Size of unit: 5 GAL

4. Material of construction: POLY

5. If a tank, is it aboveground or underground? N/A

I. Is the waste stored temporarily in a satellite accumulation area? YES

   If yes, describe the area and length of time the waste is stored here: N/A

J. Is the waste treated prior to temporary storage? ____

   If yes, describe the treatment and applicable treatment units:

   N/A

Form Completed By ____________ Date ____________

Area Supervisor ____________ Date ____________

ENVIRONMENTAL SECTION REPRESENTATIVE:

K. Is the waste hazardous or non-hazardous? 2

VHT? CONTAINS CN

L. Is the waste stored elsewhere onsite prior to shipment off site or for onsite disposal? YES

If yes, describe the storage area:

1. Storage unit (container, tank, etc.): HW TANKER
2. Unit location: 200
3. Size of unit: 6000
4. Material of construction: SS
5. If a tank, is it above or underground? N/A

M. Is the waste recycled? NO

If no, is there a potential for recycling? NO

N. Is the waste disposed of onsite? NO

If yes, describe the disposal method.

1. Disposal method(thermal flare, sewer discharge, landfill):

N/A

2. Flow rate(s): ________
3. Continuous or batch? ________

O. Offsite disposal of wastes (landfill, incineration, etc.)

1. Disposal method: INCINERATION
2. Frequency of transport/disposal: ________
3. Facility name/EPA ID No.: ________
4. Facility location: ________
5. Associated costs for offsite transport and disposal:

P. Are there any wastes on site that could be incompatible with this waste stream? Describe:

YES, pH CHANGES

Q. Will changes in the mission affect waste management (e.g., increase or decrease in waste generated, change in characteristic)? NO

R. Is this wasted stream a candidate for waste minimization? If so, how? NO

S. Have there been changes in regulations which call for changes in the management of this waste stream? ____ Yes X No

If yes, what changes? ____

T. Other comments (e.g., PCB storage): ____

N/A

____ Environmental Section

____ Date

1439

10-07-02

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
Masterlith Industries, Inc.	(213) 927-9572
ADDRESS (Number, Street, City, State, and ZIP Code) 10103 Freeman Ave. - Santa Fe Springs, Ca. 90670	
CHEMICAL NAME AND SYNONYMS chemical mixture	TRADE NAME AND SYNONYMS E-Stat ETch
CHEMICAL FAMILY Fountain Solution	FORMULA N/A

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Sodium Ferrocyanide	5	NA

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	212°F	SPECIFIC GRAVITY (H_2O=1)	1.184
VAPOR PRESSURE (mm Hg.)	NA	PERCENT, VOLATILE BY VOLUME (%)	81.0
VAPOR DENSITY (AIR=1)	NA	EVAPORATION RATE (______ =1)	NA
SOLUBILITY IN WATER	complete		

APPEARANCE AND ODOR Clear, pale green solution, no odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel
N/A			

EXTINGUISHING MEDIA

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARDS

(Continued on reverse side)

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE ($C_6F_eN_6N_a$), LD50 for mice, intra peritoneal : 512-1024 Mg/Kg

EFFECTS OF OVEREXPOSURE
Inability to concentrate, Nausea, dizziness when ingested.

EMERGENCY AND FIRST AID PROCEDURES
Remove from exposure. Seek medical attention.

SECTION VI - REACTIVITY DATA

STABILITY			
	UNSTABLE		CONDITIONS TO AVOID
	STABLE	x	

INCOMPATABILITY *(Materials to avoid)*
Avoid contact with strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS
HCN is liberated from contact with strong acids.

HAZARDOUS POLYMERIZATION			
	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	x	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Contain with absorbent materials. Wash area with detergents & water.

WASTE DISPOSAL METHOD
Bury absorbed materials in sanitary land-fill in accordance with local, state and federal regulations (RCRA). Do not incinerate or allow material to enter sewers.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*
NA

VENTILATION			
NA	LOCAL EXHAUST		
	MECHANICAL *(General)*	SPECIAL	

PROTECTIVE GLOVES	OTHER
Rubber	EYE PROTECTION Safety glasses or goggles

OTHER PROTECTIVE EQUIPMENT
NA

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Avoid contact with skin or eyes. Wash hands thoroughly after handling.

OTHER PRECAUTIONS
Do not store together with strong acids.

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-04

MAR 12 1997

Facility Area 100 Work Area PRINT SHOP Responsible Section 4052

Name of Waste WASTE PLATE FOUNTAIN SOLUTION

Describe the Process Generating the Waste:
THE 1PT PRODUCT TO 15 PARTS WATER SOLUTION IS USED TO ETCH PLATES AND IS DRAINED INTO A TANK IN THE MACHINE WHEN SPENT.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
-0-

Waste Description: Physical State LIQUID pH >6.0 <7.0
Specific Gravity 1.0 Flash Point NA

Other Comments: (phases, clarity, color, consistency, etc.)
LIGHT PINK

Quantity expected to be generated annually: 20. Units: GALLONS

Material Safety Data Sheet Number (if applicable): ATTACHED

Task Order associated with waste stream (if applicable): -0-

Form Completed By	Date
DANIEL SANCHEZ	03/18/91

Hazard Classification 3 If Nonhazardous, Disposal Method SEWER
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: -0-

Environmental Section Representative's Initials: MAE

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
-0-

Describe how the waste is collected at the point of generation:
-0-

Waste Accumulation Area, if applicable: -0-

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: -0-

Is this waste recycled? NO

List the offsite disposal method for this waste: -0-
(Incineration, Landfill, Treatment, etc.)

Comments:
DISCHARE TO SEWAGE LAGOON. INACTIVE AS OF 10/96.

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-04

APR 1 1991

Facility Area 100 Work Area PRINT SHOP Responsible Section 4052

Name of Waste WASTE PLATE FOUNTAIN SOLUTION

Describe the Process Generating the Waste:
THE 1PT PRODUCT TO 15 PARTS WATER SOLUTION IS USED TO ETCH PLATES AND IS DRAINED INTO A TANK IN THE MACHINE WHEN SPENT.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
-0-

Waste Description: Physical State LIQUID pH >6.0 <7.0
Specific Gravity 1.0 Flash Point NA

Other Comments: (phases, clarity, color, consistency, etc.)
LIGHT PINK

Quantity expected to be generated annually: 50. Units: GALLONS

Material Safety Data Sheet Number (if applicable): ATTACHED

Task Order associated with waste stream (if applicable): -0-

Form Completed By: DANIEL SANCHEZ
Date: 03/18/91

Hazard Classification 3 If Nonhazardous, Disposal Method SEWER
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: -0-

Environmental Section Representative's Initials: HFH

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
-0-

Describe how the waste is collected at the point of generation:
-0-

Waste Accumulation Area, if applicable: -0-

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: -0-

Is this waste recycled? NO

List the offsite disposal method for this waste: -0-
(Incineration, Landfill, Treatment, etc.)

Comments:
DISCHARE INTO NEAREST DRAIN TO SEWAGE LAGOON.

07-04
10-~~23~~-~~88~~ ~~09~~

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet

This page to be completed by Generator.

Facility Area 100   Work Area 100 print shop   Responsible Section 405D

Name of waste stream Waste plate Fountian ~~Concent~~

Describe the process generating the waste:

15 to 1   Replaces Estat Etch

List known hazardous constituents in waste stream and their concentrations:

Polyethylene Glycol

Ethylene Glycol

Waste Description: Physical State Liquid   pH ≈ 6.0

Specific Gravity ≈ 1   Flash Point NO

Other comments: (phases, clarity, color, consistency, etc.)

light pink

Quantity expected to be generated annually: 50   Units: Gallons

Material Safety Data Sheet Number (if applicable): Attached

Task Order associated with waste stream (if applicable): ______

Form Completed By: Daniel Sanchez   Date: 3/18/91

WSTF Individual Waste Profile Sheet

WIWPS # 10-~~FF~~ ~~07~~ 07-04

The following will be completed for Hazardous or Hazardous Constituent Waste By the Contractor Environmental Section.

Hazard Classification: 3 If Nonhazardous, Disposal Method Sewage Lagoon
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate waste in waste drum labeled —0—

Environmental Section representative's initials: UFH

If applicable, the USEPA waste ID numbers that apply to this waste:

—0—

Describe how the waste is collected at the point of generation:

—0—

If applicable, what Waste Accumulation Area is this waste collected in: —0—

If applicable, list onsite storage area where this waste is stored prior to shipment off site or disposal on site: —0—

Is this waste recycled? —0—

List the off-site disposal method for this waste: —0—
(Incineration, Landfill, Treatment, etc.)

Comments:

Dispose in a sewage drain

NASA Area Environmental Coordinator ____________

NASA Environmental Coordinator ____________

Date Printed: 12-12-1989 ✓ Page 1

MATERIAL SAFETY DATA SHEET
MSDS for 38776 ITEK MEGA PLATE FOUNTAIN.

1 -Section I - Product Identification

Manufacturer's Name FR CHEMICALS	Emergency Phone Number: (24 HOURS) (312) 763-1900/ CHEMTREC 800-424-9300
Street Address 524 SO. COLUMBUS AVE.	Date Prepared JULY/20/1989
City,State,Zip Code MT.VERNON, NY 10550	Prepared By KENNETH W. PINTER

Product Use: OFFSET PRINTING.

Chemical Name, Trade Name, Synonyms: CONTAINER SIZE: 1 QUART

HMIS RATING
1 - Health 0 - Flammability 0 - Reactivity A - Personal Protection

2 -Section II - Ingredients

Components	CAS NO.	% WT.	Exposure Limits OSHA PEL	ACGIH TLV	OTHER
WATER	7732-18-5	N.D.	N.D.	N.D.	
POLYETHLENE GLYCOL 300	25322-68-3	N.D.	N.D.	N.D.	
ETHYLENE GLYCOL	107-21-1	N.D.	50 PPM C).	50 PPM (C).	

(C): CEILING

3 -Section III - Physical Data

Boiling POINT(F): > 212	pH: 5.5
Vapor Pressure(mm Hg): N.D.	Freezing Point(F): N.D.
Vapor Density (AIR = 1): N.D.	% Volatile By Volume: > 80
Specific Gravity (H2O=1): 1.027	Color And Odor: PINK / ODORLESS

6 -Section VI - Health Hazard Data (Acute and Chronic)

Primary Route(s) of Entry: INHALATION, INGESTION.

Oral Ingestion: SWALLOWING ETHYLENE GLYCOL MAY CAUSE ABDOMINAL DISCOMFORT OR PAIN, EUPHORIA, CENTRAL NERVOUS SYSTEM DEPRESSION, OLIGURIA, URENIA. KIDENY DAMAGE POSSIBLE ETHYLENE GLYCOL MAY BE FATAL.

Eye Contact: EYE DISCOMFORT WITH POSSIBLE TRANSIENT CONJUNCTIVITIS. SERIOUS CORNEAL INJURY NOT ANTICIPATED.

Skin Contact: NO ADVERSE EFFECTS FROM AVAILABLE INFORMATION EITHER THROUGH CONTACT OR ABSORPTION.

Inhalation: ETHYLENE GLYCOL MISTS MAY IRRITATE THE NOSE AND THROAT. HIGH VAPOR CONCENTRATIONS CAUSED BY HEATING IN A POORLY VENTILATED AREA MAY PRODUCE NAUSEA, VOMITING, HEADACHE AND DIZZINESS.

Effects of Overexposure: MAY CAUSE NOSE AND THROAT IRRITATION. MAY CAUSE KIDNEY DAMAGE.

Medical Conditions Generally Aggravated by Exposure	NO MEDICAL CONDITIONS KNOWN TO BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

Carcinogenicity: NONE OF THE CHEMICALS USED IN THIS PRODUCT ARE LISTED ON NTP, IARC, OR OSHA LISTINGS OF CARCINOGENS.

Mutagenicity: NOT KNOWN TO BE MUTAGENIC.

Teratogenicity: NOT KNOWN TO BE TERATOGENIC.

Reproductive Toxicity: NOT KNOWN TO HAVE REPRODUCTIVE TOXICITY.

FIRST AID PROCEDURES

Ingestion: IF CONSCIOUS, GIVE 2 GLASSES OF WATER. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

Eye: FLUSH THE EYES THOROUGHLY WITH WATER. OBTAIN MEDICAL ATTENTION.

Skin: REMOVE CONTAMINATED CLOTHING AND FLUSH THE EXPOSED AREA THOROUGHLY WITH WATER.

Inhalation: REMOVE TO FRESH AIR. IF DISCOMFORT PERSISTS CONTACT A PHYSICIAN.

11 -Section XI - Transportation Information

Hazard Class: N.A.
DOT Proper Shipping Name: NOT REGULATED.

12 -Section XII - Regulatory Information

CERCLA/SUPERFUND,40 CFR 117,302: THIS PRODUCT DOES NOT CONTAIN ANY REPORTABLE QUANTITY (RQ) SUBSTANCE.

SARA(TITLE III) - Sections 302, 311, 312, and 313:

Section 302 Extremely Hazardous Substances (40 CFR 355): THIS PRODUCT DOES NOT CONTAIN ANY INGREDIENTS LISTED AS AN EXTREMELY HAZARDOUS SUBSTANCE.

Section 311 and 312 MSDS Submission and Inventory Reporting (40 CFR 370): THIS PRODUCT CONTAINS MATERIAL THAT MAY REQUIRE REPORTING UNDER 311 AND 312 IF STORED IN LARGE ENOUGH QUANTITIES.
Section 313 Toxic Chemical Release Reporting (40 CFR 372): THIS PRODUCT CONTAINS ETHYLENE GLYCOL WHICH MAY REQUIRE REPORTING UNDER SECTION 313.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
This product complies with rules and regulations of TSCA.

California Proposition 65: THIS PRODUCT DOES NOT CONTAIN ANY MATERIALS, THAT ARE CURRENTLY LISTED BY THE STATE OF CALIFORNIA UNDER PROPOSITION 65.

13 -Section XIII - Addition Information

NONE

N.D. = No Data N.A. = Not Applicable
The information herein given in good faith but no warranty, express or implied, is made.

7 -Section VII - Toxicology Information

Ingredient	Inhalation LC50	Oral LD50(RATS)	Dermal LD50(RABBITS)
WATER	N.D.	N.D.	N.D.
POLYETHYLENE GLYCOL 300	N.D.	N.D.	N.D.
ETHYLENE GLYCOL	N.D.	4.0g/KG	19.5g/KG

8 -Section VIII - Spill or Leak Procedure

Steps to be taken in case material is released or spilled: NEUTRALIZE WITH MILD CAUSTIC (BICARBONATE OF SODA). DILUTE WITH WATER (1+10 RATIO). SEWER SEWER DISPOSAL MAYBE SUITABLE. CONSULT LOCAL, STATE, AND FEDERAL REGULATORY AGENCIES FOR APPROPRIATE WASTE DISPOSAL METHODS.

Disposal Method: NEUTRALIZE WITH CAUSTIC (BICARBONATE OF SODA). DILUTE WITH WATER (1+10 RATIO). SEWER DISPOSAL MAY BE SUITABLE.CONSULT LOCAL, STATE AND FEDERAL REGULATORY AGENCIES FOR APPROPRIATE WASTE DISPOSAL METHODS.

9 -Section IX - Special Protection Information

Ventilation — Local Exhaust: RECOMMENDED. Special: N.A.
Mechanical(General): RECOMMENDED. Other: N.A.

Respiratory Protection: NONE REQUIRED.

Protective Clothing: GLOVES.

Eye Protection: SPLASH GOGGLES.

Other Protective Equipment: LAB COAT.

10 -Section X - Special Precautions

Precautions to be taken in Handling and Storing:
STORE AT ROOM TEMPERATURE. LAB COAT.

Other Precautions: CONTACT LENS WEARERS SHOULD WEAR REGULAR GLASSES.

3 -Section III - Physical Data (continued)

Odor Threshold: N.D. | Physical State: LIQUID

Evaporation Rate (Butyl Acetate = 1): N.D.

Solubility in Water: COMPLETE.

4 -Section IV - Fire and Explosion Hazard Data

FLASH POINT (METHOD USED): NONE. | Flammable Limits: LEL: N.A. | UEL: N.A.

Auto-ignition Temperature: N.D.

Extinguishing Media: NONE.

Special Fire Fighting Procedures: NONE.

Unusual Fire And Explosion Hazards: NONE.

5 -Section V - Reactivity Data

Stability Unstable :
Stable : X | Conditions to Avoid: NONE.

Incompatibility (Materials to Avoid): NONE.

Hazardous Decomposition Products: NONE.

Hazardous Polymerization | May Occur:
Will Not Occur: X | Conditions to Avoid: NONE.

Photographic Process Chemicals MSDS

(provided by Presstek)

MATERIAL SAFETY DATA SHEET

38745 & 38750 ITEK MEGA PLATE ACTIVATOR   Revision Date:1/1/09

Section I - Product Identification

Manufacturer's Name Presstek	Emergency Phone Number: (24 HOURS) CHEMTREC @ (800)424-9300
Street Address 55 Executive Drive	MSDS Request Phone Number: 1-603-595-7000
City,State,Zip Code Hudson, NH 03051	For MSDS via Fax: 1-800-995-0088
	Date Prepared: February 14, 1995
Product Use: PLATE ACTIVATOR.	Prepared By: Kenneth W. Pinter

Chemical Name, Trade Name, Synonyms: CONTAINER SIZE: 1 GALLON.

HMIS RATING
2 - Health   0 - Flammability   0 - Reactivity   A - Personal Protection

Section II - Ingredients

Components	CAS NO.	% WT.	Exposure Limits OSHA PEL	ACGIH TLV	OTHER
WATER	7732-18-5	70-90	N.A.	N.A.	
SODIUM SULFITE	7757-83-7	3-7	N.A.	N.A.	
POTASSIUM HYDROXIDE	1310-58-3	3-7	2 mg/M3(C).	2 mg/M3(C).	
N-AMINO ETHYLETHANOLAMINE	111-41-1	1-5	N.A.	N.A.	
SODIUM HYDROXIDE	1310-73-2	1-5	2 mg/M3(C).	2 mg/M3(C).	
			(C): CEILING		

Section III - Physical Data

Boiling POINT(F): > 212	pH: 13.8
Vapor Pressure(mm Hg): N.D.	Freezing Point(F): N.D.
Vapor Density (AIR = 1): N.D.	VOC: NONE
Specific Gravity (H2O=1): 1.102	Color And Odor: COLORLESS/ODORLESS
Odor Threshold: N.D.	Physical State: LIQUID

Evaporation Rate (Butyl Acetate = 1): N.D.

Solubility in Water: COMPLETE.

Section IV - Fire and Explosion Hazard Data

FLASH POINT (METHOD USED): NONE.   Flammable Limits:
LEL: N.A.   UEL: N.A.

Auto-ignition Temperature: N.D.

Extinguishing Media: NONE.

Special Fire Fighting Procedures: NONE.

Unusual Fire And Explosion Hazards: NONE.

Section V - Reactivity Data

Stability   Unstable :   Conditions to Avoid: NONE.
Stable : X

Incompatibility (Materials to Avoid): NONE.

Hazardous Decomposition Products: NONE.

Hazardous Polymerization	May Occur: Will Not Occur: X	Conditions to Avoid: NONE.

Section VI - Health Hazard Data (Acute and Chronic)

Primary Route(s) of Entry: SKIN, INHALATION, INGESTION.

Oral Ingestion: CORROSION OF TISSUE MAY OCCUR. NAUSEA, VOMITING, OR ABDOMINAL PAIN POSSIBLE. LARGE DOSES OF SODIUM SULFITE MAY CAUSE CIRCULATORY DISTURBANCES AND CENTRAL NERVOUS SYSTEM DEPRESSION.

Eye Contact: IRRITATION OR BURNING MAY OCCUR WITH POSSIBLE TISSUE DESTRUCTION. MAY CAUSE MODERATE TO SEVERE CORNEAL INJURY, WITH IRITIS.

Skin Contact: REDDENING, SWELLING OR BURNING MAY OCCUR. PROLONGRD OR REPEATED EXPOSURE MAY RESULT IN THE ABSORPTION OF POTENTIALLY HARMFUL AMOUNTS OF AMINOETHYLETHANOLAMINE.

Inhalation: CONCENTRATED MISTS MAY IRRITATE OR DAMAGE RESPIRATORY TRACT AND LUNGS. MAY CAUSE NAUSEA OR VOMITING.

Effects of Overexposure: MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION.

Medical Conditions Generally Aggravated by Exposure	SULFITES MAY CAUSE ALLERGIC REACTIONS IN SOME ASTHMATICS.

Carcinogenicity: NONE OF THE CHEMICALS USED IN THIS PRODUCT ARE LISTED ON NTP, IARC, OR OSHA LISTINGS OF CARCINOGENS.

Mutagenicity: NOT KNOWN TO BE MUTAGENIC.

Teratogenicity: NOT KNOWN TO BE TERATOGENIC.

Reproductive Toxicity: NOT KNOWN TO HAVE REPRODUCTIVE TOXICITY.

FIRST AID PROCEDURES

Ingestion: IF CONSCIOUS, GIVE 2 GLASSES OF WATER. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.
Eye: FLUSH WITH WATER FOR 15 MINUTES. OBTAIN MEDICAL ATTENTION. CHECK FOR CORNEAL INJURY.
Skin: REMOVE CONTAMINATED CLOTHING. WASH THE EXPOSED AREA THOROUGHLY WITH WATER. CONTACT A PHYSICIAN. WASH CONTAMINATED CLOTHING BEFORE RE-USE.
Inhalation: REMOVE TO FRESH AIR. IF ADVERSE SYMPTOMS DEVELOP, CONTACT A PHYSICIAN.

Section VII - Toxicology Information

Ingredient	Inhalation LC50	Oral LD50(RATS)	Dermal LD50(RABBITS)
WATER	N.A.	N.A.	N.A.
SODIUM SULFITE	N.D.	N.D.	N.D.
POTASSIUM HYDROXIDE	N.D.	365 mg/KG.	N.D.
N-AMINOETHYLETHANOLAMINE	N.D.	3000mg/KG	N.D.
SODIUM HYDROXIDE	N.D.	140-340mg/KG.	1350 mg/KG.

Section VIII - Spill or Leak Procedure

Steps to be taken in case material is released or spilled: DIKE THE SPILL AND SOAK UP WITH ABSORBANT MATERIAL. PREVENT LIQUID FROM ENTERING SEWERS OR WATERWAYS.

Disposal Method: IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS.

Section IX - Special Protection Information

Ventilation: Local Exhaust: RECOMMEND SUFFICIENT GENERAL ROOM VENTILATION AND/OR LOCAL EXHAUST. Special: N.A. Other: N.A.

Respiratory Protection: NONE REQUIRED.

Protective Clothing: GLOVES.

Eye Protection: SPLASH GOGGLES.

Other Protective Equipment: LAB COAT.

Section X - Special Precautions

Precautions to be taken in Handling and Storing: STORE AT ROOM TEMPERATURE, LAB COAT.

Other Precautions: CONTACT LENS WEARERS SHOULD WEAR REGULAR GLASSES.

Section XI - Transportation Information

Hazard Class: 8 Label: Corrosive
DOT Proper Shipping Name: Corrosive Liquids, N.O.S. (Potassium Hydroxide, Sodium Hydroxide), 8, UN1760, II

Section XII - Regulatory Information

CERCLA/SUPERFUND,40 CFR 117,302: THIS PRODUCT CONTAINS POTASSIUM HYDROXIDE AND SODIUM HYDROXIDE BOTH REPORTABLE QUANTITY (RQ) SUBSTANCES.

SARA(TITLE III) - Sections 302, 311, 312, and 313:

Section 302 Extremely Hazardous Substances (40 CFR 355): THIS PRODUCT DOES NOT CONTAIN ANY INGREDIENTS LISTED AS AN EXTREMELY HAZARDOUS SUBSTANCE.

Section 311 and 312 MSDS Submission and Inventory Reporting (40 CFR 370): THIS PRODUCT CONTAINS MATERIAL THAT MAY REQUIRE REPORTING UNDER 311 AND 312 IF STORED IN LARGE ENOUGH QUANTITIES.
Section 313 Toxic Chemical Release Reporting (40 CFR 372): THIS PRODUCT DOES NOT CONTAIN ANY INGREDIENTS ON THE LIST OF TOXIC CHEMICALS.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
This product complies with rules and regulations of TSCA.

California Proposition 65: THIS PRODUCT DOES NOT CONTAIN ANY MATERIALS, THAT ARE CURRENTLY LISTED BY THE STATE OF CALIFORNIA UNDER PROPOSITION 65.

Section XIII - Addition Information

NONE

N.D. = No Data N.A. = Not Applicable
The information herein given in good faith but no warranty, express or implied, is made.

MATERIAL SAFETY DATA SHEET

38753 & 38756 ITEK MEGA PLATE STABILIZER Revision Date:1/1/09

Section I - Product Identification

Manufacturer's Name: Presstek	Emergency Phone Number: (24 hours) CHEMTREC @ (800)424-9300
Street Address 55 Executive Drive	MSDS Request Phone Number: 1-603-595-7000
City,State,Zip Code Hudson, NH 03051	Date Prepared: January 10, 1994
	Prepared By: Kenneth W. Pinter

Product Use: PLATE STABILIZER.

Chemical Name, Trade Name, Synonyms: CONTAINER SIZE: 5 Gal Cube

HMIS RATING
1 - Health 0 - Flammability 0 - Reactivity B - Personal Protection

Section II - Hazardous Ingredients

Hazardous Components	CAS NO.	% WT.	Exposure Limits OSHA PEL	ACGIH TLV	OTHER
WATER	7732-18-5	80-90	N.A.	N.A.	
POTASSIUM PHOSPHATE	7778-83-7	5-15	N.A.	N.A.	
SODIUM SULFITE	7757-83-7	1-5	N.A.	N.A.	
			(C): CEILING.		

Section III - Physical Data

Boiling POINT(F): > 212	pH: 5.55
Vapor Pressure(mm Hg): NOT AVAILABLE	Freezing Point(F): N.D.
Vapor Density (AIR = 1): NOT AVAILABLE	VOC: 0.25 LBS/GAL
Specific Gravity (H2O=1): 1.061	Color And Odor: COLORLESS/ODORLESS
Odor Threshold: N.D.	Physical State: LIQUID

Evaporation Rate (Butyl Acetate = 1): N.D.

Solubility in Water: COMPLETE.

Section IV - Fire and Explosion Hazard Data

FLASH POINT (METHOD USED): NONE | Flammable Limits: LEL: N.A. | UEL: N.A.

Auto-ignition Temperature: N.D.

Extinguishing Media: NONE.

Special Fire Fighting Procedures: NONE.

Unusual Fire And Explosion Hazards: NONE.

Section V - Reactivity Data

Stability		Conditions to Avoid: NONE.
	Unstable :	
	Stable : X	

Incompatibility (Materials to Avoid): NONE.

Hazardous Decomposition Products: NONE.

Hazardous Polymerization	May Occur: Will Not Occur: X	Conditions to Avoid: NONE.

Section VI - Health Hazard Data (Acute and Chronic)

Primary Route(s) of Entry: EYE, INHALATION, INGESTION.

Oral Ingestion: MAY CAUSE ABDOMINAL DISCOMFORT OR PAIN, DIZZINESS, LUMBAR PAIN, OLIGURIA AND CENTRAL NERVOUS SYSTEM DEPRESSION. MAY CAUSE KIDNEY DAMAGE AND GASTROINTESTINAL IRRITATION.

Eye Contact: EYE DISCOMFORT WITH POSSIBLE TRANSIENT CONJUNCTIVITIS. SERIOUS CORNEAL INJURY NOT ANTICIPATED.

Skin Contact: NO ADVERSE EFFECTS.

Inhalation: MAY CAUSE IRRITATION TO NOSE AND THROAT.

Effects of Overexposure: EYE IRRITATION AND NAUSEA.

Medical Conditions Generally Aggravated by Exposure	NONE.

Carcinogenicity: CONTAINS NO MATERIALS THAT ARE CONSIDERED TO BE CARCINOGENS BY NTP / IARC OR OSHA.

Mutagenicity: NOT KNOWN TO BE MUTAGENIC.

Teratogenicity: NOT KNOWN TO BE TERATOGENIC.

Reproductive Toxicity: NO KNOWN TO HAVE REPRODUCTIVE TOXICITY.

FIRST AID PROCEDURES

Ingestion: DO NOT INDUCE VOMITING, SEEK MEDICAL ATTENTION.
Eye: FLUSH WITH WATER THOROUGHLY, SEEK MEDICAL ATTENTION.

Skin: REMOVE CONTAMINATED CLOTHING AND FLUSH THE EXPOSED AREA THOROUGHLY WITH WATER.
Inhalation: REMOVE TO FRESH AIR. IF DISCOMFORT PERSISTS, CALL A PHYSICIAN.

Section VII - Toxicology Information

Ingredient	Inhalation LC50	Oral LD50(RATS)	Dermal LD50(RABBITS)
WATER	N.D.	N.D.	N.D.
MONOPOTASSIUM PHOSPHATE	N.D.	N.D.	N.D.
SODIUM SULFITE	N.D.	N.D.	N.D.

Section VIII - Spill or Leak Procedure

Steps to be taken in case material is released or spilled:
DIKE THE SPILL AND SOAK UP WITH ABSORBANT MATERIAL. PREVENT LIQUID FROM ENTERING SEWERS.

Disposal Method: IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

MATERIAL SAFETY DATA SHEET

Section IX - Special Protection Information

Ventilation Local Exhaust: N.A. Special: N.A.
Mechanical(General): ACCEPTABLE. Other: N.A.

Respiratory Protection: NONE REQUIRED.

Protective Clothing: GLOVES TO PREVENT SKIN CONTACT.

Eye Protection: SPLASH GOGGLES.

Other Protective Equipment: LAB COAT.

Section X - Special Precautions

Precautions to be taken in Handling and Storing:
STORE AT ROOM TEMPERATURE. LAB COAT.

Other Precautions: CONTACT LENS WEARERS SHOULD WEAR REGULAR GLASSES.

Section XI - Transportation Information

Hazard Class: N.A.
DOT Proper Shipping Name: NOT REGULATED.

Section XII - Regulatory Information

CERCLA/SUPERFUND,40 CFR 117,302: THIS PRODUCT DOES NOT CONTAIN ANY REPORTABLE QUANTITY (RQ) SUBSTANCE.

SARA(TITLE III) - Sections 302, 311, 312, and 313:

Section 302 Extremely Hazardous Substances (40 CFR 355): THIS PRODUCT DOES NOT CONTAIN ANY INGREDIENTS LISTED AS AN EXTREMELY HAZARDOUS SUBSTANCE.

Section 311 and 312 MSDS Submission and Inventory Reporting (40 CFR 370): THIS PRODUCT CONTAINS MATERIAL THAT MAY REQUIRE REPORTING UNDER 311 AND 312 IF STORED IN LARGE ENOUGH QUANTITIES.
Section 313 Toxic Chemical Release Reporting (40 CFR 372): None

TOXIC SUBSTANCES CONTROL ACT (TSCA):
This product complies with rules and regulations of TSCA.

California Proposition 65: THIS PRODUCT DOES NOT CONTAIN ANY MATERIALS, THAT ARE CURRENTLY LISTED BY THE STATE OF CALIFORNIA UNDER PROPOSITION 65.

Section XIII - Addition Information

NONE

N.D. = No Data N.A. = Not Applicable
The information herein given in good faith but no warranty, express or implied, is made.

Photographic Process Chemicals MSDS

(from 1991 WIWPS)

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-03

MAR 1 7 1997

Facility Area 100 Work Area PRINT SHOP Responsible Section 4052

Name of Waste WASTE PLATE DEVELOPER

Describe the Process Generating the Waste:
PRODUCT IS MIXED 1 TO 1 WITH WATER FOR DEVELOPING PRINTER PLATES AT A RATE OF APPROX. 1 GALLON PER WEEK THEN DRAINED INTO A CATCH TANK FOR EMPTING ONCE A MONTH.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
SODIUM HYDROXIDE (<3%), POTASSIUM HYDROXIDE (<3%)

Waste Description: Physical State LIQUID pH 13.8
Specific Gravity 1.1 Flash Point NA

Other Comments: (phases, clarity, color, consistency, etc.)
COLORLESS, ODORLESS

Quantity expected to be generated annually: 40. Units: GALLONS

Material Safety Data Sheet Number (if applicable): ATTACHED

Task Order associated with waste stream (if applicable): -0-

Form Completed By: DANIEL SANCHEZ
Date: 03/18/91

Hazard Classification 1 If Nonhazardous, Disposal Method -0-
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: WASTE PLATE DEVELOPER

Environmental Section Representative's Initials: MAE

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
D002

Describe how the waste is collected at the point of generation:
IN CONTAINER # 419

Waste Accumulation Area, if applicable: PRINTS

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: EVAP TNK

Is this waste recycled? NO

List the offsite disposal method for this waste: WMDS 101863
(Incineration, Landfill, Treatment, etc.)

Comments:
CALL THE ENVIRONMENTAL SECTION FOR TRANSFER AND DISPOSAL SUPPORT. UPDATED 02/17/94 T. DAVIS. INACTIVE AS OF 10/96.

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE MAR 2 4 1993
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-03

Facility Area 100 Work Area PRINT SHOP Responsible Section 4052

Name of Waste WASTE PLATE DEVELOPER

Describe the Process Generating the Waste:
PRODUCT IS MIXED 1 TO 1 WITH WATER FOR DEVELOPING PRINTER PLATES AT A RATE OF APPROX. 1 GALLON PER WEEK THEN DRAINED INTO A CATCH TANK FOR EMPTING ONCE A MONTH.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
SODIUM HYDROXIDE (<3%), POTASSIUM HYDROXIDE (<3%)

Waste Description: Physical State LIQUID pH 13.8
Specific Gravity 1.1 Flash Point NA

Other Comments: (phases, clarity, color, consistency, etc.)
COLORLESS, ODORLESS

Quantity expected to be generated annually: 40. Units: GALLONS

Material Safety Data Sheet Number (if applicable): ATTACHED

Task Order associated with waste stream (if applicable): -0-

Form Completed By: DANIEL SANCHEZ
Date: 03/18/91

Hazard Classification 1 If Nonhazardous, Disposal Method -0-
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: WASTE PLATE DEVELOPER

Environmental Section Representative's Initials: HFH

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
D002

Describe how the waste is collected at the point of generation:
IN CONTAINER # 419

Waste Accumulation Area, if applicable: PRINTS

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: EVAP TNK

Is this waste recycled? NO

List the offsite disposal method for this waste: WMDS 101863
(Incineration, Landfill, Treatment, etc.)

Comments:
CALL THE ENVIRONMENTAL SECTION FOR ACCESS AND SUPPORT FOR DISPOSAL 5461.
UPDATED 12-11-91 PKM

SECTION I

CATALOGUE NUMBER(S): 38745, 38750
PRODUCT NAME: ITEK MEGA PLATE DEVELOPER
MANUFACTURER: FR Chemicals 524 South Columbus Avenue Mt. Vernon, New York 10550
PRODUCT INFORMATION: (914)-667-1002 MSDS REVISED AS OF: 05/01/91
EXPOSURE or ACCIDENT EMERGENCY (24 HOUR): CHEMTREC (800) 424-9300

SECTION II: COMPONENT AND REGULATORY INFORMATION

COMPONENTS & (REGULATORY LISTS)	CAS REG. NO.	OSHA PEL	ACGIH TLV	% WT.
Water	7732-18-5	N/A	N/A	60-100
Sodium Sulfite	7757-83-7	N/A	N/A	3-7
Potassium Hydroxide (A)	1310-58-3	N/A	(TWA) 2 mg/m3 *	1-5
N-Aminoethylethanolamine	111-41-1	N/A	N/A	1-5
Sodium Hydroxide (A)	1310-73-2	(TWA) 2 mg/m3	(TWA) 2 mg/m3 *	1-5

* CEILING VALUE (TWA) - TIME WEIGHTED AVERAGE N/A - NOT APPLICABLE

REGULATORY LISTS FOR APPLICABLE COMPONENTS
A - CERCLA HAZARDOUS SUBSTANCE LIST
B - SARA TITLE III EXTREMELY HAZARDOUS SUBSTANCE LIST (SECTION 302)
C - SARA TITLE III TOXIC CHEMICAL LIST (SECTION 313)
D - CALIFORNIA (PROP. 65) LIST OF CANCER CAUSING SUBSTANCES
E - RESOURCE CONSERVATION AND RECOVERY ACT HAZARDOUS WASTE LIST

SECTION III: PHYSICAL DATA

pH: 13.8 SPECIFIC GRAVITY: 1.10 SOLUBILITY IN WATER: Completely soluble.
BOILING POINT: Approx. 212 F EVAPORATION RATE: Not Available
VOC CONTENT: 0 Lbs/Gallon VAPOR PRESSURE: Not Available
% VOLATILITY (as Water) 60-100 as Water. VAPOR DENSITY: Not Available
APPEARANCE AND ODOR: Colorless, odorless solution.

SECTION IV: FIRE AND EXPLOSION DATA

FLASH POINT (METHOD USED): None
FLAMMABLE LIMITS - LEL: N/A UEL: N/A
EXTINGUISHING MEDIA: Any applicable to the primary cause of fire.
SPECIAL FIREFIGHTING PROCEDURES: Evacuate personnel to a safe area. Firefighters should wear self-contained breathing apparatus.
UNUSUAL FIRE HAZARDS: Excessive heat may release sulfur dioxide vapors.

SECTION V: REACTIVITY

STABILITY: Stable CONDITIONS TO AVOID: None
INCOMPATIBILITY (AVOID): Avoid strong acids.
HAZARDOUS DECOMPOSITION PRODUCTS: Sulfur Dioxide
POLYMERIZATION: Does not polymerize. CONDITIONS TO AVOID: None

SECTION VI: SPILL AND DISPOSAL INFORMATION

S P I L L S
Use appropriate protective equipment. Dike the spill and soak up with absorbant material. Prevent liquid from entering sewers or waterways. Dispose in accordance with Federal, State, and Local Regulations.
W A S T E D I S P O S A L
Discharge to sewer requires the approval of permitting authority and may require pretreatment. Incineration requires a permitted incinerator. Landfill disposal requires a permitted landfill. Treatment, storage, transportation, and disposal must be in accordance with Federal, State, and Local Regulations.

SECTION VII: HEALTH HAZARD AND FIRST AID INFORMATION

EXPOSURE EFFECTS:
EYE CONTACT: Irritation or burning may occur with possible tissue destruction. May cause moderate to severe corneal injury, with iritis.
SKIN CONTACT: Reddening, swelling or burning may occur. Prolonged or repeated exposure may result in the absorpotion of potentially harmful amounts of aminoethylethanolamine.
INGESTION: Corrosion of tissue may occur. Nausea, vomiting, or abdominal pain possible. Large doses of sodium sulfite may cause circulatory disturbances and central nervous system depression.
INHALATION: Concentrated mists may irritate or damage respiratory tract and lungs. May cause nausea or vomiting.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Sulfites may cause allergic reactions in some asthmatics.

CARCINOGENICITY: None of the chemicals used in this product are listed on NTP, IARC, or OSHA listings of carcinogens.

FIRST AID:
EYE: Flush with water for 15 minutes. Obtain medical attention. Check for corneal injury.

SKIN: Remove contaminated clothing. Wash the exposed area thoroughly with water. Contact a physician. Wash contaminated clothing before re-use.
INGESTION: If conscious, give 2 glasses of water. Do not induce vomiting. Obtain prompt medical attention.
INHALATION: Remove to fresh air. If adverse symptoms develop, contact a physician.

SECTION VIII: SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Use a NIOSH approved cartridge respirator in poorly ventilated areas.
VENTILATION RECOMENDED: 10 room volumes per hour is adequate ventilation under normal conditions.
PROTECTIVE EQUIPMENT RECOMMENDED: Chemical splash goggles, latex or neoprene gloves, lab coat, and eye wash station.

SECTION IX: SPECIAL PRECAUTIONS

STORAGE AND HANDLING PRECAUTIONS: Store in a well ventilated area. Keep container tightly capped when not in use. Do not store food, drink, or tobacco in areas where contamination could occur with this product.
OTHER PRECAUTIONS: Avoid breathing vapors or mists. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Do not take internally. Keep out of reach of children.

SECTION X: NFPA RATING

HEALTH - 2 FLAMMABILITY - 0 REACTIVITY - 0

SECTION X1: DOT INFORMATION

DOT SHIPPING NAME: Potassium Hydroxide Solution
HAZARD CLASS: Corrosive Material
ID #: UN 1814

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-03

Facility Area 100 Work Area PRINT SHOP Responsible Section 4052

Name of Waste WASTE PLATE DEVELOPER

Describe the Process Generating the Waste:
PRODUCT IS MIXED 1 TO 1 WITH WATER FOR DEVELOPING PRINTER PLATES AT A RATE OF APPROX. 1 GALLON PER WEEK THEN DRAINED INTO A CATCH TANK FOR EMPTING ONCE A MONTH.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
SODIUM HYDROXIDE (1-5%), POTASSIUM HYDROXIDE (1-5%)

Waste Description: Physical State LIQUID pH 13.8
Specific Gravity 1.1 Flash Point NA

Other Comments: (phases, clarity, color, consistency, etc.)
COLORLESS, ODORLESS

Quantity expected to be generated annually: 40. Units: GALLONS

Material Safety Data Sheet Number (if applicable): ATTACHED

Task Order associated with waste stream (if applicable): -0-

Form Completed By: DANIEL SANCHEZ
Date: 03/18/91

Hazard Classification 1 If Nonhazardous, Disposal Method -0-
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: WASTE PLATE DEVELOPER

Environmental Section Representative's Initials: HFH

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
D002

Describe how the waste is collected at the point of generation:
IN CONTAINER # 419

Waste Accumulation Area, if applicable: PRINTS

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: EVAP TNK

Is this waste recycled? NO

List the offsite disposal method for this waste: WMDS 101863
(Incineration, Landfill, Treatment, etc.)

Comments:
CALL THE ENVIRONMENTAL SECTION FOR ACCESS AND SUPPORT FOR DISPOSAL 5461.
UPDATED 12-11-91 PKM

A Division of CINE MAGNETICS, INC.

FASCIMILE TRANSMITTAL

DATE: 12-11-91

NUMBER OF PAGES TRANSMITTED

(INCLUDES THIS COPY) 3

TO: Pat Matthews

COMPANY: Lockheed

REGARDING: MSDS

FROM: GLEN URDSICK - ASSISTANT CHEMIST

COMPANY: FRC

PHONE: (800) 456-7800 FAX: (914) 667-0068

MESSAGE: Following is the information You Requested

DEC 11 11 40 AM '91
COMM CENTER
NASA JSC/WSTF.N.MEX.

NEW YORK:
524 South Columbus Avenue
Mt. Vernon, NY 10550
FAX: (914) 667-6165

Toll Free (800) 456-7800
N.Y.S. 914-667-1002
N.Y.C. 212-733-1288

CALIFORNIA:
517 Maple Avenue
Carpinteria, CA 93013

805-684-4528
FAX: (805) 684-5207

SECTION I

CATALOGUE NUMBER(S): 38745, 38750
PRODUCT NAME: ITEK MEGA PLATE DEVELOPER
MANUFACTURER: FR Chemicals 524 South Columbus Avenue Mt. Vernon, New York 10550
PRODUCT INFORMATION: (914)-667-1002 MSDS REVISED AS OF: 05/01/91
EXPOSURE or ACCIDENT EMERGENCY (24 HOUR): CHEMTREC (800) 424-9300

SECTION II: COMPONENT AND REGULATORY INFORMATION

COMPONENTS & (REGULATORY LISTS)	CAS REG. NO.	OSHA PEL	ACGIH TLV	% WT.
Water	7732-18-5	N/A	N/A	60-100
Sodium Sulfite	7757-83-7	N/A	N/A	3-7
Potassium Hydroxide (A)	1310-58-3	N/A	(TWA) 2 mg/m3 *	1-5
N-Aminoethylethanolamine	111-41-1	N/A	N/A	1-5
Sodium Hydroxide (A)	1310-73-2	(TWA) 2 mg/m3	(TWA) 2 mg/m3 *	1-5

* CEILING VALUE (TWA) - TIME WEIGHTED AVERAGE N/A - NOT APPLICABLE

REGULATORY LISTS FOR APPLICABLE COMPONENTS
A - CERCLA HAZARDOUS SUBSTANCE LIST
B - SARA TITLE III EXTREMELY HAZARDOUS SUBSTANCE LIST (SECTION 302)
C - SARA TITLE III TOXIC CHEMICAL LIST (SECTION 313)
D - CALIFORNIA (PROP. 65) LIST OF CANCER CAUSING SUBSTANCES
E - RESOURCE CONSERVATION AND RECOVERY ACT HAZARDOUS WASTE LIST

SECTION III: PHYSICAL DATA

pH: 13.8 SPECIFIC GRAVITY: 1.10 SOLUBILITY IN WATER: Completely soluble.
BOILING POINT: Approx. 212 F EVAPORATION RATE: Not Available
VOC CONTENT: 0 Lbs/Gallon VAPOR PRESSURE: Not Available
% VOLATILITY (as Water) 60-100 as Water. VAPOR DENSITY: Not Available
APPEARANCE AND ODOR: Colorless, odorless solution.

SECTION IV: FIRE AND EXPLOSION DATA

FLASH POINT (METHOD USED): None
FLAMMABLE LIMITS - LEL: N/A UEL: N/A
EXTINGUISHING MEDIA: Any applicable to the primary cause of fire.
SPECIAL FIREFIGHTING PROCEDURES: Evacuate personnel to a safe area. Firefighters should wear self-contained breathing apparatus.
UNUSUAL FIRE HAZARDS: Excessive heat may release sulfur dioxide vapors.

SECTION V: REACTIVITY

STABILITY: Stable CONDITIONS TO AVOID: None
INCOMPATIBILITY (AVOID): Avoid strong acids.
HAZARDOUS DECOMPOSITION PRODUCTS: Sulfur Dioxide
POLYMERIZATION: Does not polymerize. CONDITIONS TO AVOID: None

SECTION VI: SPILL AND DISPOSAL INFORMATION

S P I L L S
Use appropriate protective equipment. Dike the spill and soak up with absorbant material. Prevent liquid from entering sewers or waterways. Dispose in accordance with Federal, State, and Local Regulations.
W A S T E D I S P O S A L
Discharge to sewer requires the approval of permitting authority and may require pretreatment. Incineration requires a permitted incinerator. Landfill disposal requires a permitted landfill. Treatment, storage, transportation, and disposal must be in accordance with Federal, State, and Local Regulations.

SECTION VII: HEALTH HAZARD AND FIRST AID INFORMATION

EXPOSURE EFFECTS:
EYE CONTACT: Irritation or burning may occur with possible tissue destruction. May cause moderate to severe corneal injury, with iritis.
SKIN CONTACT: Reddening, swelling or burning may occur. Prolonged or repeated exposure may result in the absorpotion of potentially harmful amounts of aminoethylethanolamine.
INGESTION: Corrosion of tissue may occur. Nausea, vomiting, or abdominal pain possible. Large doses of sodium sulfite may cause circulatory disturbances and central nervous system depression.
INHALATION: Concentrated mists may irritate or damage respiratory tract and lungs. May cause nausea or vomiting.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Sulfites may cause allergic reactions in some asthmatics.

CARCINOGENICITY: None of the chemicals used in this product are listed on NTP, IARC, or OSHA listings of carcinogens.

FIRST AID:
EYE: Flush with water for 15 minutes. Obtain medical attention. Check for corneal injury.

SKIN: Remove contaminated clothing. Wash the exposed area thoroughly with water. Contact a physician. Wash contaminated clothing before re-use.
INGESTION: If conscious, give 2 glasses of water. Do not induce vomiting. Obtain prompt medical attention.
INHALATION: Remove to fresh air. If adverse symptoms develop, contact a physician.

SECTION VIII: SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Use a NIOSH approved cartridge respirator in poorly ventilated areas.
VENTILATION RECOMENDED: 10 room volumes per hour is adequate ventilation under normal conditions.
PROTECTIVE EQUIPMENT RECOMMENDED: Chemical splash goggles, latex or neoprene gloves, lab coat, and eye wash station.

SECTION IX: SPECIAL PRECAUTIONS

STORAGE AND HANDLING PRECAUTIONS: Store in a well ventilated area. Keep container tightly capped when not in use. Do not store food, drink, or tobacco in areas where contamination could occur with this product.
OTHER PRECAUTIONS: Avoid breathing vapors or mists. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Do not take internally. Keep out of reach of children.

SECTION X: NFPA RATING

HEALTH - 2 FLAMMABILITY - 0 REACTIVITY - 0

SECTION X1: DOT INFORMATION

DOT SHIPPING NAME: Potassium Hydroxide Solution
HAZARD CLASS: Corrosive Material
ID #: UN 1814

10-~~99~~-~~08~~ 07-03

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet

This page to be completed by Generator.

Facility Area 100 Work Area 101 Printing Shop Responsible Section 405R

Name of waste stream Waste Plate Developer

Describe the process generating the waste:

Mix 2½ product to 2½ H_2O to Develope Plates
Waste is drained from the machine's tank one a month for disposal Replaced Solvent

List known hazardous constituents in waste stream and their concentrations:

Sodium Sulfite, Potassium Hydroxide
N. Amino Ethylenolamine, Sodium Hydroxide

Waste Description: Physical State Liquid pH 13.8

Specific Gravity 1.1 Flash Point None

Other comments: (phases, clarity, color, consistency, etc.)

Colorless – Odorless

Quantity expected to be generated annually: 50 Units: Gallons

Material Safety Data Sheet Number (if applicable): Attached

Task Order associated with waste stream (if applicable): ________

Form Completed By: Daniel Sanchez

Date: 3/18/91

WSTF Individual Waste Profile Sheet

WIWPS # 10-~~95~~ ~~08~~ 07-03

The following will be completed for Hazardous or Hazardous Constituent Waste By the Contractor Environmental Section.

Hazard Classification: 1 If Nonhazardous, Disposal Method ______
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate waste in waste drum labeled Waste, Plate Developer

Environmental Section representative's initials: HFH

If applicable, the USEPA waste ID numbers that apply to this waste:

D002

Describe how the waste is collected at the point of generation:

Drum Collection Can

If applicable, what Waste Accumulation Area is this waste collected in: Evap Tank

If applicable, list onsite storage area where this waste is stored prior to shipment off site or disposal on site: -0-

Is this waste recycled? NO

List the off-site disposal method for this waste: -0-
(Incineration, Landfill, Treatment, etc.)

Comments:

Call Environmental Section for access to Evap Tank and Support (5461)

NASA Area Environmental Coordinator ______

NASA Environmental Coordinator ______

(914) 667-1002

MATERIAL SAFETY DATA SHEET
MSDS for 38750 ITEK MEGA PLATE DEVELOPER.

1 -Section I - Product Identification

Manufacturer's Name FR CHEMICALS	Emergency Phone Number: (24 HOURS) (312) 763-1900/ CHEMTREC 800-424-9300
Street Address 524 SO. COLUMBUS AVE.	Date Prepared JULY/20/1989
City,State,Zip Code MT.VERNON, NY 10550	Prepared By KENNETH W. PINTER

Product Use: PLATE DEVELOPER.

Chemical Name, Trade Name, Synonyms: CONTAINER SIZE: 1 GALLON.

HMIS RATING
2 - Health 0 - Flammability 0 - Reactivity A - Personal Protection

2 -Section II - Ingredients

Components	CAS NO.	% WT.	Exposure Limits OSHA PEL	ACGIH TLV	OTHER
WATER	7732-18-5	~~N.D.~~	N.A.	N.A.	
SODIUM SULFITE	7757-83-7	N.D.	N.A.	N.A.	
POTASSIUM HYDROXIDE	1310-58-3	N.D.	2 mg/M3(C).	2 mg/M3(C).	
N-AMINO ETHYLETHANOLAMINE	111-41-1	N.D.	N.A.	N.A.	
SODIUM HYDROXIDE	1310-73-2	N.D.	2 mg/M3(C). (C): CEILING	2 mg/M3(C).	

3 -Section III - Physical Data

Boiling POINT(F): > 212	pH: 13.8
Vapor Pressure(mm Hg): N.D.	Freezing Point(F): N.D.
Vapor Density (AIR = 1): N.D.	% Volatile By Volume: > 80
Specific Gravity (H2O=1): 1.102	Color And Odor: COLORLESS/ODORLESS

6 -Section VI - Health Hazard Data (Acute and Chronic)

Primary Route(s) of Entry: SKIN, INHALATION, INGESTION.

Oral Ingestion: CORROSION OF TISSUE MAY OCCUR. NAUSEA, VOMITING, OR ABDOMINAL PAIN POSSIBLE. LARGE DOSES OF SODIUM SULFITE MAY CAUSE CIRCULATORY DISTURBANCES AND CENTRAL NERVOUS SYSTEM DEPRESSION.

Eye Contact: IRRITATION OR BURNING MAY OCCUR WITH POSSIBLE TISSUE DESTRUCTION. MAY CAUSE MODERATE TO SEVERE CORNEAL INJURY, WITH IRITIS.

Skin Contact: REDDENING, SWELLING OR BURNING MAY OCCUR. PROLONGRD OR REPEATED EXPOSURE MAY RESULT IN THE ABSORPTION OF POTENTIALLY HARMFUL AMOUNTS OF AMINOETHYLETHANOLAMINE.

Inhalation: CONCENTRATED MISTS MAY IRRITATE OR DAMAGE RESPIRATORY TRACT AND LUNGS. MAY CAUSE NAUSEA OR VOMITING.

Effects of Overexposure: MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION.

Medical Conditions Generally Aggravated by Exposure	SULFITES MAY CAUSE ALLERGIC REACTIONS IN SOME ASTHMATICS.

Carcinogenicity: NONE OF THE CHEMICALS USED IN THIS PRODUCT ARE LISTED ON NTP, IARC, OR OSHA LISTINGS OF CARCINOGENS.

Mutagenicity: NOT KNOWN TO BE MUTAGENIC.

Teratogenicity: NOT KNOWN TO BE TERATOGENIC.

Reproductive Toxicity: NOT KNOWN TO HAVE REPRODUCTIVE TOXICITY.

FIRST AID PROCEDURES

Ingestion: IF CONSCIOUS, GIVE 2 GLASSES OF WATER. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.
Eye: FLUSH WITH WATER FOR 15 MINUTES. OBTAIN MEDICAL ATTENTION. CHECK FOR CORNEAL INJURY.
Skin: REMOVE CONTAMINATED CLOTHING. WASH THE EXPOSED AREA THOROUGHLY WITH WATER. CONTACT A PHYSICIAN. WASH CONTAMINATED CLOTHING BEFORE RE-USE.
Inhalation: REMOVE TO FRESH AIR. IF ADVERSE SYMPTOMS DEVELOP, CONTACT A PHYSICIAN.

11 -Section XI - Transportation Information

Hazard Class: CORROSIVE.
DOT Proper Shipping Name: POTASSIUM HYDROXIDE SOLUTION. UN# 1814

12 -Section XII - Regulatory Information

CERCLA/SUPERFUND,40 CFR 117,302: THIS PRODUCT CONTAINS POTASSIUM HYDROXIDE AND SODIUM HYDROXIDE BOTH REPORTABLE QUANTITY (RQ) SUBSTANCES.

SARA(TITLE III) - Sections 302, 311, 312, and 313:

Section 302 Extremely Hazardous Substances (40 CFR 355): THIS PRODUCT DOES NOT CONTAIN ANY INGREDIENTS LISTED AS AN EXTREMELY HAZARDOUS SUBSTANCE.

Section 311 and 312 MSDS Submission and Inventory Reporting (40 CFR 370): THIS PRODUCT CONTAINS MATERIAL THAT MAY REQUIRE REPORTING UNDER 311 AND 312 IF STORED IN LARGE ENOUGH QUANTITIES.
Section 313 Toxic Chemical Release Reporting (40 CFR 372): THIS PRODUCT CONTAINS SODIUM HYDROXIDE WHICH MAY REQUIRE REPORTING UNDER SECTION 313.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
This product complies with rules and regulations of TSCA.

California Proposition 65: THIS PRODUCT DOES NOT CONTAIN ANY MATERIALS, THAT ARE CURRENTLY LISTED BY THE STATE OF CALIFORNIA UNDER PROPOSITION 65.

13 -Section XIII - Addition Information

NONE

N.D. = No Data N.A. = Not Applicable
The information herein given in good faith but no warranty, express or implied, is made.

10-07-03

LAND BAN WASTE DATA

1. **BAN CITATION:**

   40 CFR 268.~~42~~ 35

2. **SITE HANDLING & TREATMENT:**

   Waste is drained to 200 Area Evaporation Tanks

3. **CONSTITUENTS:**

   Sodium and Potassium Hydroxide

4. **RECORDKEEPING:**

   (a) **UHWM NO.:** NONE

   (b) **USEPA I.D. NO.:** D002

   (c) **TREATMENT STANDARD:** Deactivation (40 CFR 268.42)

   (d) **PROHIBITIONS:** Land Disposal

   (e) **WASTE ANALYSIS:** MSDS and process knowledge

3 -Section III - Physical Data (continued)

Odor Threshold: N.D. | Physical State: LIQUID

Evaporation Rate (Butyl Acetate = 1): N.D.

Solubility in Water: COMPLETE.

4 -Section IV - Fire and Explosion Hazard Data

FLASH POINT (METHOD USED): NONE. | Flammable Limits: LEL: N.A. | UEL: N.A.

Auto-ignition Temperature: N.D.

Extinguishing Media: NONE.

Special Fire Fighting Procedures: NONE.

Unusual Fire And Explosion Hazards: NONE.

5 -Section V - Reactivity Data

Stability — Unstable : — Stable : X | Conditions to Avoid: NONE.

Incompatibility (Materials to Avoid): NONE.

Hazardous Decomposition Products: NONE.

Hazardous Polymerization | May Occur: — Will Not Occur: X | Conditions to Avoid: NONE.

7 -Section VII - Toxicology Information

Ingredient	Inhalation LC50	Oral LD50(RATS)	Dermal LD50(RABBITS)
WATER	N.A.	N.A.	N.A.
SODIUM SULFITE	N.D.	N.D.	N.D.
POTASSIUM HYDROXIDE	N.D.	365 mg/KG.	N.D.
N-AMINOETHYLETHANOLAMINE	N.D.	3000mg/KG	N.D.
SODIUM HYDROXIDE	N.D.	140-340mg/KG.	1350 mg/KG.

8 -Section VIII - Spill or Leak Procedure

Steps to be taken in case material is released or spilled: NEUTRALIZE WITH WEAK ACID. DILUTE WITH LARGE AMOUNTS OF WATER (1+10 RATIO). SEWER DISPOSAL MAY BE SUITABLE UNDER AN APPROVED PERMIT. CONSULT LOCAL REGULATORY AGENCIES FOR APPROPRIATE WASTE DISPOSAL METHODS.

Disposal Method: NEUTRALIZE WITH WEAK ACID. DILUTE WITH LARGE AMOUNTS OF WATER (1+10 RATIO). SEWER DISPOSAL MAY BE SUITABLE UNDER AN APPROVED PERMIT. CONSULT LOCAL REGULATORY AGENCIES FOR APPROPRIATE WASTE DISPOSAL METHODS.

9 -Section IX - Special Protection Information

Ventilation
Local Exhaust: RECOMMENDED. Special: N.A.
Mechanical(General): RECOMMENDED. Other: N.A.

Respiratory Protection: NONE REQUIRED.

Protective Clothing: GLOVES.

Eye Protection: SPLASH GOGGLES.

Other Protective Equipment: LAB COAT.

10 -Section X - Special Precautions

Precautions to be taken in Handling and Storing: STORE AT ROOM TEMPERATURE, LAB COAT.

Other Precautions: CONTACT LENS WEARERS SHOULD WEAR REGULAR GLASSES.

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-07

MAR 1 2 1997

Facility Area 100 | Work Area PRINT SHOP | Responsible Section 4052

Name of Waste WASTE PRINTING STABILIZER

Describe the Process Generating the Waste:
THE 1 PART PRODUCT TO 3 PARTS WATER SOLUTION IS USED TO PREPARE PRINTING PLATES AND COLLECTED IN AN ACCUMULATION TANK WHEN SPENT.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
ETHELENE GLYCOL

Waste Description: Physical State LIQUID | pH 5.55
Specific Gravity 1.06 | Flash Point NA

Other Comments: (phases, clarity, color, consistency, etc.)
CLEAR LIQUID

Quantity expected to be generated annually: 44. Units: GALLONS

Material Safety Data Sheet Number (if applicable): ATTACHED

Task Order associated with waste stream (if applicable): -0-

Form Completed By: DANIEL SANCHEZ
Date: 03/18/91

Hazard Classification 3 If Nonhazardous, Disposal Method SEWAGE LAGOON
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: -0-

Environmental Section Representative's Initials: MAE

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
-0-

Describe how the waste is collected at the point of generation:
-0-

Waste Accumulation Area, if applicable: -0-

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: -0-

Is this waste recycled? NO

List the offsite disposal method for this waste: -0-
(Incineration, Landfill, Treatment, etc.)

Comments:
SEWAGE LAGOON DISPOSAL. INACTIVE AS OF 10/96.

APR 08 1994

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet
WIWPS # 10-07-07

Facility Area 100   Work Area PRINT SHOP   Responsible 4052 Section

Name of Waste WASTE PRINTING STABILIZER

Describe the Process Generating the Waste:
THE 1 PART PROTUCT TO 3 PARTS WATER SOLUTION IS USED TO PREPARE PRINTING PLATES AND COLLECTED IN AN ACCUMULATION TANK WHEN SPENT.

List known Hazardous Constituents in Waste Stream and Their Concentrations:
ETHELENE GLYCOL

Waste Description: Physical State LIQUID   pH 5.55
Specific Gravity 1.06   Flash Point NA

Other Comments: (phases, clarity, color, consistency, etc.)
CLEAR LIQUID

Quantity expected to be generated annually: 44. Units: GALLONS

Material Safety Data Sheet Number (if applicable): ATTACHED

Task Order associated with waste stream (if applicable): -0-

Form Completed By: DANIEL SANCHEZ   Date: 03/18/91

Hazard Classification 3 If Nonhazardous, Disposal Method SEWAGE LAGOON
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate Waste in Waste Drum Labeled: -0-

Environmental Section Representative's Initials: TJD

The following will be completed for Hazardous or Hazardous Constituent Waste

If applicable, what USEPA waste ID numbers apply to this waste:
-0-

Describe how the waste is collected at the point of generation:
-0-

Waste Accumulation Area, if applicable: -0-

If applicable, list onsite storage area where this waste is stored prior to shipment offsite or disposal onsite: -0-

Is this waste recycled? NO

List the offsite disposal method for this waste: -0-
(Incineration, Landfill, Treatment, etc.)

Comments:
SEWAGE LAGOON DISPOSAL

WHITE SANDS TEST FACILITY ENVIRONMENTAL DATABASE
WSTF Individual Waste Profile Sheet

10-07-07

This page to be completed by Generator.

Facility Area 100 Work Area 201 Printing Responsible Section 4052

Name of waste stream WASTE PRINTING STABILIZER

Describe the process generating the waste:

Stabilizes the plates of the plate maker
1pt product to 3pts H_2O 1¼ gal to 3¾ H_2O

Replaces solvent

List known hazardous constituents in waste stream and their concentrations:

mono potassium phosphate and ethylene glycol

Waste Description: Physical State Liquid pH 5.55

Specific Gravity 1.065 Flash Point N

Other comments: (phases, clarity, color, consistency, etc.)

Clear liquid

Quantity expected to be generated annually: 44 Units: Gallons

Material Safety Data Sheet Number (if applicable): attached

Task Order associated with waste stream (if applicable): ______

Form Completed By: Daniel Sanchez

Date: 3/18/91

WSTF Individual Waste Profile Sheet

WIWPS # 10-07-07

The following will be completed for Hazardous or Hazardous Constituent Waste By the Contractor Environmental Section.

Hazard Classification: 3 If Nonhazardous, Disposal Method Sewage Lagoon
(1 = Hazardous Waste, 2 = Hazardous Constituent, 3 = Nonhazardous Waste)

Accumulate waste in waste drum labeled — 0 —

Environmental Section representative's initials: HFH

If applicable, the USEPA waste ID numbers that apply to this waste:

— 0 —

Describe how the waste is collected at the point of generation:

— 0 —

If applicable, what Waste Accumulation Area is this waste collected in: — 0 —

If applicable, list onsite storage area where this waste is stored prior to shipment off site or disposal on site: — 0 —

Is this waste recycled? NO

List the off-site disposal method for this waste: — 0 —
(Incineration, Landfill, Treatment, etc.)

Comments:

NASA Area Environmental Coordinator ______

NASA Environmental Coordinator ______

MATERIAL SAFETY DATA SHEET
MSDS for 38753 ITEK MEGA PLATE STABILIZER.

1 -Section I - Product Identification

Manufacturer's Name FR CHEMICALS	Emergency Phone Number: (24 HOURS) (312) 763-1900/ CHEMTREC 800-424-930(
Street Address 524 SO. COLUMBUS AVE.	Date Prepared JULY/20/1989
City,State,Zip Code MT.VERNON, NY 10550	Prepared By KENNETH W. PINTER

Product Use: PLATE STABILIZER.

Chemical Name, Trade Name, Synonyms: CONTAINER SIZE: 5 GALLONS

HMIS RATING
1 - Health 0 - Flammability 0 - Reactivity A - Personal Protection

2 -Section II - Ingredients

Components	CAS NO.	% WT.	Exposure Limits OSHA PEL	ACGIH TLV	OTHER
WATER	7732-18-5	N.D.	N.A.	N.A.	
MONOPOTASSIUM PHOSPHATE	7778-77-0	N.D.	N.A.	N.A.	
ETHYLENE GLYCOL	107-21-1	N.D.	50 PPM(C).	50PPM(C).	
			(C): CEILING		

3 -Section III - Physical Data

Boiling POINT(F): > 212	pH: 5.55
Vapor Pressure(mm Hg): N.D.	Freezing Point(F): N.D.
Vapor Density (AIR = 1): N.D.	% Volatile By Volume: > 80
Specific Gravity (H2O=1): 1.065	Color And Odor: COLORLESS/ODORLESS

6 -Section VI - Health Hazard Data (Acute and Chronic)

Primary Route(s) of Entry: INHALATION, INGESTION.

Oral Ingestion: SWALLOWING ETHYLENE GLYCOL MAY CAUSE ABDOMINAL DISCOMFORT OR PAIN, DIZZINESS, OLIGURIA, AND CENTRAL NERVOUS SYSTEM DEPRESSION. KIDNEY DAMAGE POSSIBLE. ETHYLENE GLYCOL MAY BE FATAL.

Eye Contact: EYE DISCOMFORT WITH POSSIBLE TRANSIENT CONJUNCTIVITIS. SERIOUS CORNEAL INJURY NOT ANTICIPATED.

Skin Contact: NO ADVERSE EFFECTS FROM AVAILABLE INFORMATION EITHER THROUGH CONTACT OR ABSORPTION.

Inhalation: ETHYLENE GLYCOL MISTS MAY IRRITATE THE NOSE AND THROAT. HIGH VAPOR CONCENTRATIONS CAUSED BY HEATING IN A POORLY VENTILATED AREA MAY PRODUCE NAUSEA, VOMITING, HEADACHE AND DIZZINESS.

Effects of Overexposure: MAY CAUSE NOSE AND THROAT IRRITATION. MAY CAUSE KIDNEY DAMAGE.

Medical Conditions Generally Aggravated by Exposure	NO MEDICAL CONDITIONS KNOWN TO BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

Carcinogenicity: NONE OF THE CHEMICALS USED IN THIS PRODUCT ARE LISTED ON NTP IARC, OR OSHA LISTINGS OF CARCINOGENS.

Mutagenicity: NOT KNOWN TO BE MUTAGENIC.

Teratogenicity: NOT KNOWN TO BE TERATOGENIC.

Reproductive Toxicity: NOT KNOWN TO HAVE REPRODUCTIVE TOXICITY.

FIRST AID PROCEDURES

Ingestion: IF CONSCIOUS, GIVE 2 GLASSES OF WATER. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

Eye: FLUSH THE EYES THOROUGHLY WITH WATER. OBTAIN MEDICAL ATTENTION.

Skin: REMOVE CONTAMINATED CLOTHING AND FLUSH THE EXPOSED AREA THOROUGHLY WITH WATER.

Inhalation: REMOVE TO FRESH AIR. IF DISCOMFORT PERSISTS CONTACT A PHYSICIAN.

11 -Section XI - Transportation Information

Hazard Class: N.A.
DOT Proper Shipping Name: NOT REGULATED.

12 -Section XII - Regulatory Information

CERCLA/SUPERFUND,40 CFR 117,302: THIS PRODUCT DOES NOT CONTAIN ANY REPORTABLE QUANTITY (RQ) SUBSTANCE.

SARA(TITLE III) - Sections 302, 311, 312, and 313:

Section 302 Extremely Hazardous Substances (40 CFR 355): THIS PRODUCT DOES NOT CONTAIN ANY INGREDIENTS LISTED AS AN EXTREMELY HAZARDOUS SUBSTANCE.

Section 311 and 312 MSDS Submission and Inventory Reporting (40 CFR 370): THIS PRODUCT CONTAINS MATERIAL THAT MAY REQUIRE REPORTING UNDER 311 AND 312 IF STORED IN LARGE ENOUGH QUANTITIES.
Section 313 Toxic Chemical Release Reporting (40 CFR 372): THIS PRODUCT CONTAINS ETHYLENE GLYCOL WHICH MAY REQUIRE REPORTING UNDER SECTION 313.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
This product complies with rules and regulations of TSCA.

California Proposition 65: THIS PRODUCT DOES NOT CONTAIN ANY MATERIALS, THAT ARE CURRENTLY LISTED BY THE STATE OF CALIFORNIA UNDER PROPOSITION 65.

13 -Section XIII - Addition Information

NONE

N.D. = No Data N.A. = Not Applicable
The information herein given in good faith but no warranty, express or implied, is made.

7 -Section VII - Toxicology Information

Ingredient	Inhalation LC50	Oral LD50(RATS)	Dermal LD50(RABBITS)
WATER	N.A.	N.A.	N.A.
MONOPOTASSIUM PHOSPHATE	N.D.	N.D.	N.D.
ETHYLENE GLYCOL	N.D.	4g/KG.	19.5g/KG.

8 -Section VIII - Spill or Leak Procedure

Steps to be taken in case material is released or spilled: NEUTRALIZE WITH MILD ALKALI..DILUTE WITH LARGE AMOUNTS OF WATER (1+10 RATIO). SEWER DISPOSAL MAYBE SUITABLE UNDER AN APPROVED PERMIT. CONSULT LOCAL REGULATORY AGENCIES FOR APPROPRIATE WASTE DISPOSAL METHODS.

Disposal Method: NEUTRALIZE WITH MILD ALKALI..DILUTE WITH LARGE AMOUNTS OF WATER (1+10 RATIO). SEWER DISPOSAL MAY BE SUITABLE UNDER AN APPROVED PERMIT. CONSULT LOCAL REGULATORY AGENCIES FOR APPROPRIATE WASTE DISPOSAL METHODS.

9 -Section IX - Special Protection Information

Ventilation
Local Exhaust: RECOMMENDED. Special: N.A.
Mechanical(General): RECOMMENDED. Other: N.A.

Respiratory Protection: NONE REQUIRED.

Protective Clothing: GLOVES.

Eye Protection: SPLASH GOGGLES.

Other Protective Equipment: LAB COAT.

10 -Section X - Special Precautions

Precautions to be taken in Handling and Storing: STORE AT ROOM TEMPERATURE LAB COAT.

Other Precautions: CONTACT LENS WEARERS SHOULD WEAR REGULAR GLASSES.

3 -Section III - Physical Data (continued)

Odor Threshold: N.D.
Physical State: LIQUID

Evaporation Rate (Butyl Acetate = 1): N.D.

Solubility in Water: COMPLETE.

4 -Section IV - Fire and Explosion Hazard Data

FLASH POINT (METHOD USED): NONE.
Flammable Limits:
LEL: N.A. UEL: N.A.

Auto-ignition Temperature: N.D.

Extinguishing Media: NONE.

Special Fire Fighting Procedures: NONE.

Unusual Fire And Explosion Hazards: NONE.

5 -Section V - Reactivity Data

Stability
Unstable :
Stable : X
Conditions to Avoid: NONE.

Incompatibility (Materials to Avoid): NONE.

Hazardous Decomposition Products: NONE.

Hazardous Polymerization
May Occur:
Will Not Occur: X
Conditions to Avoid: NONE.

Analytical Results for 5 Gal. WSTF X-Ray Solution Waste

Client:	NASA/WSTF/North Wind	**Service Request:**	R1100377
Project:	White Sands Test Facility/PO #490260	**Date Collected:**	1/19/11
Sample Matrix:	Water	**Date Received:**	1/20/11
Sample Name:	1101190840 DRUM #3445		
Lab Code:	R1100377-001	**Basis:**	NA

General Chemistry Parameters

Analyte Name	Method	Result	Q	Units	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
Carbon, Total Organic (TOC)	9060	**3560**		mg/L	200		200	NA	1/27/11 16:48	
Carbon, Total Organic (TOC)	9060	**3660**		mg/L	200		200	NA	1/27/11 16:56	
Carbon, Total Organic (TOC)	9060	**3700**		mg/L	200		200	NA	1/27/11 17:04	
Carbon, Total Organic (TOC)	9060	**3690**		mg/L	200		200	NA	1/27/11 17:14	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	NASA/WSTF/North Wind	**Service Request:**	R1100377
Project:	White Sands Test Facility/PO #490260	**Date Collected:**	1/19/11
Sample Matrix:	Water	**Date Received:**	1/20/11
		Pre-Prep Date:	1/25/11
Sample Name:	1101190841 DRUM #3445		
Lab Code:	R1100377-002	**Basis:**	NA

Toxicity Characteristics Leachate Procedure (TCLP)
Inorganic Parameters

Pre-Prep Method: EPA 1311

Analyte Name	Method	Result	Q	Units	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
Antimony	6010C	ND	U	mg/L	0.60	0.05	1	1/26/11	1/27/11 20:51	
Arsenic	6010C	**0.07**	J	mg/L	5.0	0.04	1	1/26/11	1/27/11 20:51	
Barium	6010C	**0.03**	BJ	mg/L	10	0.02	1	1/26/11	1/27/11 20:51	
Beryllium	6010C	**0.004**	J	mg/L	0.050	0.003	1	1/26/11	1/27/11 20:51	
Cadmium	6010C	ND	U	mg/L	1.0	0.003	1	1/26/11	1/27/11 20:51	
Chromium	6010C	**0.07**	J	mg/L	1.0	0.006	1	1/26/11	1/27/11 20:51	
Lead	6010C	**0.06**	J	mg/L	1.0	0.03	1	1/26/11	1/27/11 20:51	
Mercury	7470A	**0.0006**	J	mg/L	0.0060	0.0003	1	1/26/11	1/26/11 16:27	
Nickel	6010C	**0.05**	J	mg/L	1.0	0.04	1	1/26/11	1/27/11 20:51	
Selenium	6010C	**0.1**	J	mg/L	5.0	0.05	1	1/26/11	1/27/11 20:51	
Silver	6010C	**218**		mg/L	25	0.6	25	1/26/11	1/31/11 12:11	
Thallium	6010C	ND	U	mg/L	0.10	0.04	1	1/26/11	1/27/11 20:51	
Zinc	6010C	**0.5**	J	mg/L	1.0	0.02	1	1/26/11	1/27/11 20:51	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	NASA/WSTF/North Wind	**Service Request:**	R1100377
Project:	White Sands Test Facility/PO #490260	**Date Collected:**	1/19/11
Sample Matrix:	Water	**Date Received:**	1/20/11
		Pre-Prep Date:	1/25/11
Sample Name:	1101190842 DRUM #3445		
Lab Code:	R1100377-003	**Basis:**	NA

Toxicity Characteristics Leachate Procedure (TCLP)
Inorganic Parameters

Pre-Prep Method: EPA 1311

Analyte Name	Method	Result	Q	Units	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
Antimony	6010C	ND	U	mg/L	0.60	0.05	1	1/26/11	1/27/11 21:19	
Arsenic	6010C	**0.1**	J	mg/L	5.0	0.04	1	1/26/11	1/27/11 21:19	
Barium	6010C	**0.03**	BJ	mg/L	10	0.02	1	1/26/11	1/27/11 21:19	
Beryllium	6010C	**0.005**	J	mg/L	0.050	0.003	1	1/26/11	1/27/11 21:19	
Cadmium	6010C	ND	U	mg/L	1.0	0.003	1	1/26/11	1/27/11 21:19	
Chromium	6010C	**0.06**	J	mg/L	1.0	0.006	1	1/26/11	1/27/11 21:19	
Lead	6010C	**0.05**	J	mg/L	1.0	0.03	1	1/26/11	1/27/11 21:19	
Mercury	7470A	ND	U	mg/L	0.0060	0.0003	1	1/26/11	1/26/11 16:32	
Nickel	6010C	**0.04**	J	mg/L	1.0	0.04	1	1/26/11	1/27/11 21:19	
Selenium	6010C	**0.06**	J	mg/L	5.0	0.05	1	1/26/11	1/27/11 21:19	
Silver	6010C	**186**		mg/L	25	0.6	25	1/26/11	1/31/11 12:33	
Thallium	6010C	ND	U	mg/L	0.10	0.04	1	1/26/11	1/27/11 21:19	
Zinc	6010C	**0.5**	J	mg/L	1.0	0.02	1	1/26/11	1/27/11 21:19	