ENTERED

AUG 2009

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH FIGHTER WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

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New Mexico Environment Department
Attn: Mr. James Bearzi
Hazardous Waste Bureau
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Dear New Mexico Environment Department

Holloman AFB is pleased to submit the SWMU 122 and 123 RCRA Facility Investigation Work Plan for your review.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to 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, please contact Mr. David Scruggs of our Asset Management Flight at (575) 572-5395.

Sincerely

A. DAVID BUDAK, YF-3, DAFC

Attachment:
SWMU 122 & 123 RFI Work Plan

cc:

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FINAL

RCRA FACILITY INVESTIGATION WORK PLAN
SWMUs 122 AND 123
HOLLOMAN AFB, NEW MEXICO

Prepared For:

U.S. Army Corps of Engineers
Albuquerque District
HTRW Branch
4191 Jefferson Plaza NE
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June 2009

Prepared by:

NATIONVIEW

1608 13th Avenue South, Suite 160
Birmingham, Alabama 35205

Contract No: W912PL-07-D-0050
Delivery Order No.: DM01
NationView Project Number: 8080014.02

FINAL
RCRA FACILITY INVESTIGATION WORK PLAN
SWMUs 122 AND 123
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49 CES/CEV
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers-
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Delivery Order No. DM01

~~November 2008~~June 2009

FINAL
RCRA FACILITY INVESTIGATION WORK PLAN
SWMUs 122 AND 123
HOLLOMAN AIR FORCE BASE, NEW MEXICO

REVIEW SHEET

This Work Plan has been reviewed and approved by:

~~11-24-08~~

David D. Martin — Signature — Date
Corporate Sponsor

~~11-24-08~~6-26-09

Frank Gardner, P.G. — Signature — Date
Project Manager

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Jim Moore, P.G. — Signature — Date
Field Team Leader/Geologist

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FINAL
RCRA FACILITY INVESTIGATION WORK PLAN
SWMUs 122 AND 123
HOLLOMAN AIR FORCE BASE, NEW MEXICO

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ACRONYMS AND ABBREVIATIONS

AAF	Army Air Field
AF Fm	Air Force Form
amsl	Above mean sea level
ANSI	American National Standards Institute
AOC	Area of Concern
ARARs	Applicable or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
bgs	Below ground surface
Bhate	Bhate Environmental Associates, Inc.
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CES/CEV	Civil Engineering Squadron/Environmental Flight
CLSM	Controlled Low Strength Material
cm/sec	Centimeters per second
COCs	C~~hain-of-custody~~hemicals of Concern
COPCs	Chemicals of Potential Concern
CSM	Conceptual Site Model
DPT	Direct Push Technology
DQOs	Data Quality Objectives
DRO	Diesel Range Organics
DRMO	Defense Reutilization Management Office
DT325	Geoprobe Systems® DT325 Dual Tube Sampling System
EA	Environmental Assessment
EDD	Electronic Data Deliverable
EM	Exposure Model
ERP	Environmental Restoration Program
ERPIMS	Environmental Restoration Program Information Management System
ESRI	Environmental Systems Research Institute
°F	Degrees Fahrenheit
ft	Feet
FWENC	Foster Wheeler Environmental Corporation
GIS	Geographical Information System
gpd	Gallons per day
GPS	Global Positioning System
GRO	Gasoline Range Organics
GTI	Groundwater Technology Inc.

HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
HHMSSLs	Human Health Medium Specific Screening Levels
HI	Hazard Index
HWB	Hazardous Waste Bureau
IDW	Investigation-Derived Waste
INRMP	Integrated Natural Resource Management Plan
J&E	Johnson and Ettinger
LCS	Laboratory Control Sample
LD	Laboratory Duplicate
LIMS	Laboratory Information Management System
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MGD	Million gallons per day
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
µg/L	Micrograms per liter
mg/L	Milligrams per liter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MW	Monitoring Well
NAD	North American Datum
NAPL	Non-aqueous phase liquid
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NOD	Notice of Deficiency
NPDES	National Pollution Discharge Elimination System
ORO	Oil Range Organics
OSHA	Occupational Safety and Health Administration
OVM	Organic Vapor Meter
PARCC	Precision, accuracy, representativeness, comparability, and completeness
PCBs	Polychlorinated Biphenyls
PCS	Petroleum Contaminated Soil
PID	Photoionization Detector
PMP	Project Management Plan
~~POCs~~	~~Pollutants of concern~~

POLs	Petroleum, oil, and lubricants
PPE	Personal Protection Equipment
PQL	Practical Quantitation Limit
PVC	Polyvinyl Chloride
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RLs	Reporting Limits
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSLs	Soil Screening Levels
SVOCs	Semi-volatile organic compounds
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TAT	Turn-around time
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit
VOCs	Volatile Organic Compounds
WRCC	Western Regional Climate Center
WWTP	Wastewater Treatment Plant

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1 INTRODUCTION

NationView, LLC (NationView), has been retained by the U.S. Army Corps of Engineers (USACE), Albuquerque District under contract W912PL-07-D-0050, Delivery Order No. DM01, to conduct a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of Solid Waste Management Unit (SWMU) 122 (Building 702 Waste Oil Tank), and SWMU 123 (Building 704 Waste Oil Tank) at Holloman Air Force Base (HAFB), New Mexico.

The Albuquerque District Scope of Work for the SWMU 122 and 123 RFI dated May 14, 2008 (USACE, 2008), included in Attachment A of this Work Plan, generally defines the additional characterization field sampling and analysis activities. This RFI Work Plan provides the relevant site specific requirements as outlined in a Notice of Disapproval issued by the New Mexico Environment Department (NMED) in May 2009 (Attachment B) for investigation activities at SWMUs 122 and 123. Responses to the NMED comments are also included in Attachment B. The objective of this additional data collection effort is to fill in the data gaps to complete a site-specific groundwater risk assessment for groundwater contamination due to historical releases from the former Building 704 Waste Oil Tank (SWMU 123). The RFI at SWMUs 122 and 123 is being performed concurrently as these two previously removed underground waste oil tanks collected waste oils from previously removed underground oil/water separators that serviced the petroleum, oil, and lubricants (POL) Washrack. The SWMU 122 and 123 RFI is being performed according to the requirements set forth in the HAFB Hazardous Waste Facility Permit No. NM6572124422; Appendix 4-B RCRA Facility Investigation (RFI) Outline, dated February 2004 (HAFB RCRA Permit). SWMUs 122 and 123 are listed on Table A of the HAFB RCRA Permit.

1.1 RFI Work Plan Organization

This Work Plan will serve as the primary working document for the investigation of potential hazardous waste releases to the subsurface from SWMU 122 (Building 702 Waste Oil Tank) and the previously identified release to groundwater from SWMU 123 (Building 704 Waste Oil Tank). The Work Plan is organized according to the requirements outline set forth in Appendix 4-B of the HAFB RCRA Permit as follows:

- Section 1 presents a summary of the RFI approach and its key elements, project and data quality objectives, HAFB background information, and relevant existing assessment data.
- Section 2 details the environmental setting in terms of hydrogeology, soils, surface water and sediment, and climate.

- Section 3 provides source characterization information.
- Section 4 provides information on the human populations and environmental systems as potential receptors that could be affected by a potential release from a waste oil tank.
- Section 5 presents the Initial Conceptual Site Model (CSM) for the site, including a summary narrative; an outline of CSM elements, including data gathering requirements, release mechanisms, status, and required actions.
- Section 6 presents the Sampling and Analysis Plan (SAP) for the additional characterization of soil and groundwater for this RFI effort, as well as the specific sampling procedures, sample analysis and related sample quality assurance/quality control (QA/QC) measures to be employed during the conduct of the investigation.
- Section 7 presents the Risk Assessment Approach to be used for conducting a site specific risk assessment (if required).
- Section 8~~7~~ describes the data management plan that will be used to support this RFI.
- Section 9~~8~~ describes the Health and Safety requirements to be followed during this RFI.
- Section 10~~9~~ presents the project management plan (PMP), including the project organization, team member roles and responsibilities, and project schedule.
- Section 11~~10~~ provides full references of the publications used to support the development of this document.
- The figures and tables referenced throughout this Work Plan are included under separate tabs following the text
- Appendices provide other key elements of the Work Plan, such as the Site-Specific Addendum to the Basewide Quality Assurance Project Plan (QAPP), the summary of past investigations and remedial actions, ~~New Mexico Environment Department (~~NMED~~)~~ correspondence, and a Site-Specific Addendum to the Basewide Health and Safety Plan.

1.2 Project Objectives

The primary project objectives of the SWMU 122 and 123 RFI are to:

1. Identify potential releases to the subsurface soil and groundwater from the previously removed Building 702 Waste Oil Tank (SWMU 122).
2. Delineate the downgradient horizontal extent of Volatile Organic Compound (VOC) (benzene, toluene, ethylbenzene and xylene) groundwater contamination from the previously removed Building 704 Waste Oil Tank (SWMU 123) that has been identified under the POL Washrack.
3. Collect sufficient analytical data to complete a site-specific risk assessment of the groundwater exposure pathways.
4. Collect the proper data to meet the data quality objectives (DQOs) to support closure of these two sites based on guidance from the NMED.

1.3 Data Quality Objectives

The DQO process is designed to generate performance criteria for the collection of new data. Performance criteria represent the full set of specifications that are needed to design a data collection effort such that newly-collected data are of sufficient quality and quantity to address the primary project objectives outlined in Section 1.2 of this Work Plan.

The steps of the DQO process are:

1. Define the nature of the problem to be studied and develop a conceptual model of the environmental hazard to be investigated (see Section 5 of this Work Plan).
2. State the decisions or estimates that need to be made.
3. Determine the type(s) of data needed for decision-making.
4. Develop a decision making process or rules that define how the data will be used to draw conclusions from the investigation results (see Section 6.4 of this Work Plan).
5. Establish acceptable quantitative criteria on the quality and quantity of the data to be collected, relative to the ultimate use of the data. These criteria are known as performance criteria, or DQOs (see Section 6.2 and 6.4 of this Work Plan).

6. Design a data collection program that will generate data meeting the quantitative and qualitative criteria specified in Step 5 which includes:

   - Type of data (see Sections 6.3 and Section 6.4 of this Work Plan).

   - Number, location, and physical quantity of samples (see Sections 6.2 and 6.4 of this Work Plan).

   - QA and QC activities to ensure that sampling design and measurement errors are managed sufficiently to meet the performance or acceptance criteria specified in the DQOs. The DQO criteria include measures of precision, accuracy, representativeness, comparability, and completeness (PARCC).

The results of this process are used to develop a QAPP (see the HAFB Basewide QAPP (Bhate, 2003b)) and the Site-Specific Addendum to the Basewide QAPP included in Appendix A of this Work Plan).

1.4 HAFB Facility Description and Operational History

HAFB is located in south central New Mexico, in the northwest central part of Otero County, approximately 75 miles north-northeast of El Paso, Texas (Figure 1-1). HAFB has a population of 6,000, and supports approximately 21,000 active-duty Air Force, National Guard, Air Force Reserve, retirees, civilians, and their family members. HAFB occupies approximately 60,000 acres in the northeast quarter of Section 1, Township 17 South, Range 8 East. The White Sands Missile Range testing facilities occupy additional land extending northward from the Base. Private and public owned lands border the remainder of HAFB. The major highway servicing HAFB is Highway 70, which runs southwest from the town of Alamogordo and separates HAFB from publicly owned lands to the south. Alamogordo is located approximately 7 miles east of the base and has a population of approximately 35,000.

HAFB was first established in 1942 as Alamogordo Army Air Field (AAF). From 1942 through 1945, Alamogordo AAF served as the training ground for over 20 different flight groups, flying primarily B-17s, B-24s, and B-29s. After World War II, most operations had ceased at the Base. In 1947, Air Material Command announced the air field would be its primary site for the testing and development of un-manned aircraft, guided missiles, and other research programs. On January 13, 1948, the Alamogordo installation was renamed Holloman Air Force Base, in honor of the late Col. George V. Holloman; a pioneer in guided missile research. In 1968, the 49th Tactical Fighter Wing arrived at HAFB and has remained since, conducting fighter aircraft training and operations. HAFB has also served as the German Air Force's Tactical Training Center since 1996.

1.5 SWMU 123 and 123 Site Description and Background

SWMUs 122 (former Building 702 Waste Oil Tank) and 123 (former Building 704 Waste Oil Tank) are located northeast of the Main Base (Figure 1-2). Specifically SWMUs 122 and 123 are located near the northwestern and northeastern corners of the POL Washrack (Figure 1-3) which is located within the fenced area of the POL Facility off Delaware Avenue. The two former underground waste oil tanks received oil and fuels removed from two underground oil/water separators that collected wash water from the POL Washrack. The two former oil/water separators (SWMUs 21 and 22) were also located along the north side of the POL Washrack (Figure 1-3). During the early 1990s the POL Washrack was renovated and the two waste oil tanks (SWMUs 122 and 123) and the associated oil/water separators (SWMUs 21 and 22) were removed and replaced with a new oil-water separator and waste oil tank also shown on Figure 1-3.

1.6 POL Washrack Activities and Waste Generation

Historically the POL Washrack (Building 703 Washrack) generated wash water from cleaning vehicles and equipment. The POL Washrack was equipped with two oil/water separators (SWMUs 21 and 22) that received the wash water containing oil, hydraulic fluid, fuels, and soil from cleaning heavy equipment. The waste oil skimmed from the wash water in the two underground oil/water separators was transferred by gravity to the two underground waste oil tanks (SWMUs 122 and 123) via a subsurface pipe. Prior to their removal, the tops of the oil/water separators were slightly below grade and covered with gravel. The waste oil tanks (approximately 5 feet [ft] long by 5 ft in diameter) were below grade and also covered with gravel. According to the RCRA Facility Assessment (A.T. Kearney, 1988) the waste oil tanks were not equipped with automatic fill controls or level monitoring devices. However, waste oil was routinely removed to prevent overfills. Figure 1-3 illustrates the proximity of the waste oil tanks and the oil/water separators that historically collected the wash water and fluid wastes from the POL Washrack.

1.7 Nature and Extent of Known Contamination

Previous investigations have identified a number of contaminants that have impacted the soil and groundwater from SWMU 123 including:

- Volatile organic compounds (benzene, toluene, ethylbenzene, xylenes);
- Semi-volatile organic compounds [SVOCs] (naphthalene and phenol) and;
- Total Petroleum Hydrocarbons [TPH] (gasoline and diesel range organics)

At present, the nature and extent of soil contamination resulting from the historical releases at SWMU 123 (former Building 704 Waste Oil Tank) have been defined. Petroleum contaminated soil (PCS) remedial actions (excavations) conducted in 1995 (by EBASCO), 1997 (by Foster Wheeler Environmental Corporation), and 2005 (by Bhate) have removed all of the contaminated soil associated with SWMU 123. Five groundwater monitoring wells have previously been installed at SWMU 123 (Bhate, 2004). Although the nature of the groundwater contamination at the site has been characterized, the horizontal extent of contamination has not been defined. Previous subsurface soil investigations have not been conducted at SWMU 122 (former Building 702 Waste Oil Tank), therefore the current nature and extent of soil contamination resulting from any suspected or unknown releases from this waste oil tank (SWMU 122) is undefined.

1.8 Summary of Past Investigations and Remedial Actions

This section presents an overview of the previous investigations and remedial actions conducted at SWMUs 122 and 123. Since 1988 these SWMUs have been the subject of five environmental investigations and three PCS remedial (removal) actions. This section provides a historical overview and chronology of the previous investigations and removal actions that were conducted from 1988 through 2005. The chronology of previous investigations at SWMUs 122 and 123 is based on information provided in the reports referenced below. Analytical results summary tables, figures depicting sampling locations, and soil boring logs for these previous investigations and PCS removal actions are included in Appendix B of this Work Plan.

- *RCRA Facility Assessment Preliminary Review/Visual Site Inspection Report*, 1988, A.T. Kearney, Inc and DPRA Inc.

- *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units,* 1994, Radian Corporation.

- *Closure Report for Remediation of POL – Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November, 1995,* 1995, EBASCO Services, Inc., and Groundwater Technology Government Services, Inc.

- *Additional Characterization of POL-Contaminated Sites SWMU-3, SWMU-8, SWMU-36, SWMU-123 and OT-44, Holloman Air Force Base, New Mexico,* 1996, Groundwater Technology Government Services, Inc.

- *Final Closure Report Addendum for Phase II Remediation of POL-Contaminated Sites and Oil/Water Separator and Waste Oil Tank Removals, Holloman Air Force Base, New Mexico,* 1997, Foster Wheeler Environmental Corporation.

- *Results of Additional Soil Sampling for Remediation of the POL-Contaminated SWMU 123, at Holloman AFB, New Mexico,* 1999, Foster Wheeler Environmental Corporation.

- *Site Investigation Report SWMU 123, Holloman Air Force Base, New Mexico,* 2004, Bhate Environmental Associates, Inc.

- *Voluntary Corrective Measures Work Plan SWMU 123, Holloman Air Force Base, New Mexico,* 2005, Bhate Environmental Associates, Inc.

Each of these actions is described below.

1.8.1 RCRA Facility Assessment Preliminary Review Report

The RCRA Facility Assessment Report (A.T. Kearney, 1988) identified the Building 702 and Building 704 Waste Oil Tanks as SWMUs 122 and 123, respectively. These underground storage tanks were used to collect oil and wastewater from the Building 702 and Building 704 Oil/Water Separators (SWMUs 21 and 22) and were located along northern side of the Building 703 Washrack concrete pad (SWMU 89). The waste oil tanks were below grade and covered with gravel. The tanks were approximately 5 ft long and 5 ft in diameter and the depth to the base of the tanks was estimated at 6.5 ft below ground surface (bgs).

Wash water, waste oil, and fuels from the adjacent wash rack were routed to the oil/water separators for processing. The waste oil was skimmed from the water in the oil/water separators was transferred by gravity to the waste oil tanks via a subsurface pipe. The tanks were not equipped with automatic fill controls or level monitoring devices. Liquid level inspections were routinely conducted by HAFB personnel and the waste was removed on regular intervals and transferred to the Defense Reutilization Management Office (DRMO) Waste Storage Area. The RCRA Facility Assessment Report concluded that the potential for release to soil and groundwater was unknown since the age, materials of construction, and integrity of the tanks were not known. The two waste oil tanks (SWMUs 122 and 123) and the two oil/water separators (SWMUs 21 and 22) were subsequently removed when the Building 703 Washrack was renovated in the early 1990s. The descriptions of SWMUs 122 and 123 from the RCRA Facility Assessment Report (A.T. Kearney, 1988) are provided in Appendix B-1 of this work plan.

1.8.2 Phase I RCRA Facility Investigation Report

The initial Phase I RFI for SWMUs 123, 21, and 22 was performed by Radian in 1993 (Radian, 1994) to evaluate potential soil contamination at each of these sites. For the Phase I RFI, six soil borings were drilled within the potentially affected areas immediately surrounding the three SWMUs. Figure 4.4-1 in Appendix B-2 of this work plan shows the locations of the six soil borings that were drilled at these SWMUs. Split spoon samples were collected every 2 ft to approximately 12 ft bgs. Each interval was logged and screened with an organic vapor meter (OVM). Boring logs with screening results are provided in Appendix B-2. Chemical analytical samples were collected from the interval at the base of the tanks (6.5 – 8.5 ft bgs), and approximately 4 ft below the base of the tanks (10.5 – 12.5 ft bgs). Twelve soil samples (two per borehole) were collected and analyzed at an off-site laboratory for VOCs, Total Recoverable Petroleum Hydrocarbons (TRPH), and metals. Six samples were also analyzed for SVOCs (SWMU 123) because they were visibly contaminated.

The analytical results indicated that detected constituents for the six soil samples collected at SWMUs 21 and 22 (Building 702 and Building 704 Oil/Water Separators) were all below the current NMED Soil Screening Levels (SSLs) (NMED, 2006a) and TPH Screening Guidelines (NMED, 2006b). However, the analytical results from SWMU 123 soil samples indicated that several VOCs and TRPH were above NMED SSLs and the TPH Screening Guidelines. One sample from borehole 123-B01 had concentrations of four VOCs (benzene, ethylbenzene, toluene, and xylene [BTEX]) and TRPH above NMED action levels. The maximum VOC concentrations were detected in sample 123-B01-02-01 collected from 8 – 10 ft bgs where benzene was reported at 54,000 micrograms per kilogram (µg/kg), ethylbenzene at 229,000 µg/kg, toluene at 345,000 µg/kg, and total xylene at 363,000 µg/kg. Additionally, TRPH was detected in three soil samples (two from 123-B01 and one from 123-B02) above the NMED TPH Screening Guideline for diesel #2/crankcase oil of 880 milligrams per kilogram (mg/kg) (NMED, 2006b). The highest TRPH concentration was also detected in sample 123-B01-02-01 at 4,510 mg/kg. All detected SVOCs and metals from the six SWMU 123 soil samples were each below their respective NMED actions levels. Tables 4.4-1, 4.4.2, and 4.4-3 in Appendix B-2 of this work plan summarize the results from SWMUs 21, 22, and 123 respectively. Soil boring locations and analytical results from the Phase I RFI which exceeded current NMED SSLs, U.S. Environmental Protection Agency (USEPA) Region 6 Human Health Medium Specific Screening Levels (HHMSSLs) (USEPA, 2008), and/or NMED TPH screening guidelines are presented on Figure 1-4.

The Phase I RCRA Facility Investigation Report (Radian, 1994) recommended no further action for SWMUs 21 and 22 and remediation of TRPH-contaminated soil and removal of the waste oil tank for SWMU 123. Recommended approaches for remediation included in-situ bioremediation or excavation and disposal of the TRPH-contaminated soil.

1.8.3 Closure Report for Remediation of POL-Contaminated Sites

The initial SWMU 123 remedial (removal) action was conducted by EBASCO Services, Inc., and took place during August 1995 (Ebasco, 1995). The Building 704 Waste Oil Tank (SWMU 123) was not found in the excavation (16 ft by 12 ft by 7 ft deep), and it was believed that the tank had been previously removed when the Building 703 POL washrack was renovated in the early 1990s. Fifty cubic yards (67.5 tons) of TRPH-contaminated soil was removed at this time. Five native soil confirmation samples were collected from the excavation corners (SWMU-123-1-7 through SWMU-123-4-7), and one from the center of the excavation (SWMU-123-5-7). The sample locations are illustrated on Figure 13-1 in Appendix B-3 of this work plan.

TRPH concentrations above the current TPH Screening Guideline for diesel #2/crankcase oil of 880 mg/kg were detected in two of the five samples. TRPH was detected in SWMU-123-1-7 (southeast corner) and SWMU-123-2-7 (southwest corner) at 7,400 and 4,600 mg/kg respectively. The laboratory analytical results also indicated detections of all four BTEX constituents in samples SWMU-123-1-7 and SWMU-123-2-7. Benzene and total xylenes were detected above their current NMED SSLs of 10.3 and 82 mg/kg (NMED, 2006a), respectively in each of these two soil samples. The maximum concentrations of benzene (39 mg/kg) and total xylenes (140 mg/kg) were detected in samples SWMU-123-1-7 and SWMU-123-2-7. No BTEX compounds were detected above the laboratory quantitation limits in the other samples. The analytical results are summarized in Table 13-2 in Appendix B-3 of this work plan.

The excavated contaminated soil was stockpiled and sampled for off site disposal. Based on the analytical results from the stockpile samples (see Table 13-3 in Appendix B-3 of this work plan) the 50-cubic yards of contaminated soil was transported offsite as non-hazardous waste to the Rhino Environmental Services, Inc., landfarm facility located north of Newman, New Mexico for disposal and treatment. Copies of the waste manifests and weight certificates/receipts are also included in Appendix B-3 of this work plan.

Due to the elevated TRPH detected in two excavation sidewall samples, the Closure Report (EBASCO, 1995) recommended further delineation and remediation of the remaining PCS (detected in samples SWMU-123-1-7 and SWMU-123-2-7). Additional investigation activities were planned for the site in 1996.

1.8.4 Additional Characterization of POL Contaminated Sites

Additional characterization to delineate the extent of subsurface soil in excess of 1,000 mg/kg (the historical HAFB TPH action level) at SWMU 123 was conducted by Groundwater Technology, Inc. (GTI), in February 1996. Three soil borings (SWMU-123-DP-1, SWMU-123-DP-3, and SWMU-123-DP-4) were drilled and sampled at SWMU 123 (see Figure 5 in Appendix B-4 of this work plan) during this sampling event. Each borehole was advanced to 14 ft bgs and sampled continuously and field screened for VOCs with a photoionization detector (PID). Two samples from each boring were analyzed for TRPH, TPH-GRO (Gasoline Range Organics), TPH-DRO (Diesel Range Organics), and BTEX constituents. Boring logs with PID screening results are provided in Appendix B-4 of this work plan.

The analytical results are summarized in Table 5 in Appendix B-4 of this work plan. TRPH, TPH-GRO, TPH-DRO, and BTEX were not detected in the samples collected from the borehole located north (SWMU-123-DP-3) and west (SWMU-123-DP-1) of the former Building 704 Waste Oil Tank (SWMU 123). However, the soil sample collected from 9 to 10 ft bgs in boring SWMU-123-DP-4 located east of the Washrack did contain TPH-GRO at 202 mg/kg, TPH-DRO at 19 mg/kg, TRPH at 114 mg/kg, and total BTEX at 3,390 µg/kg. The GTI letter report concluded that the results from boring DP-4 indicated that petroleum hydrocarbon contamination was present beneath the POL Washrack concrete slab.

1.8.5 Final Closure Report Addendum for Phase II Remediation of POL Contaminated Sites

Two closure samples (SWMU-123-1-7 and SWMU-123-2-7) from the initial PCS removal action at SWMU 123 conducted by EBASCO Services in 1995 exceeded the applicable TRPH screening criteria along the southern side of the excavation. Based on an agreement between NMED and HAFB, soil with TRPH concentrations exceeding 1,000 mg/kg that extended under large structures would not require remediation if this soil posed no potential health risk. As a result, additional excavation activities were planned to remove all TRPH-contaminated soil exceeding 1,000 mg/kg that did not extend under the concrete POL washrack pad.

In March 1997, Foster Wheeler Environmental Corporation (FWENC) resumed excavation activities and removed an additional 132.5 cubic yards (178.9 tons) of PCS from around the initial SWMU 123 excavation (FWENC, 1997). Representative samples of in-place and stockpiled soil were also collected during the second remedial action. The five excavation sidewall and floor samples were analyzed for TRPH, VOCs, SVOCs, and metals. Table 5-1 in Appendix B-5 of this work plan summarizes the analytical results for the site closure and stockpile samples and the excavation confirmation sample locations are presented in Figure 5-1 in Appendix B-5. The analytical results for four of the samples did not exceed current NMED action levels. However, the sample collected immediately adjacent to the POL washrack (SWMU-123-01-09) had a TRPH concentration of 4,100 mg/kg which was above the NMED SSL for diesel #2/crankcase oil of 880 mg/kg (NMED, 2006b). In addition, benzene (33 mg/kg) and ethylbenzene (320 mg/kg) were detected above the current SSLs for these constituents (10.3 and 128 mg/kg respectively).

The excavated contaminated soil was stockpiled and sampled for off site disposal. Based on the analytical results from the stockpile samples (shown in Table 5-1 in Appendix B-5 of this work plan) the 132.5-cubic yards of PCS from the second excavation was transported offsite as non-hazardous waste to the Rhino Environmental Services, Inc., landfarm facility located north of Newman, New Mexico for disposal and treatment. Copies of the waste manifests and weight certificates/receipts are also included in Appendix B-5 of this work plan.

Due to the closure sample adjacent to the POL washrack (SWMU-123-01-09) the Phase II Closure Report (FWENC, 1997) recommended a conditional no further action (NFA). The condition of the NFA was the remediation of vadose zone soil extending under the POL washrack over 1,000 mg/kg TRPH and 25 mg/kg benzene.

1.8.6 Additional Soil Sampling for Remediation of POL Contaminated SWMU 123

The NMED requested further investigation of soil contamination underneath the concrete washrack pad before considering NFA for the site. The primary purpose of the additional investigation was to determine the extent of TRPH contamination detected in sample SMMU123-01-09 (which was 4,100 mg/kg) during the SWMU Phase II Closure investigation (FWENC, 1997). Therefore in January 1999, FWENC cored the concrete pad and sampled six hand auger boreholes (SWMU-SB-A, -B, -C, -E, -I, and -J). Soil boring locations are shown on Figure 4-1 in Appendix B-6 of this work plan. Initially nine soil borings were planned, however three boreholes (SWMU-SB-D, -F, and -H) could not be sampled as they were located over thick concrete footers in the concrete pad. A total of 13 soil samples collected from 2 to 9 ft bgs were sent to an offsite laboratory and analyzed for TRPH and BTEX.

Six samples had concentrations of TRPH above the NMED TPH screening guideline for diesel #2/crankcase oil (880 mg/kg) (NMED, 2006b) with concentrations ranging from 1,825 mg/kg to 7,400 mg/kg. In addition, two samples had detections of total xylene above the current NMED SSL (NMED, 2006a) of 82 mg/kg. Each of the 13 soil samples had concentrations of benzene, ethylbenzene, and toluene below the current NMED SSLs (NMED, 2006a). Table 6-1 in Appendix B-6 of this work plan presents a summary of the analytical results. Soil boring locations and analytical results from the SWMU 123 Additional Soil Sampling performed by FWENC in 1999 which exceeded current NMED SSLs, USEPA Region 6 HHMSSLs (USEPA, 2008), and/or NMED TPH screening guidelines are presented on Figure 1-5.

The Letter Report *Results of Additional Soil Sampling for the Remediation of the POL-Contaminated SWMU 123, at Holloman AFB, New Mexico* (FWENC, 1999) concluded that the remaining TRPH-contaminated soil at the site was adequately covered by an 8-inch thick reinforced concrete pad (washrack) which served as an effective capping mechanism for the TRPH contaminated soil. After reviewing the referenced Letter Report the NMED issued a Notice of Deficiency (NOD) to HAFB on August 17, 2001, requiring additional information prior to making a final determination for NFA at SWMU 123. Additional information required by NMED included a valid risk assessment, additional analytical sampling parameters (TPH-GRO, -DRO, -ORO [Oil Range Organics], RCRA metals, and polychlorinated biphenyls [PCBs]) and the installation of groundwater monitoring wells. The NMED NOD letter (HWB-HAFB-01-007) is included in Appendix C of this RFI Work Plan.

1.8.7 SWMU 123 Site Investigation

In response to the NMED NOD (HWB-HAFB-01-007) dated August 17, 2001, Bhate Environmental Associates, Inc. (Bhate), was subcontracted to address the recommendations made by NMED outlined in the NOD letter. The primary objective of this investigation was to determine the vertical and lateral extent of PCS and to install a monitoring well network to evaluate groundwater quality. The field work for the SWMU 123 Site Investigation was conducted in accordance with the *Work Pan for Additional Soil Borings and Monitoring Well Installations Solid Waste Management Unit 123* (Bhate, 2003a) which was approved by the NMED. The NMED Notice of Approval letter (HWB-HAFB-03-006) for this Work Plan dated February 10, 2004, is also included in Appendix C of this work plan. The following information was obtained from the *Site Investigation Report SWMU 123, Holloman Air Force Base, New Mexico* (Bhate, 2004).

A total of five solid stem auger soil borings (SB-1 through SB-5) and nine direct push technology (DPT) locations (DP-01 through DP-09) were advanced at SWMU 123 in April 2004. The five soil borings were converted into 2-inch flush mount groundwater monitoring wells (MW-1 through MW-5). The locations of the DPT soil borings and the soil borings converted into monitoring wells are illustrated on Figure 4-1 in Appendix B-7 of this report. A total of 31 soil samples from 14 soil borings (two per borehole including three duplicates) were submitted to an offsite laboratory for analysis. Six groundwater samples (including one duplicate) and a round of water levels were collected from the five monitoring wells. Additionally four wells (MW-2 through MW-5) were resampled on September 28, 2004, to determine if site conditions had changed after the initial sampling event performed in April. The drilling logs and monitoring well construction diagrams for this investigation are included in Appendix B-7 of this Work Plan.

Table 5-1 in Appendix B-7 presents the April 2004 groundwater elevation data collected from the five monitoring wells. A potentiometric surface map was prepared using the data from Table 5-1 (see Figure 5-1 in Appendix B-7). Groundwater flows to the southeast towards Dillard's Draw with a relatively flat hydraulic gradient (0.01 ft/ft). During routine well gauging activities performed on September 14, 2004, approximately 1.41 ft of free phase liquid was measured in monitoring well MW-1. The NMED Hazardous Waste Bureau (HWB) was immediately notified and a copy of the Memorandum *Notification of Free Phase Liquid at Solid Waste Management Unit (SWMU) 123 - Bldg 704 Waste Oil Tank Site* is included in Appendix C. A sample of the non-aqueous phase liquid (NAPL) was collected on September 22, 2004, and the analytical results indicated that the NAPL contained a mixture of gasoline, jet fuel (or naphtha), and a mid-distillate (kerosene or diesel #1) (see letter from Zymax Forensics in Appendix B-7 of this work plan).

From September 22 to 27, 2004, periodic bailing of MW-1 reduced the thickness of free product to 0.14 ft. After the initial free product removal response, the well was bailed on a weekly basis to remove NAPL. A summary of the free product measurements made during the removal actions is presented in Table 5-2 in Appendix B-7 of this work plan.

1.8.7.1 Groundwater Sampling Results

Groundwater samples were analyzed for total dissolved solids (TDS), VOCs, SVOCs, TPH-GRO, TPH-DRO, TPH-ORO, and RCRA metals. TDS concentrations (shown in Table 5-3 of Appendix B-7 of this work plan) ranged from 3,010 milligrams per liter (mg/L) at MW-1 to a high of 6,050 mg/L at MW-5. These abnormally low TDS values are likely attributable to localized anthropogenic impacts such as leakage from a water supply line and runoff from the POL washrack.

Table 5-4 in Appendix B-7 of this work plan presents a summary of the analytical results (VOCs, SVOCs, TPH, and RCRA metals) for both rounds (May and September 2004) of groundwater sampling data. Due to the presence of free product, the May 2004 groundwater sample from MW-1 contained elevated concentrations of benzene (2,520 micrograms per liter [µg/L]), ethylbenzene (1,670 µg/L), toluene (7,490 µg/L), and total xylenes (2,920 µg/L) above the New Mexico Water Quality Control Commission (NMWQCC) standards (New Mexico Administrative Code [NMAC] 20.6.2.3103). The concentrations for benzene, ethylbenzene, and toluene were also above their respective current ~~U.S. Environmental Protection Agency (~~USEPA~~)~~ maximum contaminant levels (MCLs) (USEPA, 2009~~3~~). In addition to BTEX, MW-1 also contained concentrations of naphthalene, ~~n-propylbenzene,~~ 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene above their respective USEPA Region 6 action levels.

With the exception of benzene (1,080 µg/L) detected in monitoring well MW-2, all other VOCs were below their respective NMWQQ and USEPA MCL ~~standards~~ regulations during the first groundwater sampling event. The NMWQCC and USEPA MCL drinking water standards for benzene are 10 µg/L and 5 µg/L, respectively. Other VOCs detected in the downgradient well MW-2 during the first round included ethylbenzene (337 µg/L) and total xylenes (136 µg/L). The MW-2 groundwater sample collected during the second round had higher concentrations of benzene (1,340 µg/L), ethylbenzene (416 µg/L), and toluene (10J µg/L); while total xylenes (125 µg/L) slightly decreased. VOCs were not detected in monitoring well MW-3 during the first round, however low concentrations of benzene (3.2 µg/L), and ethylbenzene (21 µg/L) were detected in the sample collected during the second round. VOCs were not detected in upgradient monitoring wells MW-4 or MW-5 during either sampling event. An isocontour map depicting the distribution of BTEX compounds in the groundwater is shown on Figure 5-3 in Appendix B-7 of this report.

The May 2004 groundwater sample collected from MW-1 was the only groundwater sample to have detectable concentrations of SVOCs. Phenol (34 µg/L) was the only SVOC detected above the NMWQCC standard of 5 µg/L. In addition, naphthalene was detected (76 µg/L) above the USEPA Region 6 action level of 6 µg/L. SVOCs were not detected in groundwater samples collected from monitoring wells MW-2 through MW-5 during either sampling event.

Detectable amounts of metals included arsenic, barium, chromium, cobalt, copper, lead, molybdenum, nickel, selenium, silver, vanadium, and zinc. However, selenium was the only metal detected above the NMWQCC standard of 0.05 mg/L during the May 2004 sampling event. Selenium was detected in monitoring wells MW-2 through MW-5 with concentrations ranging from 0.161 mg/L (MW-3) to 0.261 mg/L (MW-5). However, selenium was not detected in any of the groundwater samples collected during the second round. The metal samples were not filtered in the field (or laboratory) which may explain the variation of the selenium data. Groundwater sampling locations and analytical results from the sampling performed by Bhate in May and September of 2004 which exceeded current NMWQCC standards, EPA MCLs, or USEPA Region 6 action levels are presented on Figure 1-6.

1.8.7.2 Soil Sampling Results

Soil samples were analyzed for VOCs, SVOCs, TPH-GRO, TPH-DRO, TPH-ORO, RCRA metals, and PCBs (two samples collected from DP01). Table 5-5 in Appendix B-7 of this work plan presents the analytical results for soil samples collected from the boreholes converted into monitoring wells and Table 5-6 in Appendix B-7 presents the analytical results for the DPT soil sampling locations.

The two samples (SB01-10 and SB01-12) collected from soil boring SB01 exhibited concentrations of two VOCs, benzene and total xylenes, which~~that~~ exceeded the current NMED residential SSLs (NMED, 2006a). The maximum concentrations of benzene (26.9 mg/kg) and total xylenes (170 mg/kg) were~~ also~~ detected in sample SB01-10 (10 to 11 ft bgs). The current NMED SSLs for benzene and total ~~xyelenes~~ xylenes are 10.3 mg/kg and 82 mg/kg, respectively. Three SVOCs were detected in the soil samples: 2-methylnaphthalene, naphthalene, and diethylphthalate. None of the SVOCs detected exceeded any applicable SSLs. Seven soil sampling locations contained detectable TPH concentrations: SB01, DP02, DP03, DP04, DP05, DP06, and DP08. Of these locations, the detectable concentrations for total TPH ranged from a low of 20.5 to a high of 3,940 mg/kg. Locations SB01 and DP04 were the only boreholes that had total TPH (GRO, DRO, and ORO) concentrations that exceeded the current NMED TPH screening guideline for diesel #2/crankcase oil of 880 mg/kg (NMED, 2006b).

Each of the soil boring and DPT locations had a detection of at least one RCRA metal. With the exception of four detections of arsenic, all of the metals were detected below their respective NMED SSLs. Arsenic was detected in four samples collected from soil borings DP06 and DP09 above the current NMED SSL (3.9 mg/kg) (NMED, 2006a). The arsenic concentrations in these samples ranged from 4.27 to 4.95 mg/kg.

The two soil samples (DP01-4 and DP01-11) collected from DPT borehole DP01 were also analyzed for PCBs. This location was adjacent to the excavation boundary of the previously removed building 704 waste oil tank (SWMU 123). PCBs (arochlor 1016, 1221, 1232, 1242, 1248, 1254, and 1260) were not detected in either sample. Soil boring locations and analytical results from the SWMU 123 Site Investigation performed by Bhate in 2004 which exceeded current NMED SSLs, USEPA Region 6 HHMSSLs, and/or NMED TPH screening guidelines are presented on Figure 1-7.

1.8.8 Voluntary Corrective Measures SWMU 123

Additional PCS excavation and removal activities at SWMU 123 were conducted by Bhate between October 2005 and January 2006. The NMED HWB provided verbal approval of the *Voluntary Corrective Measures Work Plan SWMU 123, Holloman Air Force Base, New Mexico* (Bhate, 2005) on August 30, 2005. The telephone record of this phone call is included in Appendix C of this RFI Work Plan. The primary objective of the additional remedial action was to remove PCS to the south and east of two prior removal actions conducted in 1995 and 1997. Complicating this excavation was the fact that the majority of the soil to be removed was beneath the reinforced concrete pad of the POL washrack, and the POL washrack structure.

The approximate area of the final PCS excavation was 3,000 square feet with an average depth of 13.5 ft bgs. Approximately 1,700 cubic yards of soil was excavated, stockpiled, and sampled. The boundary of the entire excavation conducted during the 2005/06 removal action is illustrated on Figure 1 in Appendix B-8 of this work plan. Laboratory analysis determined that approximately 1,040 cubic yards of soil contained TPH at concentrations exceeding the NMED TPH screening guideline for diesel #2/crankcase oil of 880 mg/kg. All excavated PCS during this removal was transported to the permitted FT-31 Landfarm for treatment.

1.8.8.1 Soil Stockpile Sampling Results

Four samples were collected from stockpiled soil suspected of containing PCS. The stockpile samples were collected at a frequency of approximately 1 sample for every 400 cubic yards of stockpiled soil. All the soil stockpile samples were analyzed for TPH, VOCs, and SVOCs. Stockpile samples SWMU123-PCS6-4,11 and SWMU123-PCS15 both exceeded the NMED TPH screening guidelines (NMED, 2006b) for diesel #2/crankcase oil of 880 mg/kg. A summary table of the analytical data for the stockpile soil samples collected in 2005 is presented in Table 1in Appendix B-8 of this work plan.

1.8.8.2 Excavation Confirmation Sampling Results

A total of 21 confirmation soil samples were taken from both the bottom of the excavation and from excavation sidewalls. The 17 sidewall samples (SWMU123-SW01 through SWMU123-SW16) were collected at 9 bgs along the perimeter of the excavation. The 4 bottom samples (SWMU123-BOTTOM1 through SWMU123-BOTTOM4) were taken from 13 feet bgs in the northern and central area of the excavation. The sample locations and excavation boundaries are presented on Figure 1 in Appendix B-8. All excavation confirmation samples were analyzed by an offsite laboratory for TPH as GRO, DRO, ORO (using USEPA Method Modified 8015M), VOCs (by USEPA Method 8260B), and SVOCs (using USEPA Method 8270C).

Sidewall and bottom samples collected from the excavation all had VOC, SVOC, and TPH concentrations below the NMED screening guidelines, indicating that the PCS had been removed. A summary table of the analytical data for the sidewall and bottom samples collected in 2005 is presented in Table 2 in Appendix B-8 of this work plan.

1.8.8.3 Site Restoration

Fill consisting of rock and soil was imported from the FT-31 landfarm as backfill for the limits of the excavation prior to the placement of the reinforced concrete pad area. Backfill material in areas below 6 feet bgs was placed in 24-inch lifts and compacted to at least 18 inches with a hydraulic plate compactor. From a depth of 6 feet bgs to approximately 3 feet bgs the excavation was backfilled in 9 inch lifts with compaction to at least 6 inches. The remaining fill required to reach the bottom of the existing foundation was placed as controlled low-strength material (CLSM) more commonly referred to as flowable fill. Upon completion of backfill activities a reinforced concrete pad was placed above flowable fill restoring the site to original condition.

2 ENVIRONMENTAL SETTING

2.1 Physiography and Topography

HAFB is located within the Sacramento Mountains Physiographic Province on the western edge of the Sacramento Mountains. HAFB is approximately 60,000 acres in area, and is located at a mean elevation of 4,093 feet above mean sea level (amsl). The region is characterized by high tablelands with rolling summit plains; cuesta-formed mountains dipping eastward and of west-facing escarpments with the wide bracketed basin forming the basin and range complex. The Base is located in the Tularosa Sub-basin, which is part of the Central Closed Basins. The bordering mountains rise abruptly to altitudes of 7,000 to 12,000 feet amsl. The San Andres Mountains bound the basin to the west (about 30 miles) with the Sacramento Mountains approximately 10 miles to the east. At its widest point, the basin is about 60 miles east to west and stretches approximately 150 miles north to south.

In the vicinity of HAFB, the ground surface is relatively flat and slopes gently to the southwest. There are localized areas of greater topographic relief related to arroyos present on the Base, as described in Section 2.3 of this Work Plan.

2.2 Climate

As a whole, New Mexico has a mild, arid to semi-arid, continental climate characterized by light precipitation totals; abundant sunshine, relatively low humidity and relatively large annual and diurnal temperature range (Western Regional Climate Center [WRCC], 2003). The climate of the Central Closed Basins varies with elevation. The base is found in the low areas and is characterized by warm temperatures and dry air. Daytime temperatures often exceed 100 degrees Fahrenheit (°F) in the summer months and middle 50s in the winter. A preponderance of clear skies and relatively low humidity permits rapid night time cooling resulting in average diurnal temperature ranges of 25 to 35°F. Potential evapotranspiration, at 67 inches per year, significantly exceeds annual precipitation, which is usually less than 10 inches. The very low rainfall amounts resulting in the arid conditions, which with the topographically induced wind patterns combining with the sparse vegetation, tend to cause localized “dust devils”. Much of the precipitation falls during the mid-summer monsoonal period (July and August) as brief, yet frequent, intense thunderstorms culminating in 30 – 40% of the total annual rainfall.

2.3 Surface Water and Hydrology

Intermittent streams and arroyos in the basin lowlands are important only during the infrequent periods of heavy rainfall. The Tularosa Basin contains all of the surface flow in its boundaries. The nearest inflow of surface waters to the Base comes from the Lost

River, located in the north-central region of the Base. The upper reaches of the Three Rivers and the Sacramento River are perennial in the basin. HAFB is dissected by several southwest trending arroyos that control the surface drainage. Hay Draw arroyo is located in the far north. Malone and Rita's Draw, which drain into the Lost River and Dillard Draw arroyos, are located along the eastern perimeter of the Base. Approximately 10,000 years ago, indications are of a much wetter climate. The present day Lake Otero encompassed a much larger area, possibly upwards of several hundred square miles. Its remains are the Alkali Flat and Lake Lucero. Lake Lucero is a temporary feature of merely a few inches in depth during the rainy season.

Potable water is available from municipal wells along the margins of the basin with more saline water towards the center. The principal sources of potable water are located in a long narrow north-south trending area on the upslope sides of Tularosa and Alamogordo and in the far southern part of the basin. HAFB is also supplied potable water from Lake Bonito, which is in the Pecos River Basin.

The hydrology of the southern portion of the Base (south of the wastewater treatment plant) is dominated by several manmade features that form a connected hydrologic system. The principal components of this system are: the stormwater drainage canal, Lagoon G, Lake Holloman, and Lake Stinky. In addition, there are both natural and constructed wetlands in this area, some of which are related to and dependent on the manmade surface water features.

HAFB currently generates under 1 million gallons per day (MGD) of wastewater. Approximately 200,000 to 250,000 gallons per day (gpd) of treated effluent empty into Lagoon G (approximately 46 acres) through a 6-inch force-main. This effluent is eventually discharged to the stormwater drainage canal southwest of Lagoon G and north of Highway 70. A berm surrounding this lagoon prevents stormwater from flowing into the lagoon. The stormwater drainage canal starts at a point north of Lagoon G, and then extends southwest of the lagoon into Lake Holloman. The canal is about 2 feet wide and 1 mile long with an elevation change of about 5 feet between Lagoon G and Lake Holloman. The canal also receives effluent from Lagoon G.

Lake Holloman was created in 1965 to receive excess flow from the previous sewage treatment lagoon system. It was formed by the construction of a non-engineered earthen dam midway along an existing ephemeral lake (playa) that normally received runoff from HAFB. Lake Holloman receives water from the stormwater drainage canal, Lagoon G, and effluent from the wastewater treatment plant (WWTP). The amount of effluent going to Lake Holloman can be adjusted depending on the water requirements of Lagoon G and the constructed wetlands. The lake is in a state of dynamic equilibrium, rising and falling with seasonal and annual variations in runoff, local shallow groundwater, and treated effluent from the WWTP.

Lake Stinky encompasses as much as 35 acres of playa below Lake Holloman. This area represents a remnant of the original playa grassland present in the project area prior to the construction of the lagoon system for the original wastewater treatment system in 1948. Persistent seepage from Lake Holloman is sufficient to maintain a limited surface water expression in Lake Stinky, as well as a substantial growth of wetland vegetation (tamarisk and saltgrass) at the base of the dam separating Lake Stinky and Lake Holloman. During most years, total annual discharge to Lake Holloman is sufficient to result in overflow to Lake Stinky. On these occasions, Lake Stinky extends south from the dam through culverts underneath U.S. Highway 70/82 to encompass as much as 61 acres.

There are approximately 119 acres of jurisdictional wetlands on the main base (United States Air Force, 1996), the majority of which are located south of the WWTP near Lagoon G and Lake Holloman (79 acres). Some of these areas are fed partly by seepage from artificial impoundments (e.g., north end of Lake Stinky; west and south of Lagoon G). Others may have an independent existence, or be only slightly affected by the impoundments. These latter areas seem to be remnants of the wetlands that existed before the construction of the present system. Many of the wetlands located south of the WWTP are important foraging areas for resident and migrating birds and/or bats.

2.4 Regional Geology

The sedimentary rocks which make up the adjacent mountain ranges are between 500 and 250 million years old. During the period when the area was submerged under the shallow intra-continental sea, the layers of limestone, shale, gypsum, and sandstone were deposited. In time, these layers were pushed upward through various tectonic forces forming a large bulge on the surface. Approximately 10 million years ago the center began to subside resulting in a vertical drop of thousands of feet leaving the edges still standing (the present day Sacramento and San Andres mountain ranges). In the millions of years following, rainfall, snowmelt, and wind eroded the mountain sediments depositing them in the valley (i.e. Tularosa Basin). Water carrying eroded gypsum, limestone, dolomite, gravel, and other alluvial matter continues to flow into the basin with no route of exit.

The Tularosa sub-basin is geologically described as a bolson, which is an extensive flat alluvium-floored depression, into which drainage from the surrounding mountains flows toward a central playa. The overlying alluvium generally consists of unconsolidated gravels (limestone, dolomite, and gypsum), sands, and clays. A fining sequence from the San Andreas and Sacramento Ranges towards the basin's center characterizes the area with the near surface soils as alluvial, eolian, and lacustrine deposits. The alluvial fan deposits are laterally discontinuous units of interbedded sand, silt, and clay while the eolian deposits consist primarily of gypsum sands. The eolian and alluvial deposits are usually indistinguishable due to the reworking of the alluvial sediment by eolian processes. The playa, or lacustrine deposits, consist of silty clay containing gypsum and are contiguous with the alluvial fan and eolian deposits.

Mesozoic rocks in the northwest mark the Colorado Plateau, topped by younger Tertiary strata. Quaternary age sediments have washed off the Southern Rockies into the open basins and the Rio Grande Rift, a failed spreading center or aulacogen. This would-be ocean basin runs up the center of the state with the Rio Grande flowing down its middle, exposing the Paleozoic and Precambrian rocks on its uplifted flanks. Later Cenozoic volcanic intrusions of Quaternary and Tertiary age are also associated with the rifting.

The great Permian Basin of Texas continues into the state from the southeast with younger Quaternary-Tertiary sediments of the Great Plains cover the whole eastern edge. Basin-and-range terrain of Tertiary sediments and volcanics appear in the extreme southwest coupled with wide dry basins choked with Quaternary coarse sediments eroded from the blocks of uplifted older rocks.

2.5 Regional Hydrogeology

The preponderance of the groundwater occurs as an unconfined aquifer in the unconsolidated deposits of the central basin, with the primary source of recharge as rainfall percolation and minor amounts of stream run-off along the western edge of the Sacramento Mountains. Surface water/rainfall migrates downward into the alluvial sediments at the edge of the shallow aquifer near the ranges, and flows downgradient through progressively finer-grained sediments towards the central basin. Because the Tularosa Basin is a closed system, water that enters the area only leaves either through evaporation or percolation. This elevated amount of percolation results in a fairly high water table. Beneath HAFB, the water table ranges from 5 to 50 feet bgs. Flow for the Base is generally towards the southwest with localized influences from the variations in the topography of the Base. The ground surface slopes at a slightly higher rate than the water table such that the depth to groundwater in the northern areas of the Base is comparably greater (25 to 40 feet bgs) than in the southern areas of the Base (less than 10 feet bgs). Near the arroyos, groundwater flows directly toward the surface drainage feature.

Figure 2-1 shows the general groundwater flow direction at the Base. Groundwater quality in the Tularosa Basin is of potable quality at the recharge areas in close proximity to the Sacramento Mountains and becomes increasingly mineralized toward the central portion of the basin and discharge areas (Radian, 1993). The majority (over 70 %) of the Environmental Restoration Program (ERP) Sites, SWMUs, and Areas of Concern (AOCs) located across HAFB have groundwater monitoring wells containing water with an average TDS concentration greater than 10,000 mg/L. This TDS data supports the hypothesis that TDS concentrations below 10,000 mg/L at HAFB are caused by dilution of natural groundwater from leaking water lines and surface irrigation from the domestic water supply. TDS concentrations greater than 10,000 mg/L exceed the NMWQCC limit as potable water and thus, the groundwater beneath HAFB has been designated as unfit for human consumption. Likewise, USEPA guidelines have identified the groundwater as a Class IIIB water source, characterized by TDS concentrations exceeding 10,000 mg/L.

In addition, there are no potable water wells on HAFB. Potable water for the Base (Boles, Douglas and San Andres well fields) and the city of Alamogordo is derived from the foot of the nearby Sacramento Mountains, just south of Alamogordo. The only production water well, used for livestock irrigation, is located approximately 7 miles southwest of HAFB.

2.6 Soils

Two soil types have been identified on the installation. The main soil type is the Holloman-Gypsum land-Yesum complex, 0 to 5 percent slopes. The other soil type is Mead silty clay loam, 0 to 1 percent slopes. This soil type is located only across the main drainage area for the installation.

The Holloman-Gypsum land-Yesum complex, 0 to 5 percent slopes soil consists of large areas of shallow and deep, well drained soils and areas of exposed gypsum. The Holloman soil makes up about 35 percent of the complex. Typically, the surface layer is light brown very fine sandy loam about 3 inches thick. The upper 13 inches of the substratum is pink very fine sandy loam that is very high in gypsum. Below that, the substratum is white gypsum to a depth of more than 60 inches. This soil is calcareous and mildly alkaline to moderately alkaline throughout. Permeability is moderate, and available water capacity is very low.

Gypsum land makes up about 30 percent of the Holloman-Gypsum land-Yesum complex, 0 to 5 percent slopes. Typically, less than 1 inch of very fine sandy loam overlies soft to hard, white gypsum. The deep Yesum very fine sandy loam makes up about 20 percent of the complex. Typically, the surface layer is light brown very fine sandy loam about 3 inches thick. The upper 9 inches of the substratum is light brown fine sandy loam that is very high in gypsum. Below that, the substratum is pink very fine sandy loam to a depth of more than 60 inches. The soil is calcareous throughout and is mildly alkaline. Permeability is moderate, and available water capacity is moderate. Many fine gypsum crystals are found throughout the profile.

The soil type located across the main drainage area for the installation is Mead silty clay loam, 0 to 1 percent slopes. This deep, poorly drained, nearly level soil is on outer fringes of alluvial fans. This soil formed in fine textured alluvium over lacustrine lake sediment. It is very high in salt content because of periodic flooding and poor drainage.

Slopes are smooth and concave. Typically, the surface layer is reddish brown silty clay loam and clay loam about 5 inches thick. The substratum, to a depth of 48 inches, is light reddish brown clay that has a high content of salts. Below that, the substratum is lacustrine material of variable texture and color to a depth of more than 60 inches. Included with this soil are areas of Holloman soils and Gypsum land along the margins of the unit of steep, short gully sides and knolls. These inclusions make up about 15 percent of the map unit for this soil type. Individual areas are generally smaller than 10 acres. This soil is moderately calcareous throughout and is moderately to strongly alkaline. It has a layer of salt that is more soluble than gypsum. Permeability is very slow, and available water capacity is low.

2.7 Site-Specific Setting

Based on previous investigations conducted at SWMU 123, site-specific geology consists of slightly moist silty clays with varying amounts of medium to fine grained sand and caliche to depths ranging from 4 to 5 feet bgs. These soils display low to no plasticity and weak cementation of the caliche fraction. Generally, the soils beneath 5 feet are characterized as silty, medium to fine grained sands, and silty sands with occasional layers demonstrating higher percentages of clay content. Soils tend to be moist to saturated below the water table. Groundwater occurs in an unconfined aquifer at approximately 10 to 11 feet bgs with potentiometric surface elevations ranging from 4,081.65 to 4,081.03 feet amsl and having a hydraulic gradient of approximately 0.01 feet/feet.

3 SOURCE CHARACTERIZATION

3.1 Physical Condition of the Waste Oil Tanks

The former Building 702 and 704 Waste Oil Tanks (SWMUs 122 and 123) were located along the northern side of the POL Washrack (Figure 1-3). The tanks were approximately 5 ft long by 5 ft in diameter (750 gallons), below grade, and covered with gravel. The age, materials of construction, and integrity of the tanks are unknown as the tanks were previously removed when the POL Washrack was renovated in the early 1990s. The RCRA Facility Assessment (A.T. Kearney, 1988) noted that the tanks were not equipped with automatic fill controls or level monitoring devices.

3.2 Waste Characteristics

The two waste oil tanks are assumed to have received wash water, waste oil, and fuels from the associated oil/water separators also located along the northern side of the current POL Washrack. No historical site characterization activity has been performed at SWMU 122. Previous investigations have been performed on both soil and groundwater at SWMU 123. These investigations have identified a number of contaminants that impacted the soil and groundwater from SWMU 123 including:

- Volatile organic compounds (benzene, toluene, ethylbenzene, xylenes);
- Semi-volatile organic compounds (naphthalene and phenol), and;
- Total Petroleum Hydrocarbons (gasoline and diesel range organics).

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4 POTENTIAL RECEPTORS

This section identifies and describes potential receptors and environmental systems that are susceptible to contaminant exposure associated with the potential releases of hazardous materials from SWMU 122 and 123. The potential receptors include HAFB personnel and residents as well as the flora and fauna of the surrounding ecosystem.

4.1 Current Local Uses and Planned Future Uses of Groundwater

There are no potable water wells on HAFB. Potable water for the Base and the City of Alamogordo is derived from the nearby Sacramento Mountains. The only production water well, used for livestock irrigation, is located approximately 7 miles southwest of HAFB.

There are no water supply wells on the Base because the preponderance of groundwater beneath HAFB contains water with an average TDS concentration greater than 10,000 mg/L which exceeds the NMWQCC limit as potable water and thus, the groundwater beneath HAFB has been designated as unfit for human consumption. Likewise, USEPA guidelines have identified the groundwater as a Class IIIB water source, characterized by TDS concentrations exceeding 10,000 mg/L.

4.2 Current Local Uses and Planned Future Uses of Surface Waters Directly Impacted by the Facility

Due to low rainfall and high evaporation, surface water at HAFB is limited and, therefore, is not used for domestic or municipal purposes nor is it used for recreation or agriculture. The ponds in the southern part of the Base receive effluent from the National Pollution Discharge Elimination System (NPDES) permitted WWTP and are saline (normally about half the salinity of seawater), sulfate-rich, and very rich in nutrients. These ponds provide habitat for numerous plant and wildlife species, so water quality of these receiving waters is important.

4.3 Potential Human Receptors

Potential human receptors include residents, military and civilian workers, construction and maintenance workers, vendors and service providers, and transient visitors. Human use facilities primarily consist of residential housing and industrial/operational facilities. The Base also has a hospital and three schools and a variety of other public service facilities. While groundwater is not locally extracted for use, human exposure to pollutants may result from dermal contact or ingestion from physical contact with contaminated soils or groundwater.

4.4 Potential Biological Receptors

Potential receptors include the flora and fauna of the surrounding ecosystem, as described in the following subsections. This information was generated in 2005 by Bhate during development of the Environmental Assessment (EA) for the wastewater utility privatization evaluation.

4.4.1 Flora

HAFB flora is dominated by xerophytic shrubland and grassland communities having plant assemblages biogeographically related to the Great Basin and Chihuahuan Desert. Other plant communities on the installation include those that are located in brackish marshes and riparian and/or wetland areas, such as those south of the WWTP.

4.4.2 Fauna

A wide variety of fauna can be found at HAFB as it provides a relatively diverse range of habitats for both aquatic and terrestrial species. Habitats found on the installation provide ideal environments for a variety of reptiles and amphibians, mammals, and birds. Available habitats include upland grasslands, xerophytic shrublands, brackish marshlands, playas, and surface water habitats. Additionally, the area south of the WWTP also offers a relatively extensive amount of shoreline/edge habitat along Lakes Holloman and Stinky, the stormwater drainage canal, Lagoon G, and associated constructed wetlands.

Previously performed wildlife inventories have identified numerous species of wildlife throughout the installation. Major groups of fauna are discussed below.

4.4.2.1 Invertebrates

Though invertebrates are an important feature of the desert ecosystem, little is known about their diversity in arid lands. Invertebrates play important roles as beneficial pollinators, parasites, predators, detritivores, and as prey for small mammals, reptiles, fish, and birds. To date, there have been no base-wide studies at HAFB to determine invertebrate species diversity.

However, studies on reptiles, birds, and mosquitofish (*Gambusia affinis*) habitat suggest that the roles taken by invertebrates contribute to ecosystem function. For example, it has been found that the animals on the installation consume insects such as grasshoppers (*Orthoptera*), butterflies and moths (*Lepidoptera*), beetles (*Coleoptera and Bledius*), adult chironomids (*Diptera*), and corixids (aquatic *Hemiptera*).

A total of 26 different aquatic invertebrate taxa have been identified in the area south of the WWTP (Freehling, et al., 1999) and certain fish populations located in Lost River and Malone Draw feed on mosquitoes, amphipods, and annelid worms (Suminski, 1977; Turner, 1987). Some of the invertebrate species that have been identified on the installation include harvester ants (*Pogonomyrmex* spp.), honeypot ants (*Myrmecocystus*), and grasshoppers (*Orthoptera*).

4.4.2.2 Reptiles and Amphibians

Two herpetofauna species surveys have been performed at HAFB: (1) along roads for the Texas horned lizard (*Phrynosoma cornutum*) (Mehlhop, et al., 1998), and (2) at the cinetheodolite missile towers (Johnson, et al., 1997a). The Texas horned lizard survey was conducted on the Main Base and the Boles Wells Water System Annex. The Texas horned lizard, formerly a Category 2 species for federal listing as endangered or threatened, was reclassified February 28, 1996, as a species of concern (United States Department of Interior, 1996). This lizard appears to be abundant on HAFB (Mehlhop, et al., 1998) and was found within the major plant community types on the Main Base.

Other reptiles and/or amphibians that may occur at HAFB that are not listed above include rat snakes (*Elaphe* spp.), rattlesnakes (*C. molossus*), and the greater earless lizard (*Cophosaurus texanus*).

4.4.2.3 Mammals

The most common mammals at HAFB consist of various rodent species and the black-tailed jackrabbit (*Lepus californicus*), found throughout the Great Basin Desert Shrub habitats in New Mexico (Frey and Yates, 1996). Numerous small colonies of bats that forage for insects at the numerous playas, wetlands, and riparian habitats (Johnson et al., 1997a) can be found on the installation. Bats on HAFB roost in abandoned and inhabited buildings and culverts.

Fourteen species of rodents have been identified on the dune periphery of the installation. The Ord's Kangaroo Rat (*Dipodomys ordii*), Desert Pocket Mouse (*Chaetodipus penicillatus*), and the Plains Pocket Mouse with the lighter pelage (*Perognathus flavescens gypsi*) were found primarily within the dunes; others were found equally distributed or too few were captured to determine the habitat affinity (Root and Demarais, 1997; Johnson et al., 1997a; Johnson, et al., 1997b).

At least five mammalian species that have been or could be observed on HAFB have been introduced by man. These five species include the house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), horse (*Equus caballus*), barbary sheep (*Ammotragus lervia*), and gemsbok (*Oryx gazella*). The latter two species were introduced by the New Mexico Department of Game and Fish in the late 1960s. Native big game mammals are uncommon in the project area and include mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*). Predators include bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), and coyote (*Canis latrans*). Badger

(*Taxidea taxus*) and striped skunk (*Mephitis mephitis*) are uncommon predators and omnivores, respectively.

4.4.2.4 Birds

The complex of constructed wetlands south of the WWTP provides important habitat for a number of bird species. Bird censuses are ongoing at HAFB and a complete list of birds can be found in the HAFB Integrated Natural Resource Management Plan (INRMP). The HAFB INRMP further details the relationship between habitat at HAFB and the bird species found there.

4.5 Endangered or Threatened Species

4.5.1 Endangered Species

Although not noted as being observed at HAFB, the ~~oplomado~~ Aplomado falcon (*Falco femoralis)* is known to be present in the HAFB area. The ~~oplomado~~ Aplomado falcon ranges from northern Mexico (and very rarely into southern Texas and New Mexico) southward to the southern tip of South America. In this huge range the species may be common or very rare depending upon habitat and location. This species sometimes hunts over grassland fires and feeds on small birds and/or insects fleeing the flames.

While still legally protected from hunting, the ~~oplomado~~ Aplomado falcon is not protected by Endangered Species Act requirements to preserve habitat and the like. It is believed that mainly habitat destruction caused the species' (near-)disappearance from the U.S. and hinders reestablishment of a wild breeding population; thus, a coalition of environmental groups is attempting to have full protection restored so as not to jeopardize the success of the expanding wild population and the reintroduction efforts (Associated Press, 2006).

4.5.2 Threatened Species

Although not noted as being observed at HAFB, the burrowing owl (*Athene cunicularia*; formerly *Speotyto cunicularia)* is known to be present in the HAFB area. The burrowing owl is a grassland bird historically found in vast numbers across the prairies of the western Great Plains. While the formal environmental status of the burrowing owl varies based on geography, there is an overall decline of this species, particularly where burrowing owls are strongly associated with prairie dog towns. They are listed as endangered, threatened, or a species of special concern in most states and provinces where they occur. The primary threats across its North American range are habitat loss and fragmentation due to the incursion of agriculture and urban encroachment, suppression of naturally occurring fire, and habitat degradation from the extermination of small mammals like prairie dogs and squirrels. Increases in predators such as foxes, badgers, and coyotes are also taking a toll (The Nature Conservancy, 2007; The Owl Pages, 2005).

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5 INITIAL CONCEPTUAL SITE MODEL

5.1 Initial CSM Development

The initial Conceptual Site Model (CSM) was developed in the planning and objectives phase of the project, as described in Section 1.2 of this Work Plan. The CSM is an important communication tool for regulators, responsible parties, and stakeholders and can provide a framework for the entire project. The CSM was formulated with the goal of focusing on collecting the best data to support risk based decision making, and to fill any significant data gaps that existed in relation to SWMUs 122 and 123. Release mechanisms along with fate and transport of contaminants are also very important in supporting risk management.

5.2 Initial CSM Summary Description

SWMUs 122 and 123 are the former Building 702 and 704 waste oil tanks, one of which (SWMU 123) is known to have had a historical release. The extent of the PCS source area has been defined and removed from SWMU 123, however the horizontal extent of BTEX contamination in groundwater has not been defined. The goal of this work in relation to SWMU 123 is to close the data gap that now exists in regards to the downgradient horizontal extent of groundwater contamination emanating from SWMU 123. Additionally, a subsurface soil investigation has not been performed at SWMU 122, presenting a data gap that needs to be met in order to complete a risk-based assessment of the current site(s) groundwater conditions. At SWMU 123, numerous historical investigations and remedial actions have been performed which are summarized in Section 1.8 of this work plan.

The classes of chemicals of potential~~pollutants of~~ concern (COPCs) which are documented to have been released from SWMU 123, and potentially could have been released from SWMU 122; include VOCs, SVOCs, and POLs. The release mechanisms from the waste oil tanks could have been through overflow spills, broken/cracked feeder pipes, corroded pipes, defective joints/connections, or from an actual puncture in the tank itself. The nature of the subsequent transport and fate of COPCs is dependent on environmental conditions and the nature of the COPC. The most significant COPCs in terms of likely mass are VOCs and SVOCs. Although hydraulic gradient at these sites is very flat, some COPCs can travel much more readily than others. VOCs (e.g. BTEX) are likely to be the most mobile COPCs and may travel further than other classes of COPCs. Metals, SVOCs, POLs, and oil and grease have a low degree of mobility in the subsurface. The presence of these classes of COPCs is likely to be limited to the soils and groundwater in the immediate vicinity of the leak.

The leaked COPCs (specifically BTEX compounds) from SWMU 123 have reached groundwater. Once in groundwater these COPCs have traveled in the direction of groundwater flow by advection and dispersion. Groundwater flow direction from SWMU 123 follows a southeasterly trend towards Dillard's Draw, approximately 1,000 ft to the east. The resultant plume may be spread laterally and vertically only very slightly by dispersion.

Any releases from these sites occur in the context of their location in the Tularosa sub-basin, which is geologically described as a bolson (an extensive, flat, alluvium-floored depression) into which drainage from the surrounding mountains flows toward a central playa. Water carrying eroded gypsum, limestone, dolomite, gravel, and other alluvial matter continues to flow into the basin with no route of exit.

Unconsolidated deposits in the basin include alluvium generally consisting of gravels (limestone, dolomite, and gypsum), sands, and clays. At the base, the area is characterized by near-surface soils of alluvial, eolian, and lacustrine origin. The alluvial fan deposits are laterally discontinuous units of interbedded sand, silt, and clay while the eolian deposits consist primarily of gypsum sands. The eolian and alluvial deposits are usually indistinguishable due to the reworking of the alluvial sediment by eolian processes. The playa, or lacustrine deposits, consist of silty clay containing gypsum and are contiguous with the alluvial fan and eolian deposits.

Potential evapotranspiration, at 67 inches per year, significantly exceeds annual precipitation, which is usually less than 10 inches per year. Much of the precipitation falls during the mid-summer monsoonal period (July and August) as brief, yet frequent, intense thunderstorms accounting for 30 to 40% of the total annual rainfall.

The result is that the surficial deposits are a hydrogeologic feature characterized by relatively low hydraulic conductivities (e.g., less than 10^{-4} centimeters per second [cm/sec]) in which the groundwater is non-potable due to high concentrations of TDS. The low recharge, low permeability (and hence yield), and high TDS combine to negate the utility of the groundwater for potable or other purposes.

Potable water at HAFB is supplied by municipal wells along the margins of the basin where the water has lower TDS and the permeability is higher. These locations are hydraulically upgradient of the Base. The more saline waters (high TDS) at the Base result from long travel paths or residence times of the water in contact with the gypsum and other soluble geological materials. Small zones of fresh water (with lower TDS) may occur in areas where leakage from water supply lines and the sewer line occur. Potable water is also provided by Bonita Lake, which is located approximately 60 miles northeast of the Base.

The CSM described in the previous paragraphs summarizes a generalized rendering of the Site; examples of key Site features; local geology/hydrogeology; and contaminant type, pathways, and distributions. This section has presented a synopsis of the current conceptual understanding of the Site, decision information requirements, status of information gathering, and actions required to obtain information. This information was used to create the DQOs outlined in Section 1.3 of this Work Plan. It is important to re-emphasize that the Initial CSM provides an informed hypothesis or set of hypotheses about the Site, thus, actual conditions at the Site may vary significantly from those depicted in this section.

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6 SAMPLING AND ANALYSIS PLAN FOR CHARACTERIZATION OF RELEASES OF HAZARDOUS WASTE

This section presents the Sampling and Analysis Plan (SAP) for the SWMU 122 and 123 RCRA Facility Investigation (RFI), including:

- Pre-Investigation Requirements
- Sampling Strategy
- Sampling Procedures
- Sample Analysis

The SAP for this RFI has three primary objectives. The first goal is to identify potential releases to the subsurface soil and groundwater from the previously removed Building 702 Waste Oil Tank (SWMU 122). The second objective is to delineate the extent of groundwater contamination southeast of the Building 702 and 704 Waste Oil Tanks (SWMUs 122 and 123). SWMU 123 source area soils have been removed, but the lateral extent of BTEX groundwater contamination has yet to be defined. The third and final goal of this RFI is to collect sufficient analytical (chemical and geotechnical) data to support a site-specific risk assessment of the exposure pathways present for both human and non-human receptors.

Soil and groundwater sampling procedures will utilize industry standard methods to ensure sample quality and provide a platform for efficient collection. Sample analysis includes field screening methods and offsite analysis to provide an efficient means of identifying subsurface conditions.

6.1 Pre-investigation Requirements

Before site activities can begin, there are several pre-investigation documents and approval requirements to be met, including Air Force Form (AF Fm) 332 approval, Base dig permit with utility clearances, site security measures, and facility manager notification of the intended operations. NationView will coordinate project requests for Base installation support services through the 49th Civil Engineering Squadron/Environmental Flight (CES/CEV). Pertinent to the start of activities, a pre-construction meeting and site walk-through will be conducted with the USACE Resident Engineer, HAFB personnel, and NationView Site Manager, to inspect site conditions for site/equipment access, equipment staging, and decontamination area(s), potential site hazards, and emergency evacuation routes. Also reviewed at this time will be project procedures in accordance with the schedule and planned activities.

6.1.1 AF Form 332

Prior to initiating drilling activities, a completed and approved AF Fm 332, will be obtained. This form authorizes construction work at HAFB and is required for the initiation of any construction work. This work order describes what activities will take place at the location.

6.1.2 Dig Permit/Utility Clearances

Prior to the submittal of the dig permit (AF Fm 103), the area of excavation will be clearly delineated with marker flags, stakes, or paint, as appropriate to the surface material. Utility clearance approvals will be completed by the appropriate HAFB utility office (e.g., telephone, sewer, water, natural gas etc.). Upon receipt of the approved dig permit (AF Form 103) with the utility clearances, the NationView Site Manager or other authorized project personnel will complete a site walk-through confirming the dig permit authorizations and make any required changes.

6.1.3 Site Security

Site security is concerned with safety at the site during all drilling activities, and areas surrounding the drilling activity, and will be addressed as outlined in the *Basewide Health and Safety Plan* (HASP) (Bhate, 2003c). At a minimum, the exclusion zone will be secured with caution tape, and traffic cones surrounding the perimeter of the site. The size of the exclusion zone will be determined by the size of the drilling and support equipment, and the prevailing site conditions. Open boreholes will not be left unattended without first securing the immediate area surrounding the borehole, and covering the opening so that it does not become a hazard.

6.2 Sampling Strategy

As presented in Section 1.2 of this Work Plan, the primary project objectives of the SWMU 122 and 123 RFI sampling plan are to:

- Identify potential releases to the subsurface soil and groundwater from the previously removed Building 702 Waste Oil Tank (SWMU 122).
- Delineate the downgradient horizontal extent of VOC (benzene, toluene, ethylbenzene, and xylene) groundwater contamination from the previously removed Building 704 Waste Oil Tank (SWMU 123) that has been identified under the POL Washrack.
- Collect sufficient analytical data (chemical and geotechnical) to complete a site-specific risk assessment of the exposure pathways, and,

- Collect the proper data to meet the data DQOs to support the closure of the site based on guidance from the NMED.

The sampling strategy for this RFI has been designed to characterize SWMU 122 soil and groundwater conditions, define extent of groundwater contamination related to SWMU 123, and to collect data in support of risk assessment modeling. Pre-designated sampling locations, quantities, and location rationale are presented in Section 6.2.2 of this work plan.

As described in Section 6.3 of this Work Plan, DPT drilling techniques will be used to collect samples during this work, as follows:

- Soil samples will be collected via DPT using Geoprobe Systems® Dual-Tube 325 (DT325) tooling.

- Groundwater samples will be collected from permanent 1-inch polyvinyl chloride (PVC) pre-pack well screens installed via DPT.

6.2.1 Applicable or Relevant and Appropriate Requirements

The detected analytical results for the subsurface soil samples collected during this RFI will be compared to their respective Applicable or Relevant and Appropriate Requirement (ARAR) action level. The specific action levels to be used include the following:

6.2.1.1 Soils

The residential SSLs established in NMED's Technical Background Document for Development of Soil Screening Levels (NMED, 2006a) will be used as the action levels for detections of VOCs, SVOCs, PCBs, and Target Analyte List (TAL) metals. Additionally, all inorganic constituents (e.g., metals) detected in the soil samples will be compared to the HAFB Background, Composite Soil, Upper Tolerance Limits (UTLs) (pending NMED approval of the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* [NationView/Bhate JV III, 2009]). For constituents with no established NMED residential SSL, the USEPA Region 6 HHMSSLs (USEPA, 2008) will be used as the action level. The action levels for TPH are established in the NMED TPH Screening Guidelines (NMED, 2006b). Based on the analysis of the NAPL sample collected from monitoring well MW-1 in September 2004 (Bhate, 2004) the TPH screening guideline for diesel #2/crankcase oil of 880 mg/kg will be used as the action level for total TPH concentrations (GRO, DRO, and ORO).

The geotechnical soil data collected during this investigation will be used to support a risk assessment. Specifically, the geotechnical data (moisture content, dry bulk density, specific gravity and fractional organic carbon content) will be utilized to calculate and evaluate the fate and transport pathways for indirect exposure (indoor and outdoor vapor inhalation).

6.2.1.2 Groundwater

There are two applicable standards for groundwater: the NMWQCC groundwater standards for contaminants (NMAC 20.6.2.3103) and the USEPA's National Priority Drinking Water ~~Standards~~ Regulations MCLs (USEPA, 200~~3~~9). The lower of the two standards will be used as action levels for VOCs, SVOCs, and TAL Metals in groundwater. Additionally, all inorganic constituents (e.g., TAL metals) detected in the groundwater samples will be compared to the HAFB Background, Dissolved Metals, Groundwater UTLs (pending NMED approval of the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* [NationView/Bhate JV III, 2009]). The NMED TPH screening guideline for diesel #2/crankcase oil in non-potable groundwater of 30.4 mg/L will be used as the action level for total TPH concentrations (GRO, DRO, and ORO) in groundwater (Table 2b, NMED, 2006b).

6.2.2 Field Sampling Location Plan Design Basis

A design basis was used to develop the RFI field sampling location plan. Locations for the proposed soil borings and permanent monitoring wells are illustrated on Figures 6-1 and 6-2 respectively. The design basis was used to provide a consistent rationale for pre-designating sampling locations in the immediate vicinity of SWMU 122 and to the southeast of SWMU 123. Research efforts were made to maximize the value of historical information in identifying prior site activity at these two SWMUs. Benefits of this historical information include soil conditions, COP~~O~~Cs, groundwater depth, and groundwater flow direction.

Soil lithology in the area of these two SWMUs generally consists of silty to clayey sands with an interbedded weak caliche fraction, which lends itself to the utilization of DPT drilling techniques. Pollutants of concern in groundwater at SWMU 123 are VOCs (benzene, toluene, ethylbenzene, and xylene). Groundwater depth based on previous drilling and excavation activity at SWMU 123 is approximately 10 feet bgs. Groundwater flow direction from SWMU 123 follows in a southeasterly trend towards Dillard's Draw (located approximately 1,000 ft east of SWMU 123). Newly installed wells will be spaced accordingly to intercept groundwater flow to the southeast, originating from SWMU 123 (and SWMU 122).

6.2.2.1 SWMU 122 Source Area Soil Boring and Monitoring Well Installations

At SWMU 122, four soil borings will be drilled around the perimeter of the former Building 702 waste oil tank (see Figure 6-1). These borings will be approximately 3 feet outside of the tank area on the north, south, east, and west sides. Soil borings on the north, east, and west sides of the tank area will be drilled to a depth of approximately 10-15 ft bgs. Once soils have been obtained for sampling purposes, borings SWMU122-DP01 through SWMU122-DP03 will be abandoned with hydrated bentonite chips according to Standard Operating Procedure (SOP) HAFB-10. The soil boring on the south side (downgradient) of SWMU 122 (SWMU122-DP04) will be advanced to approximately 20 feet bgs, and will be converted into a permanent 1-inch monitoring well (SWMU122-MW01) upon completion of soil sample collection (see Figure 6-2).

6.2.2.2 SWMU 122 and 123 Monitoring Well Network

As shown on Figure 6-2, eleven new monitoring wells will be installed downgradient of SWMUs 122 and 123, southeast of the POL Washrack (SWMU122-MW02 through SWMU122-MW12). These well locations are spaced and arranged linearly (in fences) perpendicular to groundwater flow in the area to intercept any groundwater contamination migrating from SWMUs 122 and 123. While drilling these wells, soils will be logged for lithology and headspace readings, however soil samples will be not obtained for offsite analysis. The source area of PCS has been previously removed from SWMU 123, and all excavation sidewall floor confirmation samples were below NMED SSLs (see Appendix B-8 of this work plan). Upon completion of these soil borings a permanent 1-inch monitoring well will be installed at each location. The purpose of these monitoring wells is to delineate the horizontal extent of groundwater contamination from SWMU 123 (and potentially SWMU 122).

6.3 Sampling Procedures

This section describes the sampling procedures and technologies to be used during the project. References are made to documents describing standard methodologies from a variety of sources including:

- *Final Basewide Quality Assurance Project Plan* (Bhate, 2003b)
- HAFB SOPs from Appendix A of the HAFB Basewide QAPP (e.g., SOP HAFB-#)
- SOPs prepared by equipment manufacturers (e.g., Geoprobe® DT325 Dual Tube Sampling System SOP, Technical Bulletin No. MK3138)

The specific HAFB SOPs for this sampling event are listed below:

HAFB SOP-1 Documentation, Sample Handling, Chain-of Custody, and Shipping

HAFB SOP-2 Sampling Equipment Documentation

HAFB SOP-3 Staking, Utility Clearance, and Permitting

HAFB SOP-4 Direct Push Sampling for Soil and Groundwater

HAFB SOP-5 Soil Sampling for Chemical Analysis

HAFB SOP-6 Procedure for Field Screening of Volatile Organics

HAFB SOP-7 Lithologic Description and Geotechnical Sampling

HAFB SOP-8 Groundwater Sampling for Chemical Analysis

HAFB SOP-9 Field Management of Investigation-Derived Waste

HAFB SOP-10 Borehole Abandonment and Site Restoration

The following sections describe the locations and procedures for DPT soil and groundwater sampling and the groundwater monitoring well installation, sampling, and analysis to be performed.

6.3.1 Environmental Media to be Sampled

Two environmental media (matrices) will be sampled during the RFI, as follows:

1. Soil - DPT core soil sampling (SWMU 122 source area)
2. Groundwater - DPT-installed permanent wells and existing wells (SWMU 122 and 123 monitoring well network)

6.3.2 Soil Sampling

As described in Section 6.2.2 of this Work Plan, soil sampling will be undertaken at each of the pre-determined sampling locations in close proximity to SWMU 122 (source area soil borings) and southeast of SWMUs 122 and 123 (soil borings for monitoring well installations). Each location will be cleared for subsurface utilities in accordance with HAFB SOP-3 in the HAFB Basewide QAPP (Bhate, 2003b). Soil samples will be collected continuously from soil borings using DPT methodology in accordance with HAFB SOP-4. Each boring will be visually classified and lithology described in the field according to HAFB SOP-7 and the Unified Soil Classification System (USCS) (American Society for Testing and Materials [ASTM] D 2487-92 and ASTM D 2488-90). The specific locations of the borings may be modified based on site-specific (access, any observed or underground utilities, etc.) field conditions.

Each soil core will be field screened every 2 feet with a PID. Soil samples with the highest PID readings will be retained for offsite laboratory analysis. Notation will also be made of any visual (discoloration) and/or aromatic observations that are indicative of potential contamination. These initial screening methods will serve as primary indicators of a potential release from SWMU 122. If no elevated PID readings are observed in the field, soil samples will be obtained from the ~~vadose zone~~capillary fringe (approximately 1 foot above water table), and half way between ground surface and saturated soils. Soil sampling will follow HAFB SOP-5 of the HAFB Basewide QAPP (Bhate, 2003b).

Four DPT soil borings (SWMU 122-DP01 through –DP04) will be completed in the immediate vicinity of SWMU 122 (former Building Waste Oil Tank 702) at the locations shown in Figure 6-1. A total of 9 soil samples (based on two samples per borehole), including one duplicate sample will be collected for chemical analysis. Each soil sample will be analyzed by an offsite laboratory for VOCs, SVOCs, TPH (DRO/GRO/ORO), PCBs, and TAL Metals. Samples selected for laboratory analysis will be labeled, handled, and prepared for shipment in accordance with HAFB SOP-1. The soil samples submitted for chemical analysis will be shipped to Accutest Laboratories in Orlando, Florida for analysis are summarized in Table 6-1.

Additionally, two undisturbed geotechnical samples will be collected from one DPT borehole (SWMU 122-DP05) located upgradient of SWMUs 123 and 122 (Figure 6-1). This location is near existing monitoring well MW-4. Soil analytical data from MW-4 exhibited no impact which makes it an ideal geotechnical sampling location. This soil boring will be labeled SWMU122-DP05, and geotechnical samples will be obtained from above the ~~vadose zone~~capillary fringe. The two soil samples will be analyzed for moisture content, dry bulk density, specific gravity, and fractional organic carbon content (Table 6-1) and will be shipped Accutest Laboratories, Orlando, Florida for analysis.

A qualified surveyor will locate the DPT boreholes using a global positioning system (GPS). All horizontal coordinates will be referenced to the State Plane Coordinate System, New Mexico Central and surveyed to an accuracy of +/- 1.0 ft.

6.3.2.1 Direct Push Soil Sampling Procedures

Samples will be collected using DPT methods for all SWMU 122 and 123 soil borings. Soil sampling will be accomplished using a Geoprobe Systems® DT325 Dual Tube Sampling System (coring tool) in accordance with the Standard Operating Procedure (Geoprobe Systems® Technical Bulletin MK3138). Samples will be collected from the DT325 tool for offsite analysis. The DT325 coring tool will be advanced to a depth of approximately 10 feet bgs and/or to groundwater to collect soil samples for analysis. No soil samples for chemical analysis will be collected from the saturated zone for offsite analysis (lithology and headspace readings only).

During soil sampling the DT325 tool will be removed from the ground and the clear PVC liner will be removed from the liner sheath at the ground surface. The liner will be capped and marked with the depth on the top and bottom of the liner using an indelible pen. The borehole number will also be written on the liner. The liner will then be opened with a cutting tool and the samples will be obtained for lithologic log, headspace readings (PID), and offsite chemical analysis.

If a risk assessment is required, geotechnical data is necessary for understanding the physical aspects of the environment which would affect the migration and fate of the release and identification of exposure pathways for both humans and non-human receptors. The two soil samples collected for geotechnical analysis will be obtained between ground surface and top of water table. These samples will be taken in a thin walled tube sampler, with tube ends capped and the top and bottom ends of the tube labeled with depths.

6.3.3 Monitoring Well Installation Activities

Twelve additional permanent groundwater monitoring wells (SWMU 122-MW01 through and SWMU 122-MW12) will be installed during this investigation to delineate the downgradient extent of the known BTEX (benzene) groundwater plume emanating from the SWMU 123 (former Building 704 waste oil tank) and potential groundwater contamination from SWMU 122 (former Building 702 waste oil tank). The SWMU 122/123 monitoring well network shown on Figure 6-2 was designed to characterize and delineate the horizontal extent of groundwater contamination.

6.3.3.1 Monitoring Well Locations

As illustrated on Figure 6-2 monitoring well SWMU 122-MW01 will be installed immediately downgradient of SWMU 122 to determine any potential impact to groundwater from the former Building 702 waste oil tank. Eleven monitoring wells (SWMU 122-MW02 through SWMU 122-MW12) will also be installed in three downgradient fences perpendicular to the southeastern groundwater flow direction. As shown on Figure 6-2 the three fences of monitoring wells are approximately 125, 300, and 475 ft downgradient from SWMUs 122 and 123. Additionally four existing monitoring wells (SWMU123-MW3 through SWMU123-MW5 and S54-MW4) will be incorporated into the SWMU122/123 monitoring well network (16 wells total). The proposed monitoring well network of existing and new wells will characterize the current groundwater conditions at each SWMU as well as determine the horizontal extent of the BTEX plume migration that has been documented at SWMU 123.

6.3.3.2 Monitoring Well Installation and Development

The 12 new monitoring wells will be constructed using DPT drilling methods. A qualified geologist will log each borehole. Based upon the depth to groundwater determined from the DPT soil borings, the permanent monitoring wells will be installed to a depth of approximately 15 - 20 ft bgs. Each monitoring well will extend to a minimum depth of 5 feet below the water table and be completed with 1-inch diameter, PVC, pre-packed well screen. The coring tool will be advanced at least 5 feet below the water table within the same hole that the soil samples were collected from and the core barrel will then be removed, leaving the outer casing in place. Each monitoring well will extend to a minimum depth of 5 feet below the water table and be completed with 10 feet of 1-inch diameter 0.010-inch slotted PVC screen. The pre-packed screens will be lowered to the bottom of the outer casing of the Geoprobe Systems® DT325 Dual Tube Sampling system. The pre-packed screens will be connected to 1-inch, PVC flush joint riser pipe in 5 or 10 foot length sections to the ground surface. A 1-inch locking cap will be secured at the top of each monitoring well.

Once the screen and riser are in place in the bottom of the casing below the water table, the outer casing of the coring tool will be retracted to expose the screen to the formation. Upon removal of all DPT tooling from the borehole, additional sandpack consisting of 10/20 Colorado Silica Sand will be placed around the well screen to a height of 2 feet above the top of the screened interval. A minimum 2 ft thick granular bentonite seal will be placed above the sand filter pack and hydrated. The remaining annular space will be backfilled with neat Portland cement. The wells will be completed as flush mount well completions (water tight vault with a rubber gasket) with a concrete pad (3 feet by 3 feet square by 4 inches thick).

The completed wells will be developed to remove fine particulate and improve hydraulic communication with the surrounding saturated material. Well development will begin no sooner than 48 hours after grouting. Water levels in newly installed wells will be monitored until levels have reached equilibrium based on three successive water level measurements made over a period of 10 minutes. Once the equilibrium water level has been recorded, the well will be developed to remove sediment which may have been introduced into the borehole and formation during drilling and installation activities. Well development will initially be conducted with a stainless steel bailer to remove sediment in the filter pack. The use of pre-pack screens will minimize the amount of sediment entering the monitoring well. Monitoring well development will take place by over-pumping each well until at least five well volumes have been removed, and the turbidity, pH, specific conductivity, dissolved oxygen, and temperature have stabilized by +/- 10 percent for at least three consecutive readings.

6.3.4 Groundwater Sampling

Once well development has been completed, and adequate time for recharge has been allowed (24 hours), the 12 new monitoring wells (SWMU 122-MW01 through and SWMU 122-MW12) will be purged using low flow sampling techniques (HAFB SOP-8, Bhate, 2003b). A peristaltic pump equipped with polypropylene tubing will be used to bring sample water to the surface where indicator field parameters will be monitored in a flow through cell. Field parameters will be measured every 1 well volume. Groundwater samples will not be obtained until 3 consecutive field parameter measurements have stabilized. Stabilization occurs when the pH measurements remain constant within 0.1 units; specific conductivity, dissolved oxygen and temperature vary by no more than 10 percent; and turbidity by no more than 5 nephelometric turbidity units. Utilizing low-flow purging and sampling techniques may require removal of a greater volume of water than three to five volumes. Once field parameters have stabilized, sample tubing will be removed from the monitoring well, and temporarily placed into a new plastic bag. Groundwater samples to be analyzed for VOCs will be collected with a disposable Teflon® bailer. Following the collection of groundwater samples for VOC analysis, sample tubing will be re-inserted into the well to collect groundwater samples for the remaining analytes. Additionally, the four existing wells (SWMU123-MW3 through SWMU123-MW5 and S54-MW4) will be purged and sampled using the procedures outlined above. A new length of polypropylene tubing and disposable Teflon® bailer will be used for each well and the tubing in the peristaltic pump head will be replaced with a new piece of tubing for each well. Water level indicators will be decontaminated prior to use at each well.

A total of 18 groundwater samples including two duplicate samples will be collected from the 16 monitoring wells and will be analyzed by an offsite laboratory for VOCs, SVOCs, TPH (DRO/GRO/ORO), TAL metals, PCBs, and TDS. Monitoring well groundwater samples will be labeled, handled, and prepared for shipment in accordance with HAFB SOP-1. The groundwater samples which will be submitted for chemical analysis are summarized in Table 6-2.

6.3.4.1 Groundwater Elevations

Twenty four hours after each of the 16 monitoring wells that comprise the SWMU 122/123 network have been sampled, groundwater elevations will be measured. Elevations will be measured for the 12 new wells (SWMU 122-MW01 through SWMU 122-MW12) and the four existing wells (SWMU123-MW3 through SWMU123-MW5 and S54-MW4) shown on Figure 6-2. A current potentiometric surface map of SWMU122/123 will be developed from the groundwater elevation data collected during this RFI.

6.3.4.2 Surveying

A qualified Surveyor will survey the 16 new and existing monitoring well locations using GPS in accordance with methods described in the Basewide QAPP (Bhate, 2003b). Horizontal locations will be relative to the State Plane Coordinate System, New Mexico Central and surveyed to an accuracy of +/- 1.0 ft. Vertical elevations will be referenced to the North American Datum (NAD) 1983. The top of casing (vertical control) will be used to determine the depth and elevation of the groundwater and surveyed to an accuracy of +/-0.01 ft. During this investigation the source area(s) will be mapped to scale showing ancillary structures, sampling locations, buildings, roads, sidewalks, paved and unpaved areas. Additionally, all maps will include a coordinate system (e.g., latitude/longitude) and the site boundaries.

6.3.5 Documentation

Documentation, sample handling, chain-of-custody, and shipping will be managed in accordance with HAFB SOP-1 of the HAFB Basewide QAPP (Bhate, 2003b).

Sampling personnel will use a bound field log book with moisture resistant pages to record pertinent sampling information with waterproof ink in addition to any forms provided in, or specified by applicable SOPs. The log book will identify project name, project number, project manager and telephone number, and principal street address or geographic location of the site. Daily field activities and sampling information will be entered in the log book on dated, initialed, and serially-numbered pages. Corrections will be made to entries by initialed and dated line-out deletions. A diagonal line will be drawn across the remaining blank space of the last page of each day's entry. Each day's entry will be signed and dated by the author.

The date and time of sample preparation, collection, and personnel who conducted sampling will be recorded with the sample identification number in the field log book and on the chain-of-custody ~~(COC)~~ form. The names of visitors and any other persons on site will also be recorded in the field log book. Sampling personnel will record the ambient weather conditions and other conditions at the sampling location that may affect sample collection, the apparent representativeness of the sample, or sample analysis.

Sample nomenclature and labeling requirements are described in Section 7.2.1 of this Work Plan.

6.3.6 Decontamination

Sampling equipment will be decontaminated as described in HAFB SOP-2 of the HAFB Basewide QAPP (Bhate, 2003b). Equipment to be steam cleaned includes:

- DT325 Dual Tube Sampling System - prior to each hole
- DPT rig - prior to demobilization or as needed to remove soil, etc.

Equipment to be washed with soap and potable water supplied by HAFB includes:

- DT325 System core barrel - prior to each use

6.3.7 Management of Investigation-Derived Waste

Investigation-derived waste (IDW) will be managed and characterized in accordance with HAFB SOP-9 of the HAFB Basewide QAPP (Bhate, 2003b). Whenever possible, waste minimization techniques will be used to reduce the amount of IDW. IDW generated by installing the new monitoring wells and subsequent groundwater sampling activities will be managed and characterized according to the following guidelines. Solid waste such as soil core liners, empty sand and bentonite bags, personal protective equipment (PPE), and used tubing, etc., will be placed in trash bags and disposed of in dumpsters on site for ultimate disposal as non-hazardous sanitary waste.

Drill cuttings and excess soils from sampling will be visually assessed for staining and screened with a PID. If the cuttings and/or soils are visibly stained or if they have PID headspace readings above background, they will be contained and temporarily staged at the FT-31 Landfarm pending receipt of sample analytical results. If analytical results indicate contaminants present at concentrations above the landfarm's acceptance levels, the material will be properly disposed offsite. If the analytical results indicate contaminants present at levels below the landfarm's acceptance levels, the material will be land-farmed. If none of the visual, screening, or analytical results based conditions are met, the material will be used as backfill or spread around borehole locations as described in HAFB SOP-9 of the HAFB Basewide QAPP (Bhate, 2003b).

Decontamination and purge waters (from monitoring well development and sampling) will be locally contained in 5 gallon pails and conveyed to a 1,000 gallon portable storage tank. The 1,000 gallon portable storage tank will be maintained by NationView until disposal through the HAFB WWTP, pending laboratory analysis. Other liquid wastes, such as decontamination rinses, are anticipated to be non-hazardous and as such, can be disposed of through the HAFB WWTP.

6.4 Sample Analysis

This section describes the objectives and procedures associated with the analytical program. The analytical strategies for the SWMU 122 and 123 RFI have been designed with past investigation and soil removal activities in mind.

6.4.1 Data Quality Objectives

The analytical methods outlined in Tables 6-1 and 6-2 of this Work Plan were selected based on their ability to provide reliable results which can be used to determine whether a given contaminant (or contaminant class) is present at concentrations:

- Above reporting limits (RLs),
- Above RLs and below its respective ARAR action level criteria, or
- Above its respective ARAR action level criteria.

In several cases, laboratory method detection limits (MDLs) will be used to compare to ARARs. Concentrations that fall between the practical quantitation limits (PQL) and the MDL will be qualified accordingly.

The selectivity and accuracy of the selected screening techniques have all been adequately proven by virtue of being an accepted method. The screening methods will be used to provide near-real-time data and will be supported by offsite definitive analytical methods.

Analytical chemistry data will be reviewed according to latest revision of the USEPA *Contract Laboratory Program National Function Guidelines for Inorganic Data Review* (USEPA, 2004c) and *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA, 1999). One hundred percent (100 %) of the analytical data will be subjected to review modeled after the USEPA Tier I guideline (USEPA Region I, 1996). The Tier I review will include a review of completeness. In addition, as specified by the Project Chemist, the definitive data may also be subjected to review modeled after the USEPA Tier II guideline (USEPA Region I, 1996). This review will compare selected QC parameters (holding time, laboratory control sample [LCS], method blanks, field blanks, surrogates, matrix spike [MS]/matrix spike duplicate [MSD]/laboratory duplicate [LD], and field duplicates) and DQOs with the acceptance criteria described in the HAFB Basewide QAPP (Bhate, 2003b) and the HAFB Basewide QAPP Addendum (see Appendix A of this work plan).

Qualifiers may be applied to data that fails to satisfy the acceptance criteria as detailed in the HAFB Basewide QAPP (Bhate, 2003b). Unless otherwise noted, all data validated using the methods noted above will be considered suitable for use in meeting the objectives of this study.

6.4.2 Laboratory Analytical Methods

Accutest Southeast in Orlando, Florida (Accutest) will be completing all analyses of both soil and groundwater. The soil and groundwater samples will be analyzed as follows:

- VOCs by USEPA Method 8260B (soil and groundwater)
- SVOCs by USEPA Method 8270C (soil and groundwater)
- PCBs by USEPA Method 8082 (soil and groundwater)
- TPH (GRO, DRO, ORO) by modified USEPA Method 8015B (soil and groundwater)
- TAL Metals by USEPA Method 6010B/7470A/7471A (soil and groundwater)
- TDS by USEPA Method ~~160.1~~2540C (groundwater only)
- Moisture content by USEPA Method ~~160.3M~~2540B (soil geotechnical only)
- Dry bulk density by ASTM Method D2937 (soil geotechnical only)
- Specific gravity by ASTM Method D1429-86 (soil geotechnical only)
- Fractional organic carbon content by ASTM Method D2974 (soil geotechnical only)

SOPs for the analytical methods are not physically included as part of this Work Plan, however, the SOPs have been reviewed and can be made available by the laboratory upon request. Table 6-3 presents a summary of sample containers necessary as per sample media along with analyte holding time requirements for the associated method protocols.

The analytical requirements, including preparation methods, analytical methods, and various QA/QC parameters, for soil and groundwater samples are summarized in the HAFB Basewide QAPP in:

- Table 3-1 (Project Data Quality Objectives),
- Table 10-1 (Sample Containers, Preservatives, and Holding Times),
- Table 13-1 (Extraction and Digestion Procedures), and,
- Table 13-2 (Analytical Procedures)

The definitive data, additional investigation field QC samples, and laboratory QC limits for soil and groundwater samples are summarized in the HAFB QAPP Addendum (Appendix A) in:

- Table 3-2 (Summary of Definitive Data)
- Table 4-1 (Summary of Additional Investigation Field QC Samples)
- Table 4-2 (Summary of Laboratory QC Limits)

As noted previously, for several compounds, MDLs will be used to meet the respective ARARs. Where concentrations fall between the PQLs and the MDLs, the data will be qualified accordingly.

Samples selected for laboratory analysis will be labeled, handled, and prepared for shipment in accordance with HAFB SOP-1 of the HAFB Basewide QAPP (Bhate, 2003b). Each cooler containing samples to be shipped for offsite VOC analysis will require a trip blank. The samples will be placed on ice and shipped under strict chain-of-custody to Accutest Laboratories in Orlando, Florida.

Accutest will provide Level II laboratory deliverables which consist of an analytical report with results and QA/QC summaries. Internal QC results, not included as part of the Level II package, will be retained on file at each of the offsite laboratories.

Results for all samples will be presented in hard copy Form-1 and Electronic Data Deliverable (EDD) formats. Electronic data shall be delivered in an appropriate format such that the data can be uploaded to the project database for subsequent manipulation and presentation.

Standard turnaround times (TAT) of 2 weeks will be expected for all organic and inorganic results.

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7 RISK ASSESSMENT APPROACH

The primary objectives of this RFI are to; identify potential releases to soil and groundwater from the previously removed Building 702 Waste Oil Tank (SWMU 122), to delineate the extent of groundwater contamination southeast of the Building 702 and 704 Waste Oil Tanks (SWMUs 122 and 123), and to collect sufficient analytical data to support a site-specific risk assessment of the exposure pathways present for both human and non-human receptors. Data collected during this RFI will be evaluated based upon the DQOs for the project. If the completed evaluation indicates an acceptable risk, the site can be considered for closure with no further action. The risk assessment methodology consists of the following events:

1. Compilation of data;
2. Identification of COPCs;
3. Development of exposure model (EM);
4. Identification of target levels;
5. Calculation of representative concentrations; and
6. Comparison of representative concentrations with target levels.

Each of these steps are generally described below.

7.1 Evaluation of COPCs

All COPCs (VOCs, SVOCs, TPH, TAL metals, and PCBs) that are detected in soil and groundwater samples collected during this RFI will be compared to the analyte specific ARARs that are presented in Section 6.2.1 of this Work Plan. Furthermore, all inorganic constituents (e.g., TAL metals) detected in the soil samples will be compared to HAFB Background, Composite Soil, UTLs (pending NMED approval of the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* [NationView/Bhate JV III, 2009]). Additionally, all inorganic constituents (e.g., TAL metals) detected in the groundwater samples will be compared to the HAFB Background, Dissolved Metals, Groundwater UTLs (pending NMED approval of the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* [NationView/Bhate JV III, 2009]).

7.2 Risk Based Evaluation

Subsequent to the investigative activities detailed in this Work Plan, a risk based evaluation will be performed to ensure that the risks to future receptors are acceptable at SWMU 122 and 123. The risk based evaluation will be included in the submittal of the SWMU 122 and 123 RFI Completion Report. The following sections present the various steps that will be included in the risk evaluation.

7.2.1 Review of Available Analytical Data

As a first step in the risk evaluation process, soil and groundwater data produced by this RFI will be combined with useable historical data. The data will then be reviewed to determine (i) the most probable source(s) of contamination, (ii) that soil and groundwater impacts have been adequately delineated, and (iii) if any additional chemicals were detected that were not previously of concern at the site. Additionally, the data will be evaluated to ensure it meets standards for data quality established in the NMED *Technical Background Document for Development of Soil Screening Levels, Revision 4.0* (NMED, 2006a).

7.2.2 Revision of the Conceptual Site Model

Following a review of available data, the CSM may need to be revised. This includes (i) re-assessing the distribution of Chemicals of Concern (COCs) in soil and groundwater, (ii) verifying current and future land use, and (iii) verifying site stratigraphy and hydrogeology. To date, COCs identified in soil at SWMU 122 and 123 above action levels are; TPH, benzene, toluene, ethylbenzene, xylenes (total), and arsenic. COCs identified in groundwater at SWMU 122 and 123 above action levels are; 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, naphthalene, toluene, xylenes (total), phenol, and selenium. However, additional COCs may be identified during the review of data collected during the SWMU 122 and 123 RFI.

7.2.3 Development of the Exposure Model

Once the conceptual site model has been refined, an exposure model will be developed. The exposure model is based on the CSM, and identifies the following:

- Media of concern
- Current and future receptors
- Complete and incomplete exposure pathways

The media of concern includes surficial soil, subsurface soil, soil to depth of construction, and groundwater. Based on current information available for SWMU 122 and 123, receptors include (i) a current and future commercial/industrial worker, (ii) a future resident, and (iii) a future construction worker. Complete routes of exposure for each media of concern/COC/receptor combination will be identified based on the above information.

7.2.4 Preliminary Screening Evaluation

As a first step, maximum concentrations for each COC in soil will be compared with the specific ARARs described in Section 6.2.1.1 of this Work Plan. Likewise, the maximum concentrations for each COC in groundwater will be compared to the specific ARARs presented in Section 6.2.1.2 of this Work Plan. If the maximum concentration of each COC in soil and groundwater is below its respective ARAR, no additional analysis will be performed, and the findings will be reported to NMED. Depending on the results of the screening evaluation, site-specific screening levels may be developed for all complete routes of exposure identified in the exposure model. Development of site-specific screening levels is described below.

7.2.5 Calculation of Site-Specific SSLs

Parameters required for the calculation of site-specific SSLs include:

- Carcinogenic toxicity values (Slope Factors)
- Non-carcinogenic toxicity values (Reference Doses)
- Exposure Factors
- Fate and Transport Parameters

Default toxicity values and exposure factors will be obtained from Tables C-1 and B-1 (respectively) of the *Technical Background Document for Development of Soil Screening Levels, Revision 4.0* (NMED, 2006a). As described in Section 6.3.2.1 site-specific fate and transport parameters will be obtained from 2 geotechnical soil samples collected from SWMU 122 and 123 during this RFI. Using the above information, site-specific screening levels will be calculated using equations presented in the *Technical Background Document for Development of Soil Screening Levels, Revision 4.0* (NMED, 2006a). The maximum detected concentration for each contaminant that is detected above the reporting limit will be used to determine the site hazard index (HI). All constituents which have an HI greater than 1 will be evaluated in the site-specific risk assessment.

7.2.6 Site-Specific Screening Level Evaluation

The site-specific screening levels will be compared with the representative concentration of each COC in each media of concern. If any COC exceeds its respective site-specific screening level, target levels for the COC will be developed during the risk-based evaluation. The Johnson & Ettinger (J&E) model (USEPA, 2004a) will be used to develop the target levels for the indoor inhalation of vapors from subsurface soil and groundwater. The use of the J&E model is required because the NMED *Technical Background Document for Development of Soil Screening Levels* (NMED, 2006a) does not have an indoor inhalation pathway. Additionally, target levels for dermal contact with soil and groundwater will be developed as per the *Risk Assessment Guidance for Superfund Volume I, Part E Supplemental Guidance for Dermal Risk Assessment* (USEPA, 2004b).

~~7~~8 DATA MANAGEMENT PLAN

This section describes the overall data management strategy and plan for the SWMU 122 and 123 RFI Work Plan.

~~7.1~~8.1 Data Management System and Strategy

The data management plan will be used to accommodate and manage fixed-based laboratory generated data at standard TAT (2 weeks). Data to be generated includes chemical analytical data, as well as spatial and features information, hydrogeologic data, and various supporting data, such as photographs and standard daily forms information. The data management system is comprised of the central project reporting database.

~~7.2~~8.2 Data Type

Analytical data will be generated by onsite field screening, as well as by offsite laboratory analysis. Analytical data generated by the offsite laboratory will be initially managed by the respective laboratory's laboratory information management system (LIMS) and transferred to the project team for use via EDD and hard copy. Prior to project startup, formats for the offsite laboratory EDDs will be approved to ensure smooth transfer and importation of the data into the central project database upon receipt.

Upon project completion, the data management system will be used to perform final spatial analysis, as well as to support tabular and graphic report development for deliverables and miscellaneous project communications as needed.

~~7.2.1~~8.2.1 Sample Identification System

Each environmental, geotechnical, and QA/QC sample collected will be identified on the sample label and chain-of-custody~~COC~~ records, regardless of type. Sample documentation, handling, and shipping will be in accordance with HAFB SOP-1. Table 6-3 provides the sample collection information inclusive of the container type, holding time, and quantity for the soil and groundwater samples collected during the investigation at SWMU 122 and 123. The field duplicate samples will appear in sequence with the other samples. The sample nomenclature for soil samples collected from DPT boreholes will be as follows:

SWMU122-DP01-10-a

Site alpha-numeric identifier: SWMU122 = Solid Waste Management Unit 122

Sample type identifier: DP = direct push boring

Sequential direct push boring number: 01, 02, etc.

Ending depth of sample interval: 10

Reserved for quality assurance (QA) sample identifiers: a = field duplicate, TB = trip blank, MS = matrix spike, MSD = matrix spike duplicate

The sample identification nomenclature for groundwater samples collected from new monitoring wells will be as follows:

SWMU122-MW01-a

Site alpha-numeric identifier: SWMU122 = Solid Waste Management Unit 122

Sample type identifier: MW = monitoring well

Sequential monitoring well number: 01, 02, etc.

Reserved for QA sample identifiers: a = field duplicate, TB = trip blank, MS = matrix spike, MSD = matrix spike duplicate

The sample identification nomenclature for groundwater samples collected from pre-existing monitoring wells will be as follows:

SWMU123-MW3-a

Site alpha-numeric identifier: SWMU123 = Solid Waste Management Unit 123

Sample type identifier: MW = monitoring well

Sequential monitoring well number: 3, 4, etc.

Reserved for QA sample identifiers: a = field duplicate, TB = trip blank, MS = matrix spike, MSD = matrix spike duplicate

~~7.2.2~~8.2.2 Data Recording

The following paragraphs describe the data recording activities that will be performed for field data, offsite and onsite laboratory analytical data, and photographs.

~~7.2.2.1~~8.2.2.1 Field Data

All information pertinent to a field and/or sampling survey will be recorded on appropriate data sheets, or in the project field logbook as described Section 10.5 of the HAFB Basewide QAPP (Bhate, 2003b). Specific data sheets are required by certain SOPs. Samplers use a bound field logbook with consecutively numbered pages. Entries in the logbook will be made using indelible ink and will include at a minimum the following information:

- Name and address of the field contact (on logbook cover),
- Date of entry,
- Names and companies of personnel on site,
- General descriptions of each day's field activities,
- Documentation of weather conditions during field activities,
- Location of sampling (e.g., monitoring well),
- Data points for field equipment derived during calibration procedures,
- Observation of sample or collection environment,
- Identification of sampling device,
- Any field measurements made,
- Sequence of collection of environmental samples,
- Type of sample matrix (e.g., soil, groundwater, etc.),
- Date and time of environmental sample collection,
- Field sample identification number,
- Sample distribution (e.g., which laboratory shipped to for analysis),
- Sampler's name,
- Sample type (e.g., composite, normal, duplicate, other QC, etc.),
- For groundwater samples, which samples were filtered if any and filter size and type, and
- Preservative used, if applicable, for the environmental sample.

If an error is made on the document or in the logbook, corrections will be made simply by crossing a line through the error in such a manner that the original entry can still be read, and the correct information added as the change. All corrections will be initialed by the author and dated.

Each page in the logbook will be signed or initialed by the person making the entries. In addition to the information entered into the logbook, the appropriate data forms must be filled out as each activity is completed.

~~7.2.2.2~~8.2.2.2 Laboratory Analytical Data

The offsite laboratory shall maintain electronic and hardcopy records sufficient to recreate each analytical event conducted. The minimum records the laboratory shall keep include the following:

- Chain-of-custody~~OC~~ forms,
- Initial and continuing calibration records including standards preparation traceable to the original material and lot number,
- Instrument tuning records (as applicable),
- Method blank results,
- Internal standard results,
- Surrogate spiking records and results (as applicable),
- Spike and spike duplicate records and results,
- Laboratory records,
- Raw data, including instrument printouts, bench work sheets, and/or chromatograms with compound identification and quantitation reports,
- Corrective action reports,
- Other method and project required QC samples and results, and
- Laboratory-specific written SOPs for each analytical method and QA/QC function in place at the time of project sample analysis.

~~7.2.2.3~~8.2.2.3 Photographs

Any photographic documentation will be recorded in the appropriate logbook. Information to be recorded includes:

- Camera make and model,
- Time and date,
- Photographer,
- Details for the location of the photograph,
- Direction of photograph, preferably measured with field compass,
- Subject of the photograph,
- Significant or relevant features, and
- Names of any personnel included in photograph.

~~7.3~~8.3 Data Reporting

Data obtained during drilling activities will be reported according to the Basewide QAPP (Bhate, 2003b). In accordance with the USACE *Chemical Quality Assurance for HTRW Projects Manual* EM 200-1-6, October 1997, the investigative data is classified as definitive data. The data will be generated using rigorous, analyte-specific analytical methods where analyte identifiers and quantitations are confirmed and QA/QC requirements have been satisfied. For this project, regular, field duplicate, and MS/MSD samples are to be collected concurrently. The data will meet the objectives of the project for level of accuracy and precision required, intended use of the data, analytical methods, time constraints, and allowable decision errors. Risk evaluation and sampling results will be tabulated and summarized in the RFI report for the site. An Environmental Restoration Program Information Management System (ERPIMS) submittal is not required for this investigation of SWMU 122 and 123.

~~7.3.1~~8.3.1 Tabular Displays

All analytical chemistry data will be presented as either Form 1 reports and/or summary reports. The Form 1 analytical reports will contain the following:

- Laboratory Name, address, telephone number, contact person, and location where the test was carried out if different from the fixed laboratory address,
- Unique Laboratory Project Number,
- Total number of pages (report must be paginated),
- Client Project Number (if applicable),
- Laboratory Sample Identification (if applicable),
- Client Sample Identification,
- Test Method,
- Matrix and/or description of sample,
- Dates: sample collection, collection time, sample receipt, preparation, and/or analysis date,
- Definition of data qualifiers,
- Reporting units,
- Solid samples: indicate dry or wet weight, and
- Indication by flagging where results are reported below the quantitation limit.

Offsite laboratories shall provide data deliverables within the standard time specified. Analytical results for all samples will be presented in hard copy Form-1 and EDD formats. Electronic data shall be delivered in an appropriate format such that the data can be uploaded to the project database for subsequent manipulation and presentation.

Tabular summary reports listing of non-chemical, field measurement data will also be generated as part of this project. These summary reports will be created on an as-needed basis to support field sampling efforts and/or final project reporting.

~~7.3.2~~8.3.2 Graphical Displays

During the field effort, Figures 6-1 and 6-2 will be used by the field teams to guide their sampling activities. Staff will hand-annotate these maps for interim documentation of notable spatial information, such as:

- Indicating which locations have been sampled,
- Documenting in-field sample location adjustments,

Administrators will perform data input and changes, as well as work with the report development team to generate requested graphical and tabular reporting documents. Creation of presentation quality maps, as well as complex map layouts, and other complex displays, analysis, and processing of spatial data, will be performed using desktop Geographical Information System (GIS) software (such as Environmental Systems Research Institute's [ESRI's] ArcGIS program suite). The desktop GIS software will be used to produce maps intended for use in reports, as well as all plate-sized map prints.

~~7.4~~8.4 Data Archiving

Hardcopy and electronic data shall be archived in project files and on electronic archive media for the duration of the project and for a minimum of 5 years, whichever is longer.

~~8~~9 HEALTH AND SAFETY REQUIREMENTS

Project Health and Safety practices will adhere to the *Basewide Health and Safety Plan* (Bhate, 2003c) and the Site Specific Addendum to the Basewide HASP, as included in Appendix D of this Work Plan for investigation activities. All work must be conducted in accordance with the USACE *Safety and Health Requirements Manual, EM 385-1-1*, 3 November 2003. It is anticipated that no greater than level D PPE will be required to complete the site sampling activities. This includes: Occupational Safety and Health Administration (OSHA) approved safety shoes, American National Standards Institute (ANSI) approved safety glasses (Z87.1) and hard hat (Z89.1-1997: Type I), sleeved shirt and long pants, and as required, hearing protection, leather work gloves, and/or nitrile gloves during sampling.

Site security is part of safety at the site for the investigation. Items of concern include the proper designation and demarcation of the investigation boundaries (i.e., Support Zone, Contaminant Reduction Zone, and Exclusion Zone) as appropriate. Likewise, compliance with any intrusive work requirements, posting of potential hazards, and control of un-authorized site personnel will be completed. This is discussed in the Basewide HASP (Bhate, 2003c).

At a minimum, the site will be secured with caution tape surrounding the perimeter of the site delineating the outer boundary of the Support Zone. This is essential in the utility clearance process and it will serve as the demarcation of the site for both project and non-project persons. A Contaminant Reduction Zone and/or Exclusion Zone will be established as guided by the HASP and site prevailing conditions.

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~~9~~10 PROJECT MANAGEMENT PLAN AND SCHEDULE OF IMPLEMENTATION

This section presents the project management plan (PMP) to be used during the performance of the SWMU 122 and 123 RFI.

~~9.1~~10.1 Management Control Structure

During the implementation of the field activities for the SWMU 122 and 123 RFI, Mr. Jim Moore will serve as the NationView Site Manager and Field Team Leader, overseeing and directing all investigation sampling activities. Mr. Moore will also provide on-site management of any sub-contractors for the project. Mr. Frank Gardner will serve as the NationView Project Manager. Mr. David Martin is the NationView Corporate Sponsor and will ensure required project documents, permits, contractual agreements, and other program tasks are completed. Key project personnel and their responsibilities are listed in Table ~~9~~10-1. The RFI field activities are anticipated to begin in the winter 2008-2009 and will last approximately 1 week.

~~9.2~~10.2 Reporting

A variety of reporting mechanisms will be utilized throughout the SWMU 122 and 123 RFI to facilitate communication between HAFB, USACE, NMED, and Contractors. These reporting mechanisms will include the standard quality control and progress reports outlined in the HAFB Basewide QAPP, as well as the Draft and Final SWMU 122 and 123 RFI Reports

Each of these reports will be instrumental in maintaining and documenting the continuing communication between various entities involved in the project.

A Draft SWMU 122 and 123 RFI Report will be prepared and undergo a series of internal reviews prior to submission to the HAFB 49 CES/CEV and the USACE Albuquerque District, as the agency service provider, prior to revision and submission to the NMED HWB for review. Upon receipt of NMED comments, the SWMU 122 and 123 RFI Report will be revised to the Final format accordingly. As needed, a meeting may be requested to address any issues of significance that are not readily resolved through standard revision-level processes. The NationView Team will be responsible for resolving any issues that rise to that level of discourse.

Specifically, the SWMU 122 and 123 RFI Report(s) will include the following elements:

- Introduction
- Environmental Setting

- Source Characterization
- Sampling and Analysis Results
- Data Quality Assurance/Data Quality Control Review
- Conclusions
- Recommendations

~~9.3~~10.3 Records Management

Project files will contain the following information:

- Correspondence
  - – External and internal correspondence
  - – Personnel, organization, and responsibilities
  - – Planning and scheduling
  - – QA auditing and inspection reports
- All Field Generated Data
- Contractual Documentation
  - Prime Contract
  - Delivery Orders / Task Orders
  - Change Orders
  - Subcontracts
  - Competitive bid evaluations
- Laboratory Analytical Data
- Submittals/Reports
- Miscellaneous project information as required

Project files will be maintained by Project Management and Quality Assurance personnel, as supported by designated document control personnel.

~~10~~11 REFERENCES

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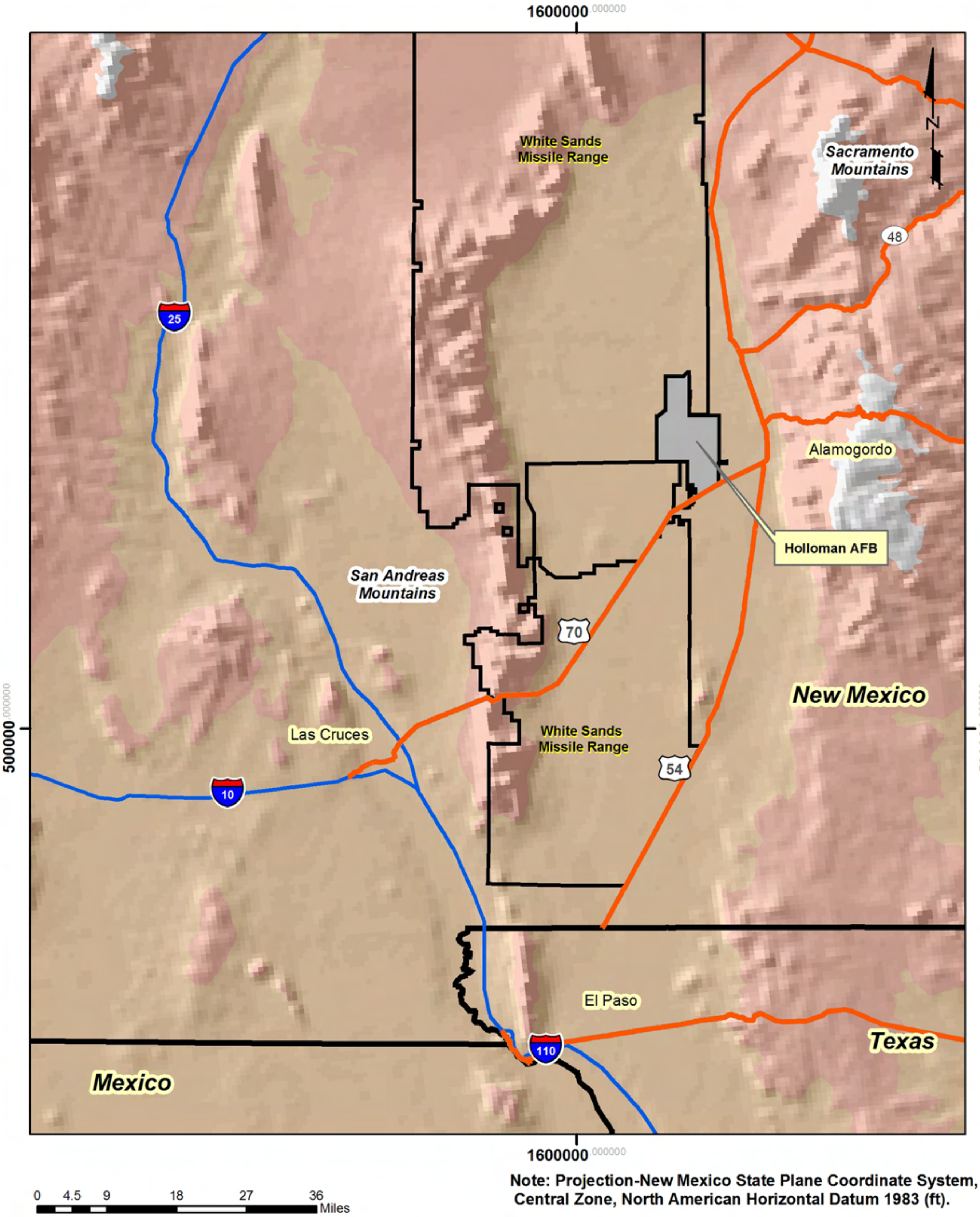
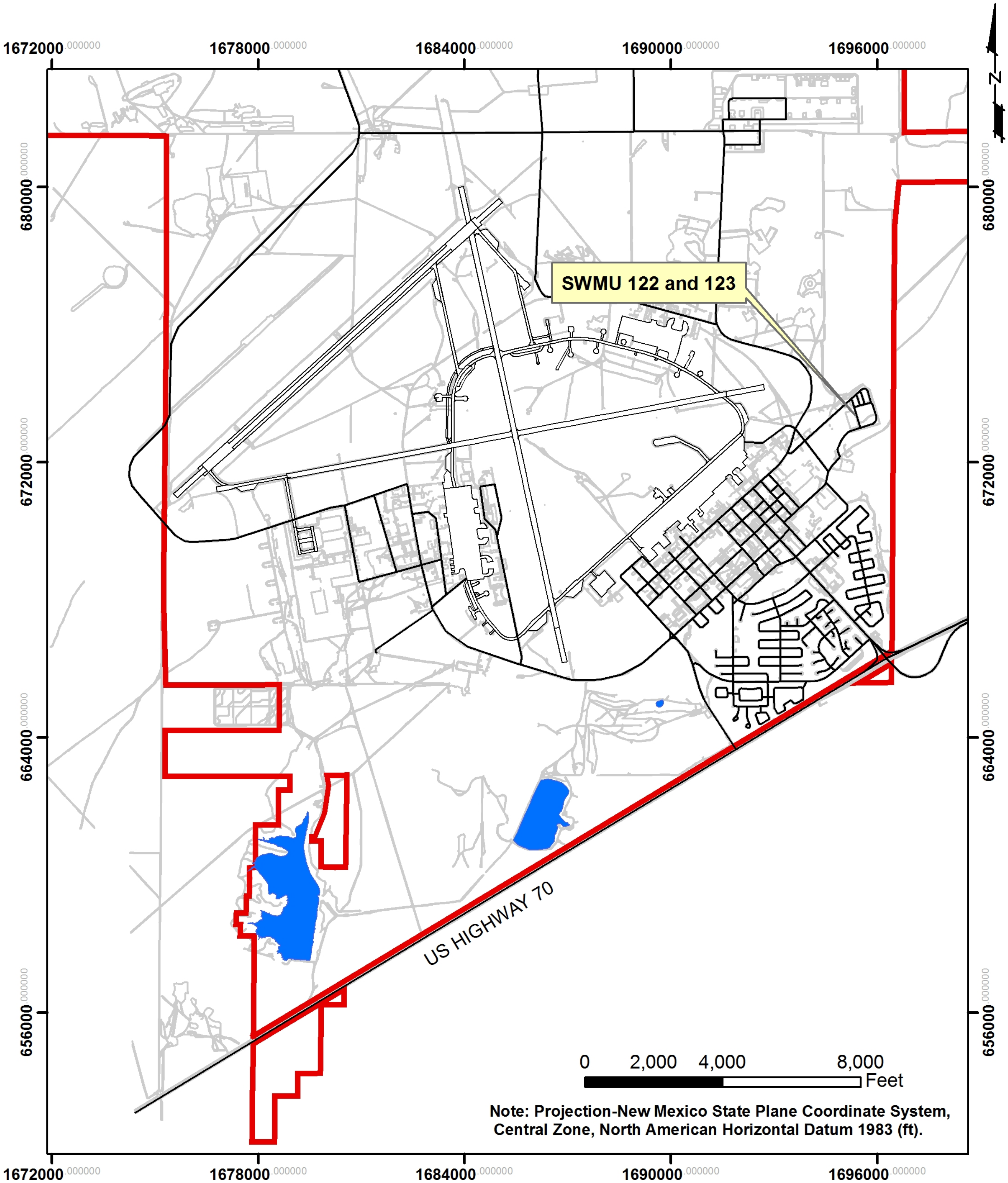
FIGURES



Note: Projection-New Mexico State Plane Coordinate System, Central Zone, North American Horizontal Datum 1983 (ft).

NATIONVIEW	Holloman AFB, New Mexico Location Map				SWMU 122 and 123 RCRA Facility Investigation Work Plan Holloman AFB, New Mexico
	PROJECT NO. 8080014	SCALE 1"=18 Miles	DATE 5/26/09	DRAWN BY: cm DRAWING NO: Figure 1-1	Figure 1-1



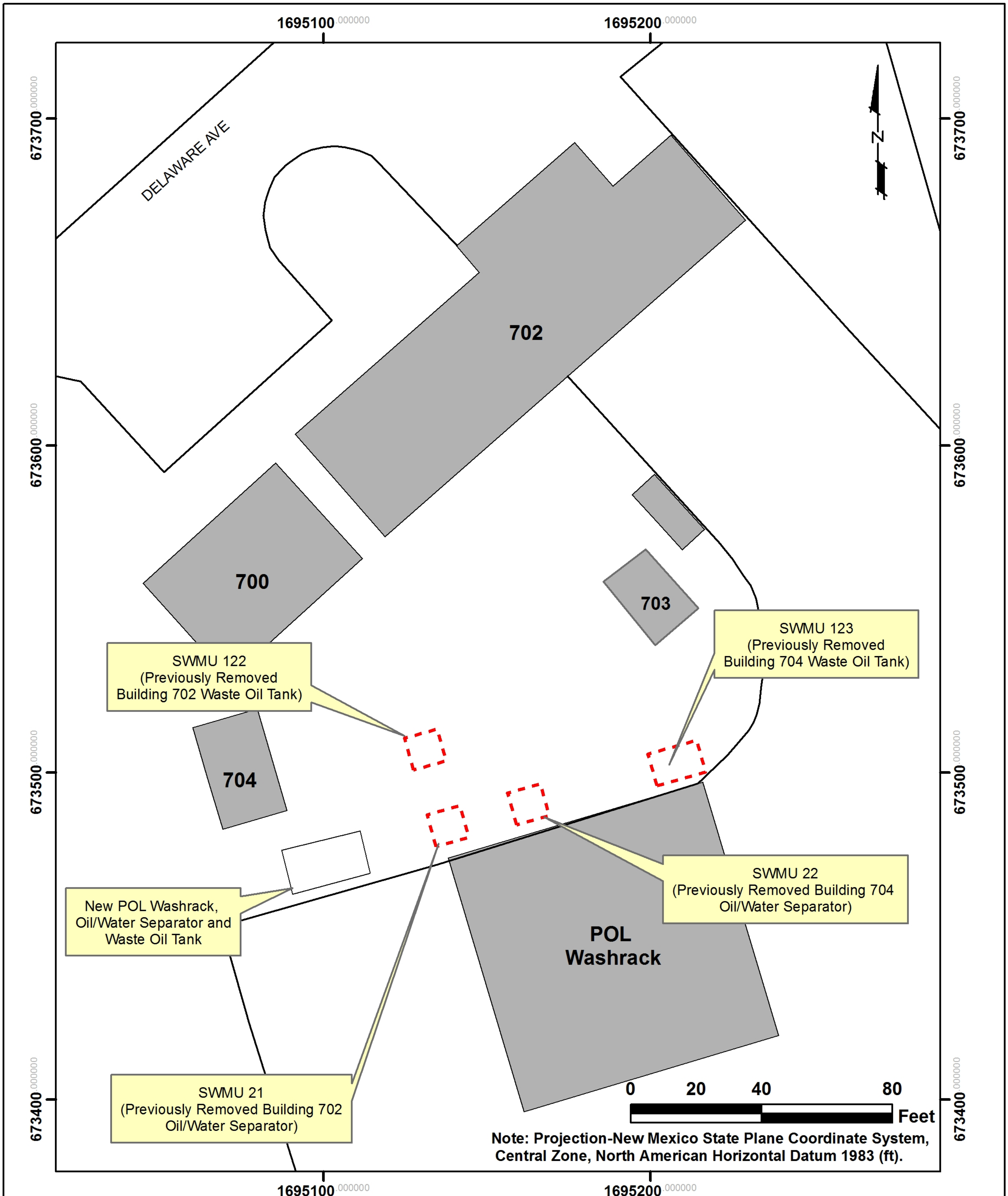
NATIONVIEW

SWMU 122 and 123
Site Location Map

PROJECT NO.	SCALE	DATE	DRAWN BY: cm / DRAWING NO: Figure 1-2
8080014	1"=4000'	5/26/09	

SWMU 122 and 123
RCRA Facility Investigation Work Plan
Holloman AFB, New Mexico

Figure 1-2



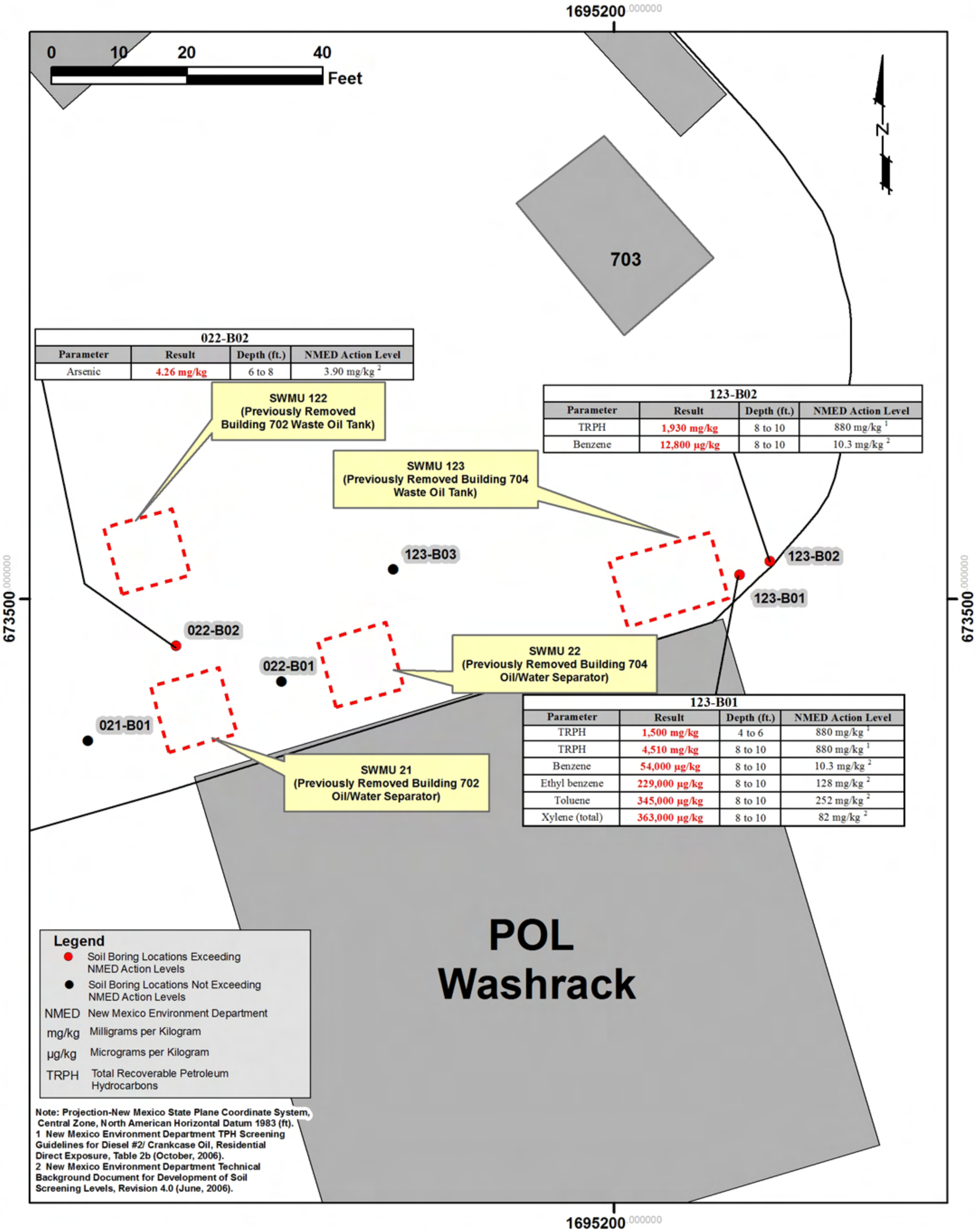
NATIONVIEW

SWMU 122 and 123 Site Map

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8080014	1"=40'	5/26/09	cm	fig_1-3

SWMU 122 and 123
RCRA Facility Investigation Work Plan
Holloman AFB, New Mexico

Figure 1-3



022-B02

Parameter	Result	Depth (ft.)	NMED Action Level
Arsenic	4.26 mg/kg	6 to 8	3.90 mg/kg [2]

123-B02

Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	1,930 mg/kg	8 to 10	880 mg/kg [1]
Benzene	12,800 µg/kg	8 to 10	10.3 mg/kg [2]

123-B01

Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	1,500 mg/kg	4 to 6	880 mg/kg [1]
TRPH	4,510 mg/kg	8 to 10	880 mg/kg [1]
Benzene	54,000 µg/kg	8 to 10	10.3 mg/kg [2]
Ethyl benzene	229,000 µg/kg	8 to 10	128 mg/kg [2]
Toluene	345,000 µg/kg	8 to 10	252 mg/kg [2]
Xylene (total)	363,000 µg/kg	8 to 10	82 mg/kg [2]

Note: Projection-New Mexico State Plane Coordinate System, Central Zone, North American Horizontal Datum 1983 (ft).
1 New Mexico Environment Department TPH Screening Guidelines for Diesel #2/ Crankcase Oil, Residential Direct Exposure, Table 2b (October, 2006).
2 New Mexico Environment Department Technical Background Document for Development of Soil Screening Levels, Revision 4.0 (June, 2006).

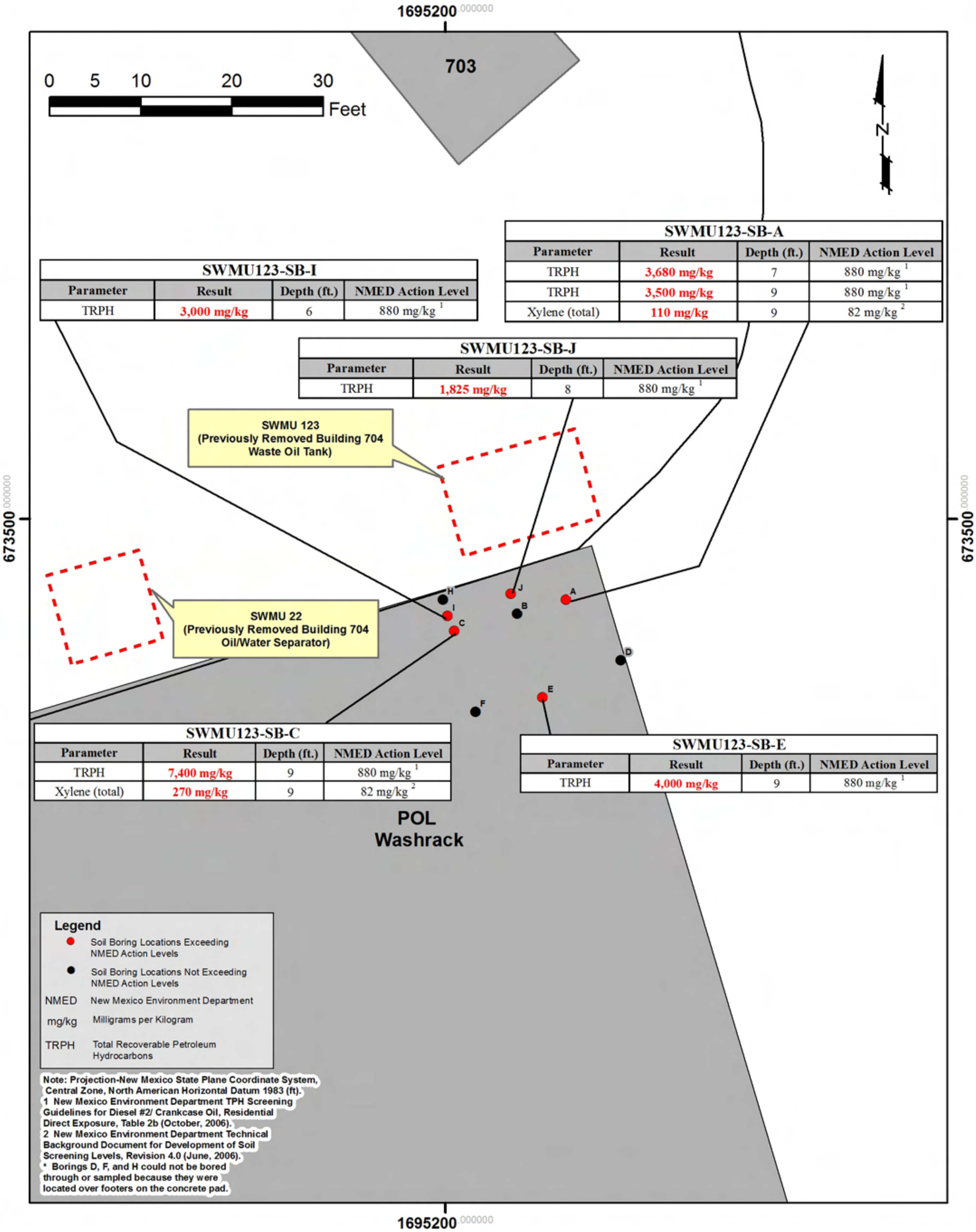
NATIONVIEW

SWMU 123 Soil Analytical Results Above NMED Action Levels (Radian, 1993)

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8080014	1"=20'	6/24/09	cm	fig_1-4

SWMU 122 and 123
RCRA Facility Investigation Work Plan
Holloman AFB, New Mexico

Figure 1-4



SWMU123-SB-A

Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	3,680 mg/kg	7	880 mg/kg [1]
TRPH	3,500 mg/kg	9	880 mg/kg [1]
Xylene (total)	110 mg/kg	9	82 mg/kg [2]

SWMU123-SB-I

Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	3,000 mg/kg	6	880 mg/kg [1]

SWMU123-SB-J

Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	1,825 mg/kg	8	880 mg/kg [1]

SWMU123-SB-C

Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	7,400 mg/kg	9	880 mg/kg [1]
Xylene (total)	270 mg/kg	9	82 mg/kg [2]

SWMU123-SB-E

Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	4,000 mg/kg	9	880 mg/kg [1]

Legend

- Soil Boring Locations Exceeding NMED Action Levels (red)
- Soil Boring Locations Not Exceeding NMED Action Levels (black)

NMED New Mexico Environment Department
mg/kg Milligrams per Kilogram
TRPH Total Recoverable Petroleum Hydrocarbons

Note: Projection-New Mexico State Plane Coordinate System, Central Zone, North American Horizontal Datum 1983 (ft).
1 New Mexico Environment Department TPH Screening Guidelines for Diesel #2/ Crankcase Oil, Residential Direct Exposure, Table 2b (October, 2006).
2 New Mexico Environment Department Technical Background Document for Development of Soil Screening Levels, Revision 4.0 (June, 2006).
* Borings D, F, and H could not be bored through or sampled because they were located over footers on the concrete pad.

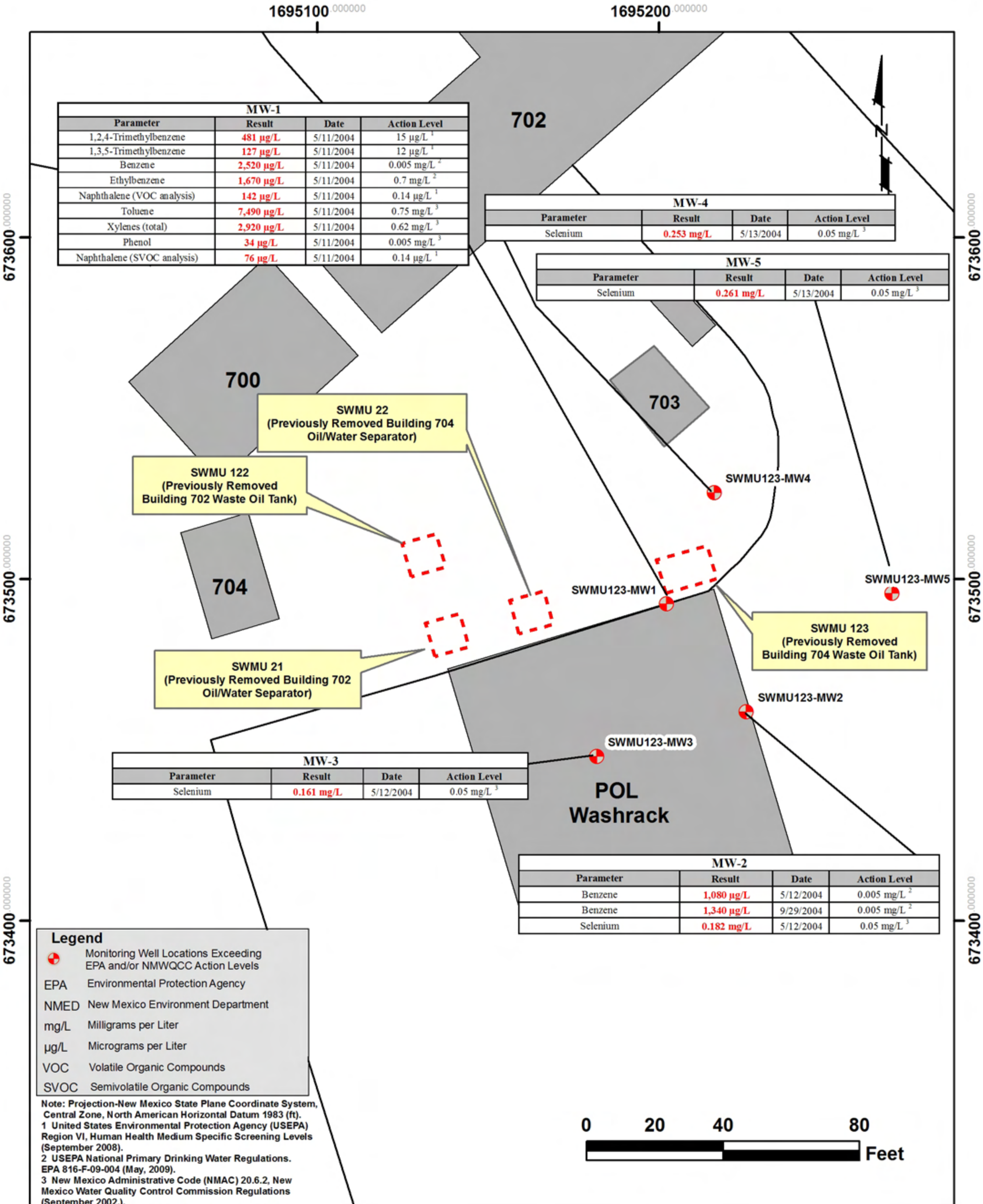
NATIONVIEW

SWMU 123 Soil Analytical Results Above NMED Action Levels (Foster Wheeler Environmental Corporation, 1999)

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8080014	1"=15'	6/24/09	cm	fig_1-5

SWMU 122 and 123
RCRA Facility Investigation Work Plan
Holloman AFB, New Mexico

Figure 1-5



MW-1

Parameter	Result	Date	Action Level
1,2,4-Trimethylbenzene	481 µg/L	5/11/2004	15 µg/L [1]
1,3,5-Trimethylbenzene	127 µg/L	5/11/2004	12 µg/L [1]
Benzene	2,520 µg/L	5/11/2004	0.005 mg/L [2]
Ethylbenzene	1,670 µg/L	5/11/2004	0.7 mg/L [2]
Naphthalene (VOC analysis)	142 µg/L	5/11/2004	0.14 µg/L [1]
Toluene	7,490 µg/L	5/11/2004	0.75 mg/L [3]
Xylenes (total)	2,920 µg/L	5/11/2004	0.62 mg/L [3]
Phenol	34 µg/L	5/11/2004	0.005 mg/L [3]
Naphthalene (SVOC analysis)	76 µg/L	5/11/2004	0.14 µg/L [1]

MW-4

Parameter	Result	Date	Action Level
Selenium	0.253 mg/L	5/13/2004	0.05 mg/L [3]

MW-5

Parameter	Result	Date	Action Level
Selenium	0.261 mg/L	5/13/2004	0.05 mg/L [3]

MW-3

Parameter	Result	Date	Action Level
Selenium	0.161 mg/L	5/12/2004	0.05 mg/L [3]

MW-2

Parameter	Result	Date	Action Level
Benzene	1,080 µg/L	5/12/2004	0.005 mg/L [2]
Benzene	1,340 µg/L	9/29/2004	0.005 mg/L [2]
Selenium	0.182 mg/L	5/12/2004	0.05 mg/L [3]

Note: Projection-New Mexico State Plane Coordinate System, Central Zone, North American Horizontal Datum 1983 (ft).
1 United States Environmental Protection Agency (USEPA) Region VI, Human Health Medium Specific Screening Levels (September 2008).
2 USEPA National Primary Drinking Water Regulations. EPA 816-F-09-004 (May, 2009).
3 New Mexico Administrative Code (NMAC) 20.6.2, New Mexico Water Quality Control Commission Regulations (September 2002.).

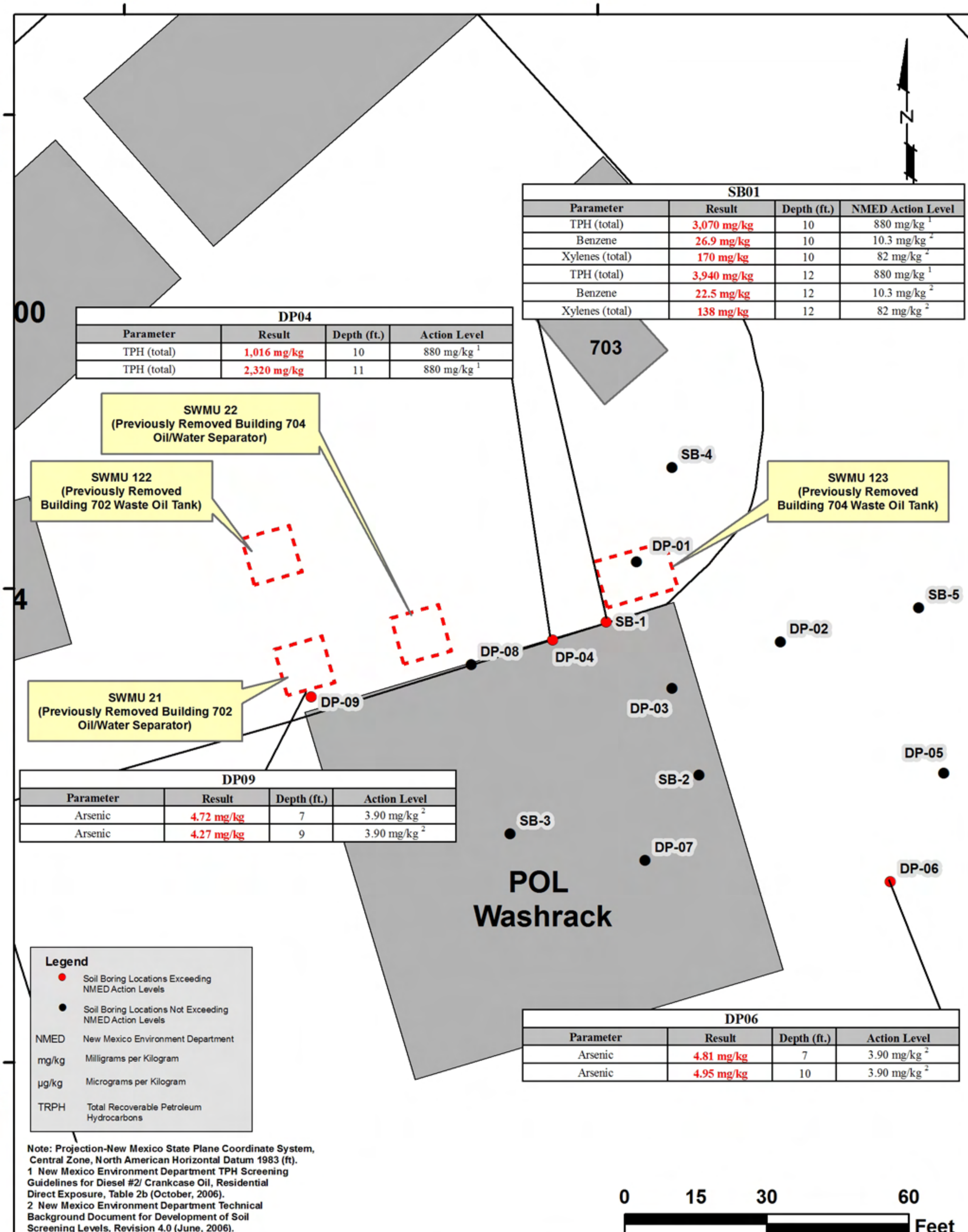
NATIONVIEW

SWMU 123 Groundwater Analytical Results Above EPA and NMED Action Levels (Bhate, 2004)

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8080014	1"=40'	6/24/09	cm	fig_1-6

SWMU 122 and 123
RCRA Facility Investigation Work Plan
Holloman AFB, New Mexico

Figure 1-6



SB01

Parameter	Result	Depth (ft.)	NMED Action Level
TPH (total)	3,070 mg/kg	10	880 mg/kg [1]
Benzene	26.9 mg/kg	10	10.3 mg/kg [2]
Xylenes (total)	170 mg/kg	10	82 mg/kg [2]
TPH (total)	3,940 mg/kg	12	880 mg/kg [1]
Benzene	22.5 mg/kg	12	10.3 mg/kg [2]
Xylenes (total)	138 mg/kg	12	82 mg/kg [2]

DP04

Parameter	Result	Depth (ft.)	Action Level
TPH (total)	1,016 mg/kg	10	880 mg/kg [1]
TPH (total)	2,320 mg/kg	11	880 mg/kg [1]

DP09

Parameter	Result	Depth (ft.)	Action Level
Arsenic	4.72 mg/kg	7	3.90 mg/kg [2]
Arsenic	4.27 mg/kg	9	3.90 mg/kg [2]

DP06

Parameter	Result	Depth (ft.)	Action Level
Arsenic	4.81 mg/kg	7	3.90 mg/kg [2]
Arsenic	4.95 mg/kg	10	3.90 mg/kg [2]

Note: Projection-New Mexico State Plane Coordinate System, Central Zone, North American Horizontal Datum 1983 (ft).
1 New Mexico Environment Department TPH Screening Guidelines for Diesel #2/ Crankcase Oil, Residential Direct Exposure, Table 2b (October, 2006).
2 New Mexico Environment Department Technical Background Document for Development of Soil Screening Levels, Revision 4.0 (June, 2006).

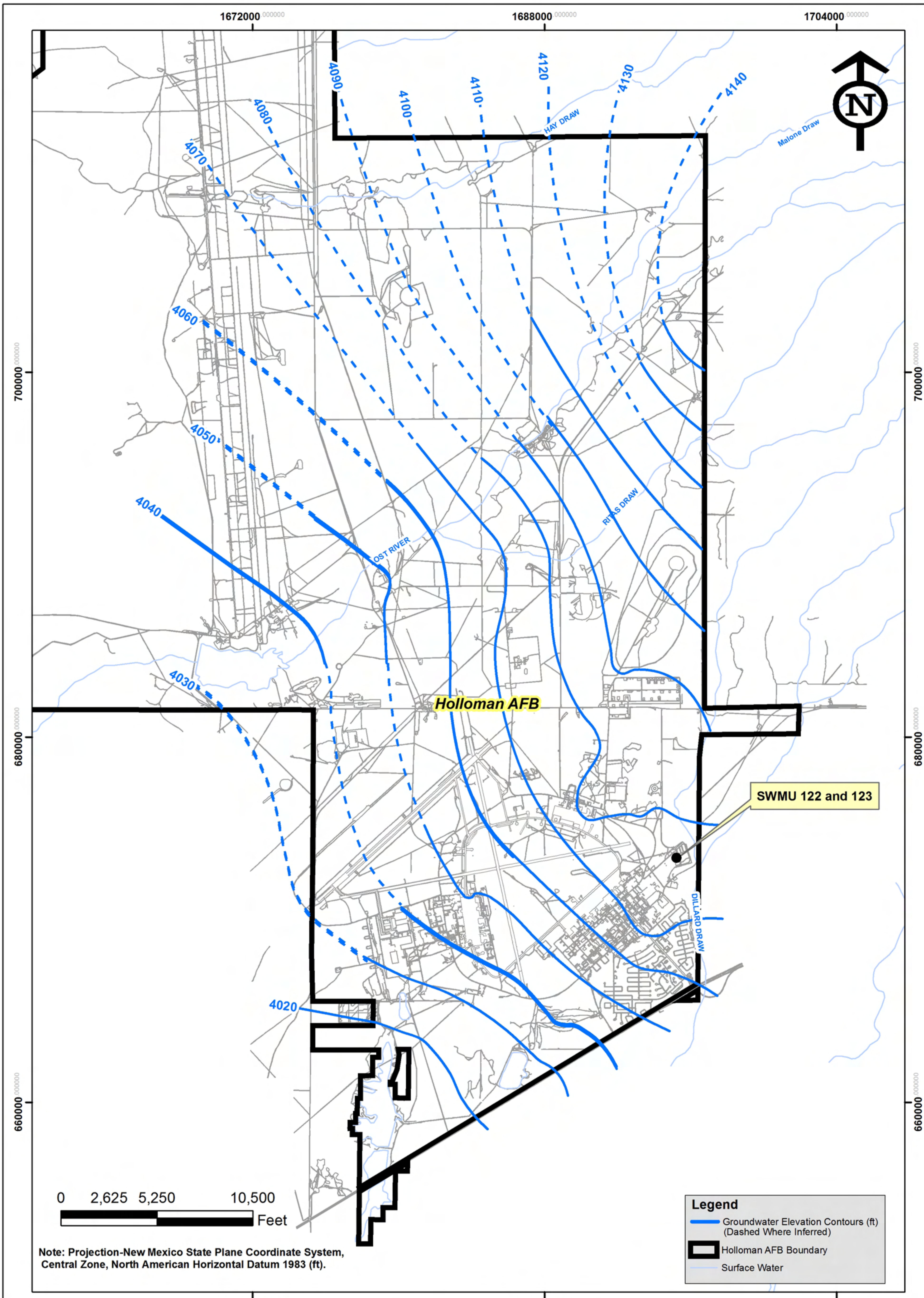
NATIONVIEW

SWMU 123 Soil Analytical Results Above NMED Action Levels (Bhate, 2004)

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8080014	1"=30'	6/24/09	cm	fig_1-7

SWMU 122 and 123
RCRA Facility Investigation Work Plan
Holloman AFB, New Mexico

Figure 1-7



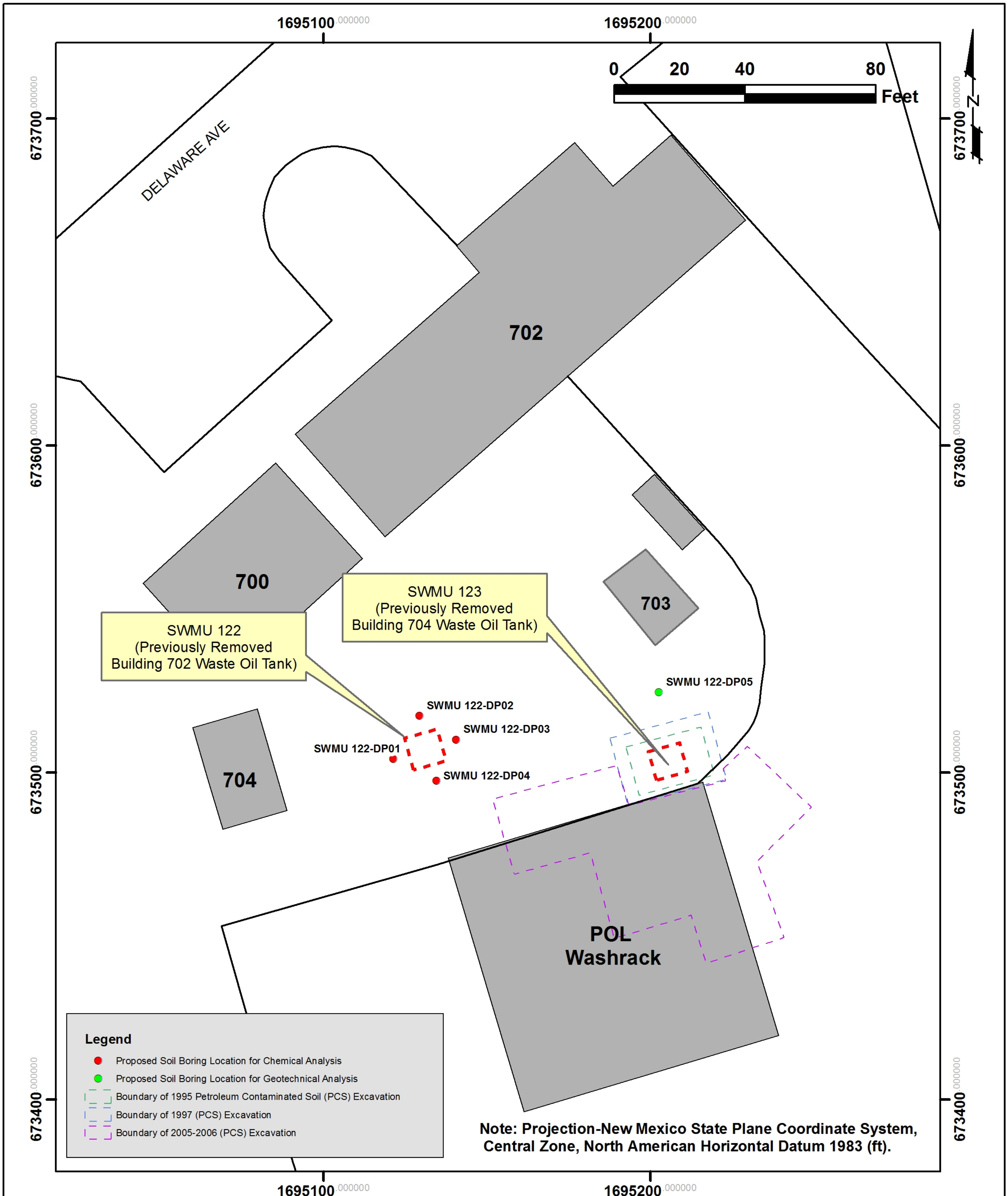
NATIONVIEW

Groundwater Contour Map
Holloman AFB, New Mexico

PROJECT NO.	SCALE	DATE	DRAWN BY:
			cm
8080014	1"=5000'	5/26/09	DRAWING NO: Figure 2-1

SWMU 122 and 123
RCRA Facility Investigation Work Plan
Holloman AFB, New Mexico

Figure 2-1



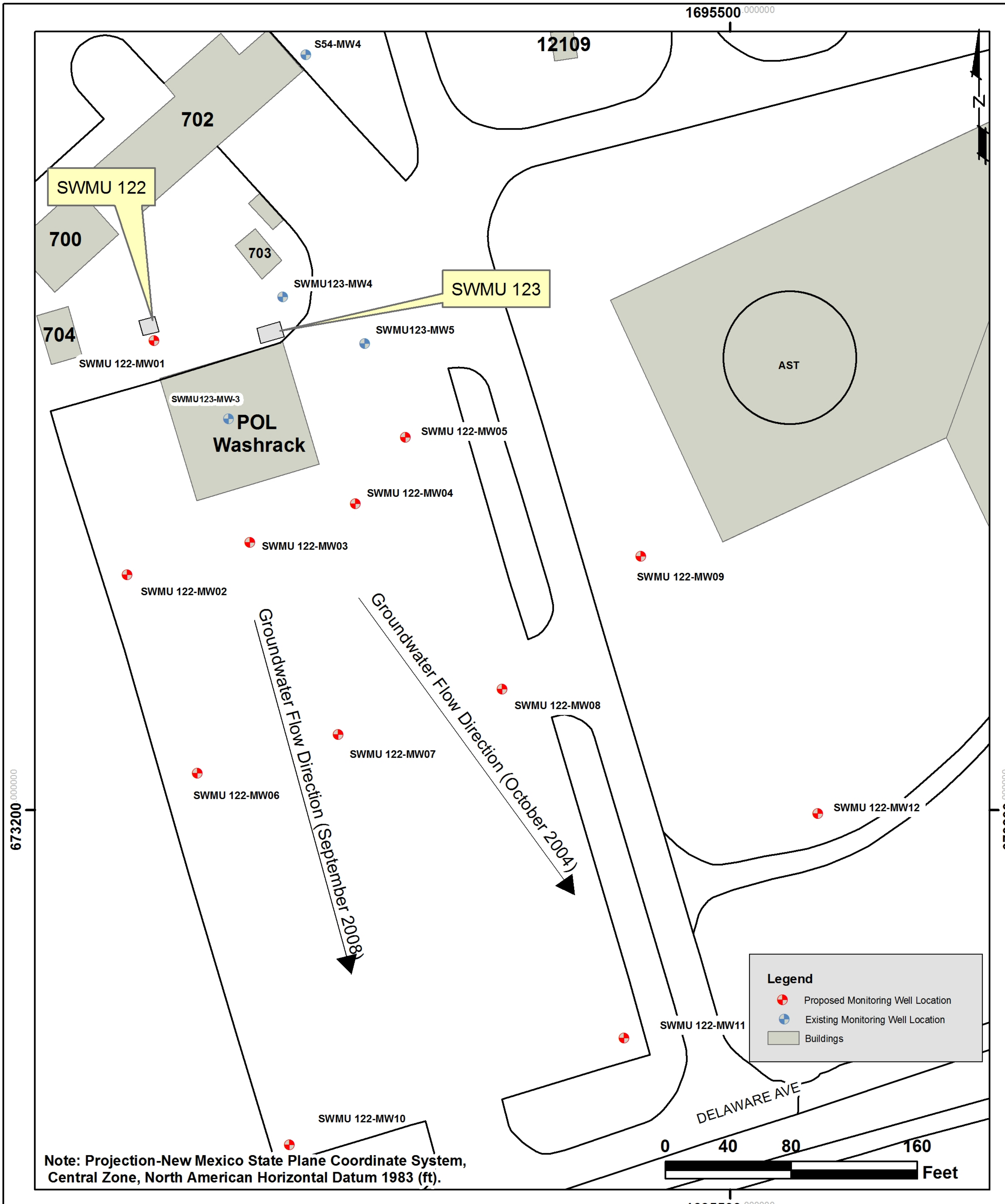
NATIONVIEW

SWMU 122
Proposed Soil Boring Locations

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8080014	1"=40'	5/26/09	cm	fig_6-1

SWMU 122 and 123
RCRA Facility Investigation Work Plan
Holloman AFB, New Mexico

Figure 6-1



NATIONVIEW

SWMU 122 and 123 Proposed Monitoring Well Locations				SWMU 122 & 123 RCRA Facility Investigation Work Plan Holloman AFB, New Mexico
PROJECT NO.	SCALE	DATE	DRAWN BY: cm	Figure 6-2
8080014	1"=80'	5/26/09	DRAWING NO: fig_6-2	

TABLES

Table 6-1
DPT Soil Sampling and Analysis
SWMU 122 and 123 RFI Work Plan
Holloman AFB, New Mexico
NationView Project No. 8080014

Analysis	Method	Primary	Duplicates	MS/MSD	Trip blanks *	Total
VOC	EPA 8260B	8	1	2	2	13
SVOC	EPA 8270C	8	1	2	0	11
TAL Metals	EPA 6010B/7471A	8	1	2	0	11
TPH DRO	EPA 8015B	8	1	2	0	11
TPH GRO	EPA 8015B	8	1	2	0	11
TPH ORO	EPA 8015B	8	1	2	0	11
PCBs	EPA 8082	8	1	2	0	11
Moisture Content	EPA 2540B	2	0	0	0	2
Dry Bulk Density	ASTM D2937	2	0	0	0	2
Specific Gravity	ASTM D1429-86	2	0	0	0	2
Fractional Organic Carbon Content	ASTM D2974	2	0	0	0	2
VOC (Field Sceening)	OVA (Headspace)	125**	0	0	0	125

Notes:
ASTM = American Society for Testing and Materials
EPA = Environmental Protection Agency
MS/MSD = Matrix Spike/Matrix Spike Duplicate
VOC = Volatile Organic Compounds
SVOC = Semi-volatile Organic Compounds
TAL = Target Analyte List
TPH = Total Petroleum Hydrocarbons
DRO = Diesel Range Organics
GRO = Gasoline Range Organics
ORO = Oil Range Organics
PCBs = Polychlorinated biphenyls
OVA = Organic Vapor Analyzer
DPT - Direct Push Technology
* Estimated, one trip blank will accompany every shipment of VOC samples
**Headspace collected continuously every 2 feet (estimated footage = 250 feet)

Table 6-2
Groundwater Sampling and Analysis
SWMU 122 and 123 RFI Work Plan
Holloman AFB, New Mexico
Nationview Project No. 8080014

Analysis	Method	Primary	Duplicates	MS/MSD	Trip blanks *	Total
VOC	EPA 8260B	16	2	2	8	28
SVOC	EPA 8270C	16	2	2	0	20
TDS	EPA 2540C	16	2	2	0	20
TAL Metals	EPA 6010B/7470A	16	2	2	0	20
TPH DRO	EPA 8015B	16	2	2	0	20
TPH GRO	EPA 8015B	16	2	2	0	20
TPH ORO	EPA 8015B	16	2	2	0	20
PCBs	EPA 8082	16	2	2	0	20
pH (field screening)	Multi-parameter sonde	16	0	0	0	16
Conductivity (field screening)	Multi-parameter sonde	16	0	0	0	16
Dissolved Oxygen (field screening)	Multi-parameter sonde	16	0	0	0	16
Temperature (field screening)	Multi-parameter sonde	16	0	0	0	16

Notes:
EPA = Environmental Protection Agency
MS/MSD = Matrix Spike/Matrix Spike Duplicate
VOC = Volatile Organic Compounds
SVOC = Semi-volatile Organic Compounds
TDS = Total dissolved solids
TAL = Target Analyte List
TPH = Total Petroleum Hydrocarbons
DRO = Diesel Range Organics
GRO = Gasoline Range Organics
ORO = Oil Range Organics
PCB = Polychlorinated biphenyls
pH = Potential of hydrogen
* Estimated, one trip blank will accompany every shipment of VOC samples

Table 6-3
Sample Containers and Holding Times by Sample Media
SWMU 122 and 123 RFI Work Plan
Holloman AFB, New Mexico
NationView Project No. 8080014

Media	Sample Collection Information	Analyte Group (Method)						
		TPH-DRO/ORO (8015B)	TPH-GRO (8015B)	VOCs (8260B)	SVOCs (8270C)	PCBs (8082)	TAL Metals (6010B/7471A/7470A)	Total Dissolved Solids (2540C)
Soil	Container	8 oz glass jar	Encore	Encore	4-oz glass jar	8-oz glass jar	8-oz glass jar	N/A
	Container Quantity	1	2	2	1	1	1	N/A
	Holding Time	14 days	48 hours	48 hours	14 days	14 days	180 days (28 days for Hg)	N/A
Groundwater	Container	1-L amber	40-mL vial	40-mL vial	1-L amber	1-L amber	1-L amber	1-L amber
	Container Quantity	2	3	3	1	1	1	1
	Holding Time	7 days	14 days	14 days	7 days	7 days	180 days (28 days for Hg)	48 hours

Notes:
TPH = Total Petroleum Hydrocarbons
DRO = Diesel Range Organics
GRO = Gasoline Range Organics
ORO = Oil Range Organics
VOCs = Volatile Organic Compounds
SVOCs = Semi-volatile Organic Compounds
PCBs = Polychlorinated biphenyls
TAL = Target Analyte List
N/A = Not Applicable
oz = Ounce
mL = Milliliter
L = Liter
Hg = Mercury

Table ~~9~~10-1

Key Personnel and Responsibilities

SWMU 122 and 123 RFI Work Plan
Holloman AFB, New Mexico
NationView Project No. 8080014

Name	Project Title/Assigned Role	Phone Numbers
Mr. David Martin	Corporate Sponsor	Cell: (205) 908-0731
Mr. Frank Gardner, P.G.	Project Manager	Cell: (303) 386-6454
Mr. Jim Moore, P.G.	Field Team Leader/Sr. Geologist	Cell: (303) 929-4840
Mr. Dustin McNeil, P.G.	Project Geologist/SSHO	Cell: (303) 895-1963
Mr. Brian Muller, CIH, CHMM	Health and Safety Manager	Office: (205) 918-4032

Notes:
P.G. = Professional Geologist
SSHO = Site Safety and Health Officer
CIH = Certified Industrial Hygienist
CHMM = Certified Hazardous Materials Manager

ATTACHMENT A

SCOPE OF WORK

Section C - Descriptions and Specifications

Scope of Work
Holloman Air Force Base (AFB
U.S. air Force 49 CES/CEV
RCRA Facility Investigations (RFIs)
At
SWMU 8, SWMU 122, and SWMU 183,
Contract No. W912PL-07-D-0050 Task Order #DM01

14 May 2008
Revised 3 June 2008

1.0 GENERAL: The Contractor shall furnish all services, permits, materials, supplies, plant, labor, equipment, studies, superintendence, travel, and any and all other services as required in connection with the tasks contained in this scope of work (SOW). The Contractor, it's subcontractor(s) and appropriate employee(s) of each, hereinafter collectively called the "contractor", shall be responsible for obtaining and maintaining any registration or certification as required by the various Federal, State, and Local regulatory agencies, and any other registrations, certifications, licenses, permits, warrants, or other credentials or permissions required to perform the contracted tasks. The contractor shall obey all laws and regulations of the United States, the State of New Mexico, and the government agencies having jurisdiction over the activities in this SOW. The contractor is responsible for determining which laws and regulations apply to a particular task, although the Contracting Officer Representative (COR) may require additional legal or regulatory compliance as that person may determine is required.

2.0 PROJECT DURATION: The duration of this project is anticipated to be approximately 730 days.

3.0 PROJECT SITE SPECIFIC REQUIREMENTS:

3.1 SWMU 8, BUILDING 231-Oil Water Separator (KWRD076044)

Contractor shall prepare an RFI work plan to determine the nature and extent of soil and groundwater contamination extending under Buildings 231 and 232. Up to 40 locations will require soil and groundwater sampling for VOCs, SVOCs, TPH, TAL Metals, and PCBs using DPT. Many of the locations will be within the buildings where low overhead clearance will require specialized DPT equipment. The contractor will perform a risk assessment to include development of site-specific standards for identified contaminants of concern. A comprehensive RFI Report documenting the investigation and risk assessment is required

***3.2* SWMU 122, BUILDING 702- WASTE OIL TANK (KWRD076046)**

Contractor shall prepare an RFI Work Plan to delineate nature and extent of soil and groundwater contamination associated with the former waste oil tank. Up to 50 locations will require soil and groundwater sampling for VOCs, SVOCs, TPH, TAL Metals, and PCBs using DPT. Estimated depth to groundwater is 10 ft. Additionally, the contractor will perform a risk assessment to include development of site-specific standards for identified contaminants of concern. A comprehensive RFI Report documenting the investigation and risk assessment is required.

3.3 SWMU 183-Holloman AFB Sewer Lines (KWRD076048)

The contractor will implement an existing TRIAD RFI Work Plan that will assess the entire HAFB sanitary sewer line system (~23 miles of pipe) for releases to the environment (Phase I). The contractor shall perform soil and groundwater sampling at approximately 250 locations in the immediate proximity of the sewer lines in a phased approach using the sampling planning logic presented in the RFI Work Plan. Using DPT and/or conventional auger drilling, confirmation of releases (Phase II) to the environment will be initially determined by VOC analysis for soil and groundwater with NELAP certified onsite laboratory and additional nitrate and TDS analysis for groundwater. Due to slow recharge conditions at Holloman, groundwater samples will require the installation of temporary 1 inch PVC wells at approximately 170 locations. The investigation will be conducted using the TRIAD approach described on the EPA web site http://www.epa.gov/tio/char.htm. TRIAD requires intense real time senior oversight and real-time correspondence with all stakeholders, especially the regulatory community. Contractor will perform ~~a risk assessment to include development of site-specific standards for identified contaminants of concern. A comprehensive RFI Report documenting the investigation and risk evaluation is required.~~ Phase I and II of the investigation and provide a draft and final Data Summary Report which will report on all contaminant detections and confirmation. The Data Summary Report shall also include recommendations for necessary further study to delineate any detected contaminants. Phase III investigations (Optional item 1) will address plume delineation. Phase IV (Optional Item 2) will address receptors and pathways and evaluate associated risk in the form of a risk assessment. The RFI (draft and final) Reports will be Optional Item 3.

4.0 PROJECT TASKS. The contractor shall prepare two (2) separate work plans, one for SWMU 8 and one for SWMU 122. The workplans for SWMU 183 have already been generated and accepted by the 49 CES/CEV. The draft and final workplans will be prepared in WORD and submitted for review and approval by 49 CES/CEV prior to initiation of field work. The contractor shall submit a proposed schedule for approval within 14 days of award. Following approval of the schedule and workplans, the contractor shall proceed with the execution of all field activities, Upon completion of field activities and receipt of analytical, the contractor shall prepare and submit a draft and final RFI Reports for SWMU 8 and 122, that will include a risk assessment. The lateral and vertical extent of contamination, risk assessment and RFI Report for SWMU 183 are optional items 1 through 3,described in Sections 9.0, 10.0 and 11.0 of this scope of work.

4.1 Schedule. The contractor will provide a proposed schedule for the 49 CES/CEV review and approval within two (2) weeks after contract award.

4.2 Workplans. The contractor shall prepare two (2) separate workplans, one for SWMU 8 and one for SWMU 122. The workplans shall be similar to those previously prepared for SWMU investigations, and shall include, but not be limited to a Sampling and Analysis Plans (SAP), Health and Safety Plan (HASP), and Quality Control Plan (QAP). The individual plans shall describe in sufficient detail all planned project activities including methods, equipment, sample locations, sample handling, chemical analysis, and other necessary information to comply with the requirements of a RCRA Facility Investigation. The contractor shall determine the appropriate guidance and ARARs and seek concurrence from the 49 CES/CEV or USACE Project Manager.

4.3 Fieldwork. The contractor will execute the field investigation activities in accordance with the approved workplans discussed in paragraph 4.2 and the previously prepared workplan for SWMU 183 (Phase I and II), and in compliance with all applicable regulatory guidance, laws, and procedures. The field activities must comply with OSHA and Corps of Engineers Safety Manual EM 385-1-1.

4.4 RFI Reports. The RFI reports must contain sufficient detail to be able to achieve regulatory concurrence regarding extent of contamination and sufficient risk analysis to determine that no further action is required if appropriate.

5.0 PERFORMANCE OF WORK. The contractor in performance of the work shall adhere to the following guidelines:

5.1 The contractor shall furnish sufficient technical, supervisory and administrative personnel at all times to ensure the work if performed in accordance with the delivery schedule. Professional level skills and management practices are required in the performance of this contract. Accordingly, the contractor shall establish an effective Quality Control program to assure that the end product meets professional standards and complies with the contractual requirements.

5.2 Meetings/conference calls shall be held when requested by the 49 CES/CEV, the contractor, or the USACE Contracting Officer (CO) for discussion of questions and problems relating to the work required under the contract. The contractor, its subsidiaries, affiliates or associates shall not release any information regarding the project to technical societies, news media or the general public without first obtaining permission.

6.0 PROJECT MANAGEMENT:.

6.1 Communication and Meetings. The contractor shall maintain file records of all communications throughout the project duration. Included will be records of conferences, meetings, discussions, directions, agreements, conversations, site visits, facsimile transmissions, letters, submittals, and any other forms of communication participated in by the contractor pertinent to the project. The records shall identify personnel involved, date, times, subjects, conclusions, directives, and action taken. All work shall be accomplished with adequate internal controls and review procedures, which will eliminate conflict, errors, omission and ensure technical accuracy.

6.1.1 Government Managers. The Government's Contracting Officer is Theresa Armijo at (505) 342-3458. The Holloman Air Force Base, 49 CES/CEV Project Manager is David Scruggs at (575) 572-3931.The USACE Project Manager is Carol Wies, (505) 342-3477. The 49 CES/CEV will assume inspector duties to ensure field work and reporting are technically adequate; any contract changes, modifications, etc. must be approved by the USACE CO listed above.

7.0 DOCUMENTS:

7.1 Required Documents. As indicated above the documents

The deliverable documents described in this SOW shall be considered "Draft" in the sense that they have not yet been reviewed and/or accepted by the members of the technical review team or the CO. The reviewers will be determined by the 49 CES/CEV lead, and may include reviewers from, USACE , NMED, CES/CEV and other regulatory agencies. Each draft document shall be reviewed and accepted prior to proceeding. In all aspects "Draft", "Draft-Final" and "Final" reports shall be complete, and be free of engineering, grammatical and typographical errors. All documents shall have the project title, site name, site location, state of document (draft, final, etc.), contract number, date, on the cover sheet and any binders included in the submittals. All maps, drawings and associated data shall be provided in AutoCADD (*.dwg) format. The final report shall be provided on diskette in MS Word for Windows format.

7.1.1 Review. The contractor shall comply with the review process as outlined below. The CES/CEV, USACE, NMED and/or EPA may furnish the contractor review comments on the submittals at the various milestones. The contractor shall comply with the review comments in the development of documents for the next milestone. If any review comment requires clarification and/or amplification to assure compliance, the contractor shall verbally notify the Project Coordinator(s). After each review, the contractor will be furnished comments to be annotated and returned to the Government. Comments shall be annotated with a C-Concur, D-Do not concur, E-Exception, or X-Delete. Comments annotated with a D, E or X must be documented

Changes in work as a result of review comments will not be considered a change to the task order unless significant change in scope is involved.

8.0 DOCUMENT AND INVOICE SUBMITTALS:

All submittals under this contract including submittals, invoices, and records of correspondence shall be submitted to:

Carol Wies
Albuquerque District Corps of Engineers
CESPA-PM-M
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Report and Workplan submittals shall be provided to:

David Scruggs – 49 CES/CEV
550 Tabosa Ave
Holloman Air Force Base, NM 88330

9.0 OPTION ITEM 1: SWMU 183, Phase III investigations will address plume delineation. The contractor shall implement an existing TRIAD RFI Work Plan to perform contaminant delineation. Using DPT and/or conventional auger drilling, vertical and lateral extent of contaminants detected and confirmed in Phase I and II shall be established for each contaminant plume in soil and/or groundwater as applicable. Due to slow recharge conditions at Holloman, groundwater samples will require the installation of temporary 1 inch PVC wells. The investigation will be conducted using the TRIAD approach described on the EPA web site http://www.epa.gov/tio/char.htm. TRIAD requires intense real time senior oversight and real-time correspondence with all stakeholders, especially the regulatory community.

FOR ESTIMATING PURPOSES THE CONTRACTOR SHALL ASSUME PHASE III DELINEATION WILL REQUIRE THE FOLLOWING:

1. 120 LOCATIONS FOR THE INSTALLATION OF 1 INCH TEMPORARY WELLS WITH AN AVERAGE DEPTH OF 25 FEET USING DIRECT PUSH TECHNOLOGY. PROVIDE COST PER FOOT OF DRILLING TO INCLUDE LABOR AND MATERIALS FOR INSTALLATION AND SAMPLING OF WELLS.
2. 50 LOCATIONS FOR THE INSTALLATION OF 2 INCH TEMPORARY WELLS WITH AN AVERAGE DEPTH OF 40 FEET USING HOLLOW STEM AUGER. PROVIDE COST PER FOOT OF DRILLING TO INCLUDE LABOR AND MATERIALS FOR INSTALLATION AND SAMPLING OF WELLS.
3. PROVIDE ANALYTICAL COST ASSOCIATED WITH THE WELL INSTALLATION AS PER THE WORK PLAN.

10.0 OPTION ITEM 2: SWMU 183, Phase IV will address receptors and all pathways and evaluate associated risk in the form of a risk assessment. The contractor will perform a risk assessment to include development of site-specific standards for identified contaminants of concern.

FOR ESTIMATING PURPOSES THE CONTRACTOR SHALL ASSUME PHASE IV WILL REQUIRE THE FOLLOWING:

1. COLLECTION OF UP TO 30 AMBIENT AIR SAMPLES UTILIZING SUMMA CANNISTERS INSIDE AFFECTED BUILDINGS. PROVIDE COST FOR LABOR MATERIALS FOR SAMPLE COLLECTION AND ANALYSIS.
2. PERFORMANCE OF RISK BASED EVALUATION USING VAPOR INHALATION AND DERMAL EXPOSURE PATHWAY. ASSUME FIFTEEN SEPARATE AND DISTINCT AREAS WILL REQUIRE RISK EVALUATION AND PROVIDE UNIT COST PER AREA.

11.0 OPTION ITEM 3: The SWMU 183 RFI (draft and final) Report will be Optional Item 3. The Contractor shall prepare an RFI Report that defines the work performed to determine the nature and extent of soil and groundwater contamination at SWMU 183. The report shall describe the number of pushes executed at each location, the soil and groundwater sampling results for for VOCs, SVOCs, TPH, TAL Metals, and PCBs. A comprehensive RFI Report documenting the investigation and risk assessment prepared under Option Item 2 is required.

ATTACHMENT B

SWMUS 122 AND 123 NOTICE OF DISSAPROVAL (HAFB-08-009) AND RESPONSES TO NEW MEXICO ENVIRONMENT DEPARTMENT COMMENTS

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us

BILL RICHARDSON
Governor

DIANE DENISH
Lieutenant Governor

RON CURRY
Secretary

JON GOLDSTEIN
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

May 22, 2009

Mr. David Scruggs, Chief
Environmental Restoration Program
49 CES/CEVR
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

SUBJECT: NOTICE OF DISAPPROVAL: RCRA FACILITY INVESTIGATION WORK PLAN, SWMUS 122 AND 123, NOVEMBER 2008 HOLLOMAN AIR FORCE BASE, NM6572124422 HAFB-08-009

Dear Mr. Scruggs:

The New Mexico Environment Department (NMED) has reviewed the RCRA Facility Investigation Work Plan for solid waste management units (SWMUs) 122 and 123, which was submitted for the performance of additional site characterization at these sites by Holloman Air Force Base (the Permittee). Upon completion of the Work Plan review, the NMED has determined that the Work Plan cannot be approved at this time, as revisions are necessary. The Permittee is required to address the following deficiencies before the NMED can make a final determination regarding approval.

COMMENTS

1. The Permittee must submit a new figure(s) showing the locations of all existing and former soil borings and monitoring wells and the results of analyses that were/are above soil and groundwater action levels.

2. The Permittee must revise Figures 1-1, 1-2, 1-3, 6-1 and 6-2 to show which datum

projection was used (e.g., New Mexico State Plane Coordinate System, Central Zone, 1983 [ft]).

3. The Permittee must revise the Work Plan to include evaluation of inorganic constituents detected in soil above the reporting limit against the soon-to-be established base-wide background concentrations. The maximum detected concentration for each contaminant that is detected above the reporting limit must be used. These comparisons will then be used to determine the site hazard index, which must be less than 1.0. Any contaminant concentrations above the soil screening levels cannot be screened out.

4. The Permittee must provide an explanation of the approach to be used to conduct a risk assessment, should one be required. This explanation shall include the use of background concentrations as discussed above.

5. The Permittee must provide a table showing all analyte holding times.

Please submit the required information in the form of a revised Work Plan that incorporates all the responses to the above NOD indicating added information in highlights, and deleted information in strikeouts, and on CDs compatible with Microsoft Word. Further, in order to expedite review of the responses, provide a matrix of the comments and HAFB responses. This response must be provided within sixty (60) days after receipt of this letter.

If you have any questions regarding this NOD or if you would like to discuss the comments prior to your response, please contact David Strasser of my staff at (505) 222-9526, or at the above address.

Sincerely,

for James P. Bearzi
Chief
Hazardous Waste Bureau

cc: J. Kieling, NMED HWB
W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HWB
L. King, EPA, Region 6 (6PD-F)
File: HAFB 2009 and Reading
HWB-HAFB-08-009

Comments Final RCRA Facility Investigation Work Plan SWMUs 122 and 123 Holloman Air Force Base, New Mexico, November 2008				
Comment No.	**Section**	**Page**	**Comment**	**Response**
Author: David Strasser			**Date of Comments: May 22, 2009**	**Date of Response: May 29, 2009**
1	General	Figures	The Permittee must submit a new figure(s) showing the locations of all existing and former soil borings and monitoring wells and the results of analyses that were/are above soil and groundwater action levels.	Concur. Four new figures (Figures 1-4 through 1-7) have been created. The new figures show the locations of all existing and former soil borings and monitoring wells along with the results of analyses that were/are above current soil and groundwater action levels (NMED and USEPA) from the previous SWMU 122 and 123 investigations. These new figures have been introduced into the Work Plan text within Subsections 1.8.2, 1.8.6, 1.8.7.1, and 1.8.7.2.
2	General	Figures	The Permittee must revise Figures 1-1, 1-2, 1-3, 6-1, and 6-2 to show which datum projection was used (e.g., New Mexico State Plane Coordinate System, Central Zone, 1983 [ft]).	Concur. All Figures have been revised to show which datum projection was used (New Mexico State Plane Coordinate System, Central Zone, 1983 [ft]).
3	General	Pages 6-3, 6-4, and 7-1	The Permittee must revise the Work Plan to include evaluation of inorganic constituents detected in soil above the reporting limit against the soon-to-be established base-wide background concentrations. The maximum detected concentration for each contaminant that is detected above the reporting limit must be used. These comparisons will then be used to determine the site hazard index, which must be less than 1.0. Any contaminant concentrations above the soil screening levels cannot be screened out.	Concur. Subsections 6.2.1.1 and 6.2.1.2 have been revised to include an evaluation of inorganic constituents detected in soil and groundwater above the reporting limit against the pending base-wide background concentrations. Additionally the following text has been included in the new Section 7 (specifically Section 7.2.5 [Calculation of Site Specific SSLs] refer to the Response to Comment 4) "The maximum detected concentration for each contaminant that is detected above the reporting limit will be used to determine the site hazard index (HI). All constituents which have an HI greater than 1 will be evaluated in the site-specific risk assessment".
4	General	Pages 7-1 through 7-4	The Permittee must provide an explanation of the approach to be used to conduct a risk assessment, should one be required. This explanation shall include the use of background concentrations as discussed above.	Concur. The Work Plan has been revised to include a Risk Assessment Approach Section (new Section 7) which provides an explanation of the approach to be used for conducting a site specific risk assessment. This explanation also includes the use of background concentrations as discussed in the Response to Comment No. 3.
5	General	Tables	The Permittee must provide a table showing all analyte holding times.	Concur. Table 6-3 has been revised to include analyte holding times for both soil and groundwater samples collected during the SWMU 122 and 123 RFI.

APPENDIX A

HAFB BASEWIDE QUALITY ASSURANCE PROJECT PLAN ADDENDUM

QUALITY ASSURANCE PROJECT PLAN ADDENDUM SWMUs 122 AND 123 RCRA FACILITY INVESTIGATION HOLLOMAN AFB, NEW MEXICO

Prepared for:

49 CES/CEV
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers
Albuquerque District
HTRW Branch
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435
USACE Albuquerque District Project No. KWRD076046

Prepared By:

NationView, LLC
1608 13th Avenue South, Suite 160
Birmingham, Alabama 35205
NationView Project No. 8080014.02

Contract No. W912PL-07-D-0050
Delivery Order No. DM01

~~November 2008~~June 2009

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QUALITY ASSURANCE PROJECT PLAN ADDENDUM SWMUs 122 AND 123 RCRA FACILITY INVESTIGATION HOLLOMAN AFB, NEW MEXICO

REVIEW SHEET

COMMITMENT TO IMPLEMENT THIS QUALITY ASSURANCE PROJECT PLAN ADDENDUM

David D. Martin	David D. Martin	6/30/09
Corporate Sponsor	Signature	Date
Frank Gardner, P.G.	Frank Gardner	6-26-09
Project Manager	Signature	Date
Jim Moore, P.G.	J H Moore	6-26-09
Field Team Leader/Sr. Geologist	Signature	Date

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QUALITY ASSURANCE PROJECT PLAN ADDENDUM
SWMUs 122 AND 123
RCRA FACILITY INVESTIGATION
HOLLOMAN AFB, NEW MEXICO

TABLE OF CONTENTS

Tables

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LIST OF ACRONYMS

AFB	Air Force Base
ASTM	American Society for Testing and Materials
Bhate	Bhate Environmental Associates, Inc.
DRO	Diesel Range Organics
EDD	Electronic data deliverable
GRO	Gasoline Range Organics
HAFB	Holloman Air Force Base
LCL	Lower Control Limit
LCS	Laboratory Control Sample
MCL	Maximum Contaminant Level
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NELAC	National Environmental Laboratory Accreditation Conference
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
ORO	Oil Range Organics
PCB	Polychlorinated Bi-phenyl
P.G.	Professional Geologist
QA	Quality Assurance
QAM	Quality Assurance Manual
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RL	Reporting Limit
RPD	Relative Percent Difference
SOPs	Standard Operating Procedures
SVOC	Semi-volatile Organic Compounds
SSLs	Soil Screening Levels
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
UCL	Upper Control Limit
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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PREFACE

This Quality Assurance Project Plan Addendum (QAPP Addendum) has been developed to assure that sample collection, analyses, and evaluations are legally and scientifically defensible for the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of Solid Waste Management Units (SWMUs) 122 and 123 at Holloman Air Force Base (HAFB) New Mexico. This document is an addendum to the *Basewide Quality Assurance Project Plan, Holloman Air Force Base, New Mexico* (Bhate, November 2003) (Basewide QAPP) and must be used in conjunction with that document. This document contains the site specific information for the work at SWMU 122 and 123 outlined in the *RCRA Facility Investigation Work Plan, SWMUs 122 and 123, Holloman Air Force Base, New Mexico* (NationView, October 2008).

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1 INTRODUCTION

NationView, LLC, has been retained by the U.S. Army Corps of Engineers (USACE), under contract W912PL-07-D-0050, Delivery Order No. DM01 to conduct a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of Solid Waste Management Units (SWMUs) 122 and 123 at Holloman Air Force Base (HAFB) New Mexico.

The primary project objectives of the SWMU 122 and 123 RFI are to:

1. Identify potential releases to the subsurface soil and groundwater from the previously removed Building 702 Waste Oil Tank (SWMU 122),

2. Delineate the downgradient horizontal extent of Volatile Organic Compound (VOC) (benzene, toluene, ethylbenzene and xylene) groundwater contamination from the previously removed Building 704 Waste Oil Tank (SWMU 123) that has been identified under the petroleum, oil, and lubricants (POL) Washrack.

3. Collect sufficient analytical data to complete a site-specific risk assessment of the groundwater exposure pathways and,

4. Collect the proper data to meet the data quality objectives (DQOs) to support closure of the site based on guidance from the NMED.

See the Basewide Quality Assurance Project Plan (QAPP) (Bhate, 2003) and SWMU 122 and 123 Work Plan (NationView, ~~October 2008~~June 2009) for additional information on HAFB and the SWMU 122 and 123 sites.

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2 PROJECT LABORATORY

The analytical work for this project will be preformed by Accutest Southeast of Orlando, Florida (Accutest).

Accutest Southeast
4405 Vineland Road, Suite C-15
Orlando, FL 32811
Phone: (407) 425-6700
Fax: (407) 425-0707

The laboratory personnel who will be involved with this project include:

Ms. Jean Dent-Smith, Accutest Project Manager

Ms. Svetlana Izosimova, Accutest Quality Assurance Officer

Accutest is certified by the National Environmental Laboratory Accreditation Conference (NELAC) and validated by USACE and has extensive previous experience in working on USACE projects. The Accutest Quality Assurance Manual (QAM) and Standard Operating Procedures (SOPs) have been reviewed by NationView and found to meet all the requirements for this project. The QAM and SOPs are available for further review if required.

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3 DATA CATEGORIES

The data use determines the required levels of data quality. The two levels of data quality established by the USACE are screening and definitive. Under this QAPP Addendum, the data to be generated under each level in this investigation are presented in Table 3-1 (Screening) and Table 3-2 (Definitive). The screening data will be generated in the field using field instruments. The definitive data generated by the laboratory will be presented with limited data deliverables (i.e. Level II data packages), using a standard turn-around-time for soil and groundwater samples collected during the investigation. All definitive data produced by the laboratory will also be presented in an electronic data deliverable (EDD) format.

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4 DATA QUALITY ASSURANCE AND QUALITY CONTROL

The general data quality assurance (QA) and quality control (QC) requirements for HAFB are presented in the Basewide QAPP. The field QC requirements for this project are presented in Table 4-1. The project specific laboratory QC limits are listed in Table 4-2.

All final definitive data will be reviewed and validated by a NationView Senior Chemist based on the logic and guidelines of the United States Environmental Protection Agency (USEPA) National Functional Guidelines for Data Validation and the site specific laboratory QC limits presented in this QAPP Addendum.

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5 REFERENCES

Bhate, November 2003. *Final Basewide Quality Assurance Project Plan, Holloman Air Force Base, New Mexico.*

NationView, ~~October 2008~~June 2009. *RCRA Facility Investigation Work Plan SWMUs 122 and 123 Holloman Air Force Base, New Mexico.*

United States Environmental Protection Agency, October 2004. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*.

United States Environmental Protection Agency, October 1999. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*.

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TABLES

Table 3-1
Summary of Screening Data

Parameter	Matrix	Testing Method
Volatile Organic Compounds (VOCs)	Soil	Organic Vapor Analyzer
Noticeable odors	Soil	Olfactory sense
pH	Water	Multi-parameter sonde and a flow-through cell
Conductivity	Water	Multi-parameter sonde and a flow-through cell
Dissolved Oxygen	Water	Multi-parameter sonde and a flow-through cell
Temperature	Water	Multi-parameter sonde and a flow-through cell

Table 3-2
Summary of Definitive Data

Parameter	Matrix	Preparation Method	Analytical Method
Volatile Organic Compounds (VOCs)	Soil	USEPA Method 5035	USEPA Method 8260B
Semi-volatile Organic Compounds (SVOCs)	Soil	USEPA Method 3550B	USEPA Method 8270C
Total Petroleum Hydrocarbons (TPH)	Soil	USEPA Method 3550B	USEPA Method 8015B
Polychlorinated Bi-phenyls	Soil	USEPA Method 3550B	USEPA Method 8082
TAL Metals	Soil	USEPA Method 3050B	USEPA Methods 6010B and 7471A
VOCs	Groundwater	USEPA Method 5030B	USEPA Method 8260B
SVOCs	Groundwater	USEPA Method 3510C	USEPA Method 8270C
TPH	Groundwater	USEPA Method 3510C	USEPA Method 8015B
Polychlorinated Bi-phenyls	Groundwater	USEPA Method 3510C	USEPA Method 8082
TAL Metals	Groundwater	USEPA Method 3010A	USEPA Methods 6010B and 7470A
Total Dissolved Solids (TDS)	Groundwater	USEPA Method 2540C	USEPA Method 2540C

Notes:
USEPA = United States Environmental Protection Agency
TAL = Target Analyte List

Table 4-1
Summary of Additional Investigation Field QC Samples

Matrix	Analysis	Number of Field Samples	Trip Blanks*	Field Duplicates	MS/MSD	Total
Soil	VOCs per EPA Method 8260B	8	2	1	2	13
	SVOCs per EPA Method 8270C	8	0	1	2	11
	TPHs per EPA Method 8015B (GRO, DRO, ORO)	8	0	1	2	11
	PCBs per EPA Method 8082	8	0	1	2	11
	TAL Metals by EPA 6010B/7471A	8	0	1	2	11
	Moisture Content per Method EPA 2540B	2	0	0	0	2
	Dry Bulk Density per Method ASTM D2937	2	0	0	0	2
	Specific Gravity per Method ASTM D1429-86	2	0	0	0	2
	Fractional Organic Carbon Content per Method ASTM D2974	2	0	0	0	2
Groundwater	VOCs per EPA Method 8260B	16	8	2	2	28
	SVOCs per EPA Method 8270C	16	0	2	2	20
	TPHs per EPA Method 8015B (GRO, DRO, ORO)	16	0	2	2	20
	PCBs per EPA Method 8082	16	0	2	2	20
	TAL Metals by EPA 6010B/7470A	16	0	2	2	20
	Total Dissolved Solids by EPA Method 2450C	16	0	2	2	20

Notes:
*Estimated, one trip blank will accompany every shipment of volatile samples
EPA = Environmental Protection Agency
VOCs = Volatile Organic Compounds
SVOCs = Semi-volatile Organic Compounds
PCBs = Polychlorinated Bi-phenyls
TAL = Target Analyte List
TPH = Total Petroleum Hydrocarbons
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
ORO = Oil Range Organics
ASTM = American Society for Testing and Materials

Table 4-2
Summary of Laboratory QC Limits

Parameter	CAS No.	RL / Evaluation Criteria					LCS				Matrix Spike Water			Matrix Spike Soil		
		Water			Soil		Water		Soil		MS Recovery		MSD	MS Recovery		MSD
		RL	NMWQCC[1]	EPA MCL	RL	SSL[2]	LCL	UCL	LCL	UCL	LCL	UCL	RPD	LCL	UCL	RPD
VOCs per EPA Method 8260B		µg/L	µg/L	µg/L	µg/kg	mg/kg	%	%	%	%	%	%	%	%	%	%
Acetone	67-64-1	25	NV	NV	50	28,100	59	134	61	144	59	134	14	61	144	29
Acetonitrile	75-05-8	20	NV	NV	50	NV	57	123	59	139	57	123	15	59	139	30
Acrolein	107-02-8	20	NV	NV	25	0.206	33	157	27	156	33	157	21	27	156	39
Acrylonitrile	107-13-1	10	NV	NV	25	4.27	62	124	55	144	62	124	13	55	144	24
Allyl chloride	107-05-1	10	NV	NV	25	NV	48	136	41	152	48	136	13	41	152	24
Benzene	71-43-2	1	10	5	5	10.3	83	124	78	130	83	124	11	78	130	25
Benzyl Chloride	100-44-7	1	NV	NV	5	NV	61	118	74	130	61	118	12	74	130	28
Bromobenzene	108-86-1	1	NV	NV	5	37	83	115	78	123	83	115	10	78	123	30
Bromochloromethane	74-97-5	1	NV	NV	5	NV	78	112	72	122	78	112	10	72	122	23
Bromodichloromethane	75-27-4	1	NV	NV	5	14.4	76	116	73	122	76	116	10	73	122	25
Bromoform	75-25-2	1	NV	NV	5	621	68	128	70	139	68	128	11	70	139	26
n-Butylbenzene	104-51-8	1	NV	NV	5	62.1	84	124	80	138	84	124	10	80	138	31
sec-Butylbenzene	135-98-8	1	NV	NV	5	60.6	86	127	82	132	86	127	10	82	132	29
tert-Butylbenzene	98-06-6	1	NV	NV	5	106	83	126	79	130	83	126	10	79	130	29
Chlorobenzene	108-90-7	1	NV	100	5	194	87	115	83	122	87	115	9	83	122	23
Chloroethane	75-00-3	2	NV	NV	5	63.3	54	166	61	153	54	166	20	61	153	31
Chloroform	67-66-3	1	100	NV	5	4	85	123	79	129	85	123	10	79	129	27
1-Chlorohexane	544-10-5	2	NV	NV	5	NV	87	128	85	137	87	128	10	85	137	29
o-Chlorotoluene	95-49-8	1	NV	NV	5	202	84	121	77	123	84	121	10	77	123	31
p-Chlorotoluene	106-43-4	1	NV	NV	5	NV	84	120	78	129	84	120	10	78	129	29
2-Chloroethyl vinyl ether	110-75-8	5	NV	NV	25	NV	63	125	52	142	63	125	24	52	142	25
Carbon disulfide	75-15-0	2	NV	NV	5	460	67	147	61	142	67	147	12	61	142	27
Carbon tetrachloride	56-23-5	1	10	5	5	3.47	74	139	79	135	74	139	13	79	135	29
1,1-Dichloroethane	75-34-3	1	25	NV	5	1,400	82	127	77	132	82	127	10	77	132	26
1,1-Dichloroethylene	75-35-4	1	5	7	5	206	75	133	66	132	75	133	13	66	132	27
1,1-Dichloropropene	563-58-6	1	NV	NV	5	NV	87	127	81	133	87	127	10	81	133	26
1,2-Dibromo-3-chloropropane	96-12-8	2	NV	0.2	5	1.84	61	118	67	129	61	118	15	67	129	29
1,2-Dibromoethane	106-93-4	1	0.1	0.05	5	0.504	80	115	77	126	80	115	10	77	126	24
1,2-Dichloroethane	107-06-2	1	10	5	5	6.04	76	122	78	129	76	122	11	78	129	24
1,2-Dichloropropane	78-87-5	1	NV	5	5	6	81	120	74	127	81	120	11	74	127	27
1,3-Dichloropropane	142-28-9	1	NV	NV	5	NV	81	113	78	118	81	113	11	78	118	26
2,2-Dichloropropane	594-20-7	1	NV	NV	5	NV	77	138	80	137	77	138	12	80	137	28
Dibromochloromethane	124-48-1	1	NV	NV	5	14.8	74	116	78	117	74	116	11	78	117	27
Dichlorodifluoromethane	75-71-8	2	NV	NV	5	161	34	158	35	162	34	158	22	35	162	30
cis-1,2-Dichloroethylene	156-59-2	1	NV	70	5	76.5	81	114	74	123	81	114	10	74	123	26
cis-1,3-Dichloropropene	10061-01-5	1	NV	NV	5	NV	83	119	79	130	83	119	10	79	130	23
cis-1,4-Dichloro-2-Butene	1476-11-5	10	NV	NV	25	NV	41	130	71	126	41	130	33	71	126	28
m-Dichlorobenzene	541-73-1	1	NV	NV	5	32.6	86	115	82	126	86	115	9	82	126	29
o-Dichlorobenzene	95-50-1	1	NV	600	5	37.4	85	115	83	123	85	115	9	83	123	28
p-Dichlorobenzene	106-46-7	1	NV	75	5	39.5	87	113	84	124	87	113	10	84	124	28
trans-1,2-Dichloroethylene	156-60-5	1	NV	100	5	112	82	126	77	129	82	126	10	77	129	27
trans-1,3-Dichloropropene	10061-02-6	1	NV	NV	5	NV	87	123	87	131	87	123	10	87	131	27
Ethylbenzene	100-41-4	1	750	700	5	128	87	118	82	124	87	118	10	82	124	25
Ethyl methacrylate	97-63-2	5	NV	NV	25	52.7	68	110	78	118	68	110	11	78	118	30
Freon 113	76-13-1	1	NV	NV	5	3280	74	139	62	147	74	139	13	62	147	29
2-Hexanone	591-78-6	5	NV	NV	25	NV	58	125	67	130	58	125	14	67	130	29
Hexachlorobutadiene	87-68-3	2	NV	NV	5	12.2	71	133	77	150	71	133	12	77	150	36
Hexane	110-54-3	2	NV	NV	5	38	71	134	65	147	71	134	11	65	147	27

Table 4-2
Summary of Laboratory QC Limits

Parameter	CAS No.	RL / Evaluation Criteria					LCS				Matrix Spike Water			Matrix Spike Soil		
		Water			Soil		Water		Soil		MS Recovery		MSD	MS Recovery		MSD
		RL	NMWQCC[1]	EPA MCL	RL	SSL[2]	LCL	UCL	LCL	UCL	LCL	UCL	RPD	LCL	UCL	RPD
VOCs per EPA Method 8260B		µg/L	µg/L	µg/L	µg/kg	mg/kg	%	%	%	%	%	%	%	%	%	%
Isopropylbenzene	98-82-8	1	NV	NV	5	271	87	131	82	133	87	131	10	82	133	27
p-Isopropyltoluene	99-87-6	1	NV	NV	5	NV	83	125	82	132	83	125	9	82	132	29
4-Methyl-2-pentanone	108-10-1	5	NV	NV	25	NV	62	125	69	125	62	125	13	69	125	24
Methacrylonitrile	126-98-7	20	NV	NV	25	3.84	62	133	70	138	62	133	17	70	138	22
Methyl bromide	74-83-9	2	NV	NV	5	8.51	55	151	60	146	55	151	21	60	146	31
Methyl chloride	74-87-3	2	NV	NV	5	NV	55	173	58	163	55	173	22	58	163	26
Methyl iodide	74-88-4	5	NV	NV	10	NV	72	125	66	128	72	125	11	66	128	27
Methyl methacrylate	80-62-6	5	NV	NV	25	2920	63	115	73	125	63	115	10	73	125	24
Methylene bromide	74-95-3	2	NV	NV	5	179	81	116	75	128	81	116	10	75	128	26
Methylene chloride	75-09-2	5	100	5	10	182	69	125	62	140	69	125	11	62	140	25
Methyl ethyl ketone	78-93-3	5	NV	NV	25	31,800	61	127	66	134	61	127	13	66	134	23
Methyl Tert Butyl Ether	1634-04-4	1	NV	NV	5	388	75	116	70	131	75	116	10	70	131	25
Naphthalene	91-20-3	5	30	NV	5	79.5	59	125	59	143	59	125	15	59	125	31
Pentachloroethane	76-01-7	10	NV	NV	25	NV	82	111	64	156	82	111	8	64	156	37
Propionitrile	107-12-0	20	NV	NV	50	NV	69	119	73	133	69	119	12	73	133	23
n-Propylbenzene	103-65-1	1	NV	NV	5	62.1	86	125	78	129	86	125	10	78	129	29
Styrene	100-42-5	1	NV	100	5	100	78	118	79	123	78	118	11	79	123	28
1,1,1,2-Tetrachloroethane	630-20-6	1	NV	NV	5	43.2	81	119	81	121	81	119	10	81	121	25
1,1,1-Trichloroethane	71-55-6	1	60	200	5	563	79	133	80	133	79	133	11	80	133	27
1,1,2,2-Tetrachloroethane	79-34-5	1	10	NV	5	5.55	71	120	70	128	71	120	11	70	128	30
1,1,2-Trichloroethane	79-00-5	1	10	5	5	11.9	80	114	76	118	80	114	11	76	118	28
1,2,3-Trichlorobenzene	87-61-6	1	NV	NV	5	NV	64	126	78	136	64	126	16	78	136	34
1,2,3-Trichloropropane	98-18-4	2	NV	NV	5	0.0861	77	115	74	125	77	115	12	74	125	30
1,2,4-Trichlorobenzene	120-82-1	1	NV	70	5	69.3	68	123	82	137	68	123	11	82	137	32
1,2,4-Trimethylbenzene	95-63-6	2	NV	NV	5	58	82	120	77	129	82	120	10	77	129	29
1,3,5-Trimethylbenzene	108-67-8	2	NV	NV	5	24.8	83	123	79	129	83	123	10	79	129	31
Tetrachloroethylene	127-18-4	1	20	5	5	12.5	80	131	79	132	80	131	12	79	132	27
Toluene	108-88-3	1	750	1,000	5	252	86	116	80	123	86	116	10	80	123	26
Trichloroethylene	79-01-6	1	100	5	5	0.638	85	124	78	132	85	124	10	78	132	28
Trichlorofluoromethane	75-69-4	2	NV	NV	5	588	66	156	67	149	66	156	15	67	149	29
Trans-1,4-Dichloro-2-Butene	110-57-6	10	NV	NV	25	NV	51	137	74	138	51	137	24	74	138	30
Vinyl chloride	75-01-4	1	1	2	5	2.25	57	153	60	145	57	153	22	60	145	29
Vinyl Acetate	108-05-4	10	NV	NV	25	1070	38	159	25	164	38	159	11	25	164	35
m,p-Xylene		2	620	10000	10	82	86	121	82	128	86	121	10	82	128	25
o-Xylene	95-47-6	1	620	10000	5	99.5	83	121	82	126	83	121	10	82	126	25
Dibromofluoromethane (surr)	1868-53-7	--	--	--	--	--	87	116	80	121	--	--	--	--	--	--
Toluene-D8 (surr)	2037-26-5	--	--	--	--	--	86	112	71	130	--	--	--	--	--	--
4-Bromofluorobenzene (surr)	460-00-4	--	--	--	--	--	84	120	59	148	--	--	--	--	--	--
1,2-Dichloroethane-D4 (surr)	17060-07-0	--	--	--	--	--	76	127	77	123	--	--	--	--	--	--

Table 4-2
Summary of Laboratory QC Limits

Parameter	CAS No.	RL / Evaluation Criteria					LCS				Matrix Spike Water			Matrix Spike Soil		
		Water			Soil		Water		Soil		MS Recovery		MSD	MS Recovery		MSD
		RL	NMWQCC[1]	EPA MCL	RL	SSL[2]	LCL	UCL	LCL	UCL	LCL	UCL	RPD	LCL	UCL	RPD
SVOCs by EPA Method 8270C		µg/L	µg/L	µg/L	µg/kg	mg/kg	%	%	%	%	%	%	%	%	%	%
Benzoic Acid	65-85-0	25	NV	NV	830	NV	10	50	44	116	10	50	40	44	116	36
2-Chlorophenol	95-57-8	5	NV	NV	170	166	44	103	54	97	44	103	29	54	97	31
4-Chloro-3-methyl phenol	59-50-7	5	NV	NV	170	NV	53	105	59	102	53	105	24	59	102	27
2,4-Dichlorophenol	120-83-2	5	NV	NV	170	183	53	108	60	101	53	108	26	60	101	30
2,4-Dimethylphenol	105-67-9	5	NV	NV	170	1,220	37	91	49	89	37	91	28	49	89	31
2,4-Dinitrophenol	51-28-5	25	NV	NV	830	122	37	111	39	107	37	111	30	39	107	40
4,6-Dinitro-o-cresol	534-52-1	10	NV	NV	330	6.11	62	115	58	109	62	115	26	58	109	37
2-Methylphenol	95-48-7	5	NV	NV	170	NV	35	91	53	94	35	91	30	53	94	29
3&4-Methylphenol	--	5	NV	NV	170	NV	32	85	54	95	32	85	29	54	95	31
2-Nitrophenol	88-75-5	5	NV	NV	170	NV	49	111	55	96	49	111	30	55	96	30
4-Nitrophenol	100-02-7	25	NV	NV	830	NV	13	55	56	106	13	55	31	56	106	29
Pentachlorophenol	87-86-5	25	NV	NV	830	29.8	57	118	50	115	57	118	26	50	115	33
Phenol	108-95-2	5	NV	NV	170	18,300	13	54	55	99	13	54	34	55	99	28
2,4,5-Trichlorophenol	95-95-4	5	NV	NV	170	6,110	59	106	60	101	59	106	23	60	101	28
2,4,6-Trichlorophenol	88-06-2	5	NV	NV	170	6.11	58	107	60	100	58	107	24	60	100	27
Acenaphthene	83-32-9	5	NV	NV	170	3,730	58	106	59	97	58	106	21	59	97	29
Acenaphthylene	208-96-8	5	NV	NV	170	NV	58	105	58	98	58	105	21	58	98	30
Anthracene	120-12-7	5	NV	NV	170	22,000	65	108	61	104	65	108	19	61	104	29
Benzidine	92-87-5	25	NV	NV	1700	0.0211	15	73	10	156	15	73	23	10	156	50
Benzo(a)anthracene	56-55-3	5	NV	NV	170	6.21	63	111	60	106	63	111	19	60	106	31
Benzo(a)pyrene	50-32-8	5	0.7	0.2	170	0.621	62	106	59	102	62	106	20	59	102	32
Benzo(b)fluoranthene	205-99-2	5	NV	NV	170	6.21	63	109	60	107	63	109	20	60	107	31
Benzo(g,h,i)perylene	191-24-2	5	NV	NV	170	NV	61	111	56	103	61	111	21	56	103	32
Benzo(k)fluoranthene	207-08-9	5	NV	NV	170	62.1	64	111	61	107	64	111	20	61	107	30
4-Bromophenyl phenyl ether	101-55-3	5	NV	NV	170	NV	64	107	60	104	64	107	20	60	104	26
Butyl benzyl phthalate	85-68-7	5	NV	NV	330	NV	59	114	57	110	59	114	20	57	110	28
Benzyl Alcohol	100-51-6	5	NV	NV	170	NV	34	98	51	102	34	98	27	51	102	34
2-Chloronaphthalene	91-58-7	5	NV	NV	170	3,990	54	105	57	95	54	105	24	57	95	28
4-Chloroaniline	106-47-8	10	NV	NV	330	NV	53	103	19	85	53	103	22	19	85	34
Chrysene	218-01-9	5	NV	NV	170	615	64	111	60	107	64	111	19	60	107	31
bis(2-Chloroethoxy)methane	111-91-1	5	NV	NV	170	NV	48	101	51	89	48	101	28	51	89	30
bis(2-Chloroethyl)ether	111-44-4	5	NV	NV	170	2.44	51	108	50	96	51	108	27	50	96	33
bis(2-Chloroisopropyl)ether	108-60-1	5	NV	NV	170	38.7	43	106	44	94	43	106	27	44	94	32
4-Chlorophenyl phenyl ether	7005-72-3	5	NV	NV	170	NV	61	107	60	101	61	107	20	60	101	26
1,2-Dichlorobenzene	95-50-1	5	NV	600	170	37.4	41	102	47	91	41	102	28	47	91	35
1,3-Dichlorobenzene	541-73-1	5	NV	NV	170	32.6	38	100	45	86	38	100	28	45	86	36
1,4-Dichlorobenzene	106-46-7	5	NV	75	170	39.5	40	100	45	88	40	100	28	45	88	36
2,4-Dinitrotoluene	121-14-2	5	NV	NV	170	122	60	109	59	103	60	109	20	59	103	30

Table 4-2
Summary of Laboratory QC Limits

Parameter	CAS No.	RL / Evaluation Criteria					LCS				Matrix Spike Water			Matrix Spike Soil		
		Water			Soil		Water		Soil		MS Recovery		MSD	MS Recovery		MSD
		RL	NMWQCC[1]	EPA MCL	RL	SSL[2]	LCL	UCL	LCL	UCL	LCL	UCL	RPD	LCL	UCL	RPD
SVOCs by EPA Method 8270C		µg/L	µg/L	µg/L	µg/kg	mg/kg	%	%	%	%	%	%	%	%	%	%
2,6-Dinitrotoluene	606-20-2	5	NV	NV	170	NV	58	104	57	99	58	104	21	57	99	30
3,3'-Dichlorobenzidine	91-94-1	10	NV	NV	330	10.8	57	105	34	88	57	105	25	34	88	31
Dibenzo(a,h)anthracene	53-70-3	5	NV	NV	170	0.621	62	112	57	105	62	112	20	57	105	29
Dibenzofuran	132-64-9	5	NV	NV	170	142	61	108	58	103	61	108	20	58	103	27
Di-n-butyl phthalate	84-74-2	5	NV	NV	330	6,110	62	109	59	105	62	109	20	59	105	27
Di-n-octyl phthalate	117-84-0	5	NV	NV	330	NV	60	120	59	117	60	120	24	59	117	28
Diethyl phthalate	84-66-2	5	NV	NV	330	48,900	62	109	59	106	62	109	19	59	106	27
Dimethyl phthalate	131-11-3	5	NV	NV	330	100,000	63	106	60	100	63	106	19	60	100	26
bis(2-Ethylhexyl)phthalate	117-81-7	5	NV	NV	330	347	59	116	57	111	59	116	21	57	111	29
Fluoranthene	206-44-0	5	NV	NV	170	2,290	65	114	60	110	65	114	21	60	110	32
Fluorene	86-73-7	5	NV	NV	170	2,660	61	106	60	99	61	106	19	60	99	30
Hexachlorobenzene	118-74-1	5	NV	1	170	3.04	62	107	58	103	62	107	20	58	103	27
Hexachlorobutadiene	87-68-3	5	NV	NV	170	12.2	38	107	49	95	38	107	30	49	95	33
Hexachlorocyclopentadiene	77-47-4	5	NV	50	170	366	19	84	36	94	19	84	35	36	94	41
Hexachloroethane	76-72-1	5	NV	NV	170	61.1	35	101	44	89	35	101	29	44	89	38
Indeno(1,2,3-cd)pyrene	193-39-5	5	NV	NV	170	6.21	61	113	57	104	61	113	20	57	104	33
Isophorone	78-59-1	5	NV	NV	170	5,120	56	111	58	97	56	111	26	58	97	30
2-Methylnaphthalene	91-57-6	5	NV	NV	170	NV	56	112	57	103	56	112	26	57	103	32
2-Nitroaniline	88-74-4	10	NV	NV	330	NV	60	109	53	106	60	109	20	53	106	29
3-Nitroaniline	99-09-2	10	NV	NV	330	NV	52	107	29	85	52	107	21	29	85	31
4-Nitroaniline	100-01-6	10	NV	NV	330	NV	59	111	49	104	59	111	21	49	104	31
Naphthalene	91-20-3	5	NV	NV	170	79.5	50	104	54	93	50	104	28	54	93	32
Nitrobenzene	98-95-3	5	NV	NV	170	22.8	52	105	53	92	52	105	28	53	92	32
N-Nitroso-di-n-propylamine	621-64-7	5	NV	NV	170	NV	51	104	49	94	51	104	28	49	94	28
N-Nitrosodiphenylamine	86-30-6	5	NV	NV	170	993	57	110	53	107	57	110	19	53	107	28
Phenanthrene	85-01-8	5	NV	NV	170	1,830	65	108	61	103	65	108	20	61	103	32
Pyrene	129-00-0	5	NV	NV	170	2,290	60	113	58	109	60	113	20	58	109	33
1,2,4-Trichlorobenzene	120-82-1	5	NV	NV	170	69.3	45	104	52	93	45	104	28	52	93	32
2-Fluorophenol (surr)	367-12-4	--	--	--	--	--	19	90	45	114	--	--	--	--	--	--
Phenol-d5 (surr)	4165-62-2	--	--	--	--	--	10	68	44	124	--	--	--	--	--	--
2,4,6-Tribromophenol (surr)	118-79-6	--	--	--	--	--	36	137	50	128	--	--	--	--	--	--
Nitrobenzene-d5 (surr)	4165-60-0	--	--	--	--	--	49	119	41	123	--	--	--	--	--	--
2-Fluorobiphenyl (surr)	321-60-8	--	--	--	--	--	45	118	46	122	--	--	--	--	--	--
Terphenyl-d14 (surr)	1718-51-0	--	--	--	--	--	46	135	45	135	--	--	--	--	--	--

Table 4-2
Summary of Laboratory QC Limits

Parameter	CAS No.	RL / Evaluation Criteria					LCS				Matrix Spike Water			Matrix Spike Soil		
		Water			Soil		Water		Soil		MS Recovery		MSD	MS Recovery		MSD
		RL	NMWQCC[1]	EPA MCL	RL	SSL[2]	LCL	UCL	LCL	UCL	LCL	UCL	RPD	LCL	UCL	RPD
TAL Metals by EPA Method 6010B/7470A/7471A		**µg/L**	**µg/L**	**µg/L**	**mg/kg**	**mg/kg**	%	%	%	%	%	%	%	%	%	%
Aluminum	7429-90-5	100	NV	NV	10	77,800	87	111	82	116	83	119	25	50	200	30
Antimony	7440-36-0	10	NV	6	1.5	31.3	88	108	82	102	81	124	25	20	200	30
Arsenic	7440-38-2	15	100	10	2	3.9	88	109	85	104	84	124	25	76	111	30
Barium	7440-39-3	10	1,000	2,000	1	15,600	92	112	87	112	85	120	25	52	159	30
Beryllium	7440-41-7	5	NV	4	0.5	156	89	113	84	114	79	121	25	72	105	30
Cadmium	7440-43-9	5	10	5	0.5	39	88	111	87	107	82	119	25	40	130	30
Calcium	7440-70-2	200	NV	NV	20	NV	90	111	82	114	48	153	25	43	165	30
Chromium	7440-47-3	10	50	100	1.5	234	90	113	84	114	73	135	25	70	200	30
Cobalt	7440-48-4	10	50	NV	1	1,520	89	111	87	108	82	119	25	72	106	30
Copper	7440-50-8	15	1,000	1,300	2	3,130	86	112	88	109	82	129	25	37	187	30
Iron	7439-89-6	100	1,000	NV	15	23,500	89	116	87	124	52	155	25	70	200	30
Lead	7439-92-1	9	50	15	0.8	400	89	109	86	107	89	121	25	70	200	30
Magnesium	7439-95-4	200	NV	NV	20	NV	92	113	90	110	62	146	25	64	145	30
Manganese	7439-96-5	10	200	NV	1	3,590	90	110	88	109	79	121	25	40	200	30
Mercury	7439-97-6	0.2	2	2	0.033	6.11	88	111	88	111	88	111	10	88	111	30
Nickel	7440-02-0	40	200	NV	4	1,560	89	111	87	108	84	120	25	61	126	30
Potassium	7440--09-7	3,000	NV	NV	300	NV	89	114	89	109	76	132	25	56	172	30
Selenium	7782-49-2	15	50	50	1.3	391	90	110	83	103	71	140	25	76	104	30
Silver	7440-22-4	10	50	NV	1	391	86	120	87	114	75	141	25	75	141	30
Sodium	7440-23-5	1,000	NV	NV	500	NV	90	117	90	112	70	203	25	78	111	30
Thallium	7440-28-0	15	NV	2	1.20	5.16	88	108	84	106	90	116	25	78	101	30
Vanadium	7440-62-2	10	NV	NV	2	78.2	91	111	88	108	85	120	25	50	169	30
Zinc	7440-66-6	20	10,000	NV	3	23,500	84	111	76	114	60	137	25	70	200	30
PCBs by EPA Method 8082		**µg/L**	**µg/L**	**µg/L**	**µg/kg**	**mg/kg**	%	%	%	%	%	%	%	%	%	%
Aroclor 1016	12674-11-2	1	1	0.5	10	3.93	61	125	71	118	53	130	30	71	118	36
Aroclor 1221	11104-28-2	1	1	0.5	10	1.12	--	--	--	--	--	--	--	--	--	--
Aroclor 1232	11141-16-5	1	1	0.5	10	1.12	--	--	--	--	--	--	--	--	--	--
Aroclor 1242	53469-21-9	1	1	0.5	10	1.12	--	--	--	--	--	--	--	--	--	--
Aroclor 1248	12672-29-6	1	1	0.5	10	1.12	--	--	--	--	--	--	--	--	--	--
Aroclor 1254	11097-69-1	1	1	0.5	10	1.12	--	--	--	--	--	--	--	--	--	--
Aroclor 1260	11096-82-5	1	1	0.5	10	1.12	63	129	65	123	58	150	30	65	123	36

Table 4-2
Summary of Laboratory QC Limits

Parameter	CAS No.	RL / Evaluation Criteria					LCS				Matrix Spike Water			Matrix Spike Soil		
		Water			Soil		Water		Soil		MS Recovery		MSD	MS Recovery		MSD
		RL	NMWQCC[1]	EPA MCL	RL	SSL[2]	LCL	UCL	LCL	UCL	LCL	UCL	RPD	LCL	UCL	RPD
TPH by EPA Method 8015B		µg/L	µg/L	µg/L	µg/kg	mg/kg	%	%	%	%	%	%	%	%	%	%
TPH-Gasoline Range Organics (C6-C10)	--	0.25	NA[3]	NV	8.3	NA[3]	63	126	66	122	67	171	31	37	142	17
4-Bromofluorobenzene (surr)	460-00-4	--	--	--	--	--	62	135	62	135	--	--	--	--	--	--
aaa-Trifluorotoluene (surr)	98-08-8	--	--	--	--	--	65	118	65	118	--	--	--	--	--	--
TPH-Diesel Range Organics (C10-C22)	--	0.25	NA[3]	NV	8.3	NA[3]	50	150	50	150	50	150	30	50	150	30
TPH-Oil Range Organics (>C22-C36)	--	0.1	NA[3]	NV	5.0	NA[3]	50	150	50	150	50	150	30	50	150	30
o-Terphenyll (surr)	84-15-1	--	--	--	--	--	57	115	57	115	--	--	--	--	--	--
Total Dissolved Solids by EPA Method 2540C		mg/L	mg/L	mg/L	mg/kg	mg/kg	%	%	%	%	%	%	%	%	%	%
Total Dissolved Solids	--	10	1,000	500 [4]	--	--	90	110	--	--	--	--	--	--	--	--

Notes:

µg/kg = Micrograms per kilogram
µg/L = Micrograms per liter
EPA = U.S. Environmental Protection Agency
LCL = Lower Control Limit
LCS = Laboratory Control Sample
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
TPH = Total Petroleum Hydrocarbons

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference
UCL = Upper Control Limit
VOCs = Volatile Organic Compounds
SVOCs = Semi-volatile Organic Compounds
TAL = Target Analyte List

PCBs = Polychlorinated bi+G4phenyls
NV = No Value
NA = Not Applicable
CAS No. = Chemical Absract Number
NMED = New Mexico Environmental Department
SSL = Soil Screening Level
MCL = Maximum Contaminant Level
NMWQCC = New Mexico Water Quality Control Commission

[1]NMWQCC Standards for Groundwater, if 10,000 mg/L TDS Concentration or Less, New Mexico Administrative Code 20.6.2.3103
[2]NMED, Technical Background Document for Development of Soil Screening Levels, Revision 4.0, June 2006 (Residential Soil)
[3]Combined TPH values (GRO/DRO/ORO) will be compared to the applicable petroleum products presented in the NMED, TPH Screening Guidelines, October 2006.
[4]EPA Secondary Drinking Water Standard

APPENDIX B

HISTORICAL DATA SUMMARIES

B-1

RCRA FACILITY ASSESSMENT

PRELIMINARY REVIEW/VISUAL SITE INSPECTION REPORT

Holloman Air Force Base
New Mexico
NM6572124422

Prepared for:

U.S. Environmental Protection Agency
Region VI
1455 Ross Avenue
Dallas, Texas 75202-2733

Prepared by:

A.T. Kearney, Inc.
Three Lagoon Drive, Suite 170
Redwood City, California 94065

and

DPRA Incorporated
245 East 6th Street, Suite 813
St. Paul, MN 55101

Contract No. 68-01-7374
Work Assignment No. R26-05-49

September 1988

SWMU 122 - Building 702 Waste Oil Tank

DESCRIPTION

Unit Type: Underground Storage Tank

Location: Located just north of the Building 702 Oil/Water Separator (SWMU 21).

Purpose of Unit: Collects oil removed from wastewater in the Building 702 Oil/Water Separator.

Period of Operation: Unknown

Dimensions/Volume: Unknown

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel
___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors _x_ Below Ground
___ In Ground ___ Above Ground
___ Less than 1000 ft to Surface Water
___ Less than 1000 feet to Drinking Water Well
___ Less than 1000 feet to Residences

Details: The size, materials of construction, and integrity of the tank are unknown.

CLOSURE INFORMATION

_x_ Active
___ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

___ Solids
_x_ Liquids
___ Gases
___ Sludges
___ Corrosive
___ Flammable
___ Reactive
_x_ Organics
___ Inorganics
___ Metals

Details: The tank receives waste oil and hydraulic fluid.

Source of Wastes: Building 702 Oil/Water Separator (SWMU 21).

Disposition of Waste: The waste liquid in the tank is removed and transferred to the DRMO Waste Storage Areas (SWMUs 75 and 76).

RELEASE CONTROLS

___ Liner
___ Level Controls
___ Leak Detection
___ Diking
___ Overflow Controls
___ Cover
___ Sewer Connection
___ Corrosion Protection

Details: Waste liquids flow by gravity into the tank from the oil/water separator. The tank is not equipped with automatic fill controls or level monitoring devices. Liquid level inspections by Holloman AFB engineers are routinely conducted and waste oil is removed on a regular interval to prevent overfills.

MONITORING

___ Monitoring Wells
___ Upgradient Wells
___ Downgradient Wells
___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air
___ Past Release to Soil/Groundwater
___ Past Release to Surface Water
___ Past Release to Subsurface Gas
___ VSI Noted Release to Air
___ VSI Noted Release to Soil/Groundwater
___ VSI Noted Release to Surface Water
___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: The tank is below ground and could not be inspected during the VSI.

Details of Past Releases: There was no evidence of past releases noted in the file information.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	___ High
Surface Water	_x_ Low	___ Medium	___ High
Subsurface Gas Generation	___ Low	___ Medium	___ High

Details of Release Potential: The potential for release to soil and groundwater and for generation of subsurface gas is unknown since the age, materials of construction, and integrity of the tank are not known.

REFERENCES: V-1

PHOTOGRAPHS: 2-5

SWMU 123 - Building 704 Waste Oil Tank

DESCRIPTION

Unit Type: Underground Tank

Location: Located adjacent to the Building 704 Oil/Water Separator (SWMU 22).

Purpose of Unit: Collects waste oil removed from wastewater in the Building 702 Oil/Water Separator (SWMU 22).

Period of Operation: Unknown

Dimensions/Volume: Unknown

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors _x_ Below Ground

___ In Ground ___ Above Ground

___ Less than 1000 ft to Surface Water

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: The size, materials of construction and integrity of the tank are not known.

CLOSURE INFORMATION

_x_ Active
___ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

___ Solids
_x_ Liquids
___ Gases
___ Sludges
___ Corrosive
___ Flammable
___ Reactive
_x_ Organics
___ Inorganics
___ Metals

Details: The unit receives waste oil and hydraulic fluid.

Source of Wastes: Building 704 Oil/Water Separator (SWMU 22).

Disposition of Waste: Waste liquid in the tank is removed and transferred to the DRMO Waste Storage Areas (SWMUs 75 and 76).

RELEASE CONTROLS

___ Liner
___ Level Controls
___ Leak Detection
___ Diking
___ Overflow Controls
___ Cover
___ Sewer Connection
___ Corrosion Protection

Details: Waste liquids flow by gravity into the tank from the oil/water separator. The tank is not equipped with automatic fill controls or level monitoring devices. Liquid level inspections by Holloman AFB engineers are routinely conducted and waste oil is removed on a regular interval to prevent overfills.

MONITORING

___ Monitoring Wells
___ Upgradient Wells
___ Downgradient Wells
___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air
___ Past Release to Soil/Groundwater
___ Past Release to Surface Water
___ Past Release to Subsurface Gas
___ VSI Noted Release to Air
___ VSI Noted Release to Soil/Groundwater
___ VSI Noted Release to Surface Water
___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: The tank is below ground and could not be inspected during the VSI.

Details of Past Releases: There was no evidence of past releases noted in the file information.

RELEASE POTENTIAL

Air	X Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	___ High
Surface Water	X Low	___ Medium	___ High
Subsurface Gas Generation	___ Low	___ Medium	___ High

Details of Release Potential: The potential for release to soil and groundwater and for generation of subsurface gas is unknown since the age, materials of construction, and integrity of the tank are not known.

REFERENCES: V-1

PHOTOGRAPHS: No photograph taken.

B-2

PHASE I RCRA FACILITY INVESTIGATION REPORT

TABLE 2 SOLID WASTE MANAGEMENT UNITS

VOLUME I

Prepared for:

49 CES/CEV
Holloman Air Force Base, NM

Prepared by:

Radian Corporation
8501 N. Mopac Blvd.
Austin, TX 78759

Under Contract No. DACA45-93-D-0027
with
U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

October 1994

4.4 SWMU 21—Building 702 Oil/Water Separator
SWMU 22—Building 704 Oil/Water Separator
SWMU 123—Building 704 Waste Oil Tank

SWMUs 123 and 22 are on Table 2 of Holloman AFB's HSWA permit. SWMU 21 is currently on Table 3 of the permit, but will be moved to Table 2 pending a Class 1 permit modification. The units were in operation from 1980 to 1991. No previous investigation has been conducted at these SWMUs. However, the SWMUs are adjacent to SWMU 54 and 55, which were initially investigated in 1988 and 1989 (*RI Report*, Walk Haydel, and Associates, Inc., 1989), and are also adjacent to IRP Site 47, which was investigated by Woodward-Clyde Consultants in 1993. For this investigation, six soil borings were drilled in the potentially affected area

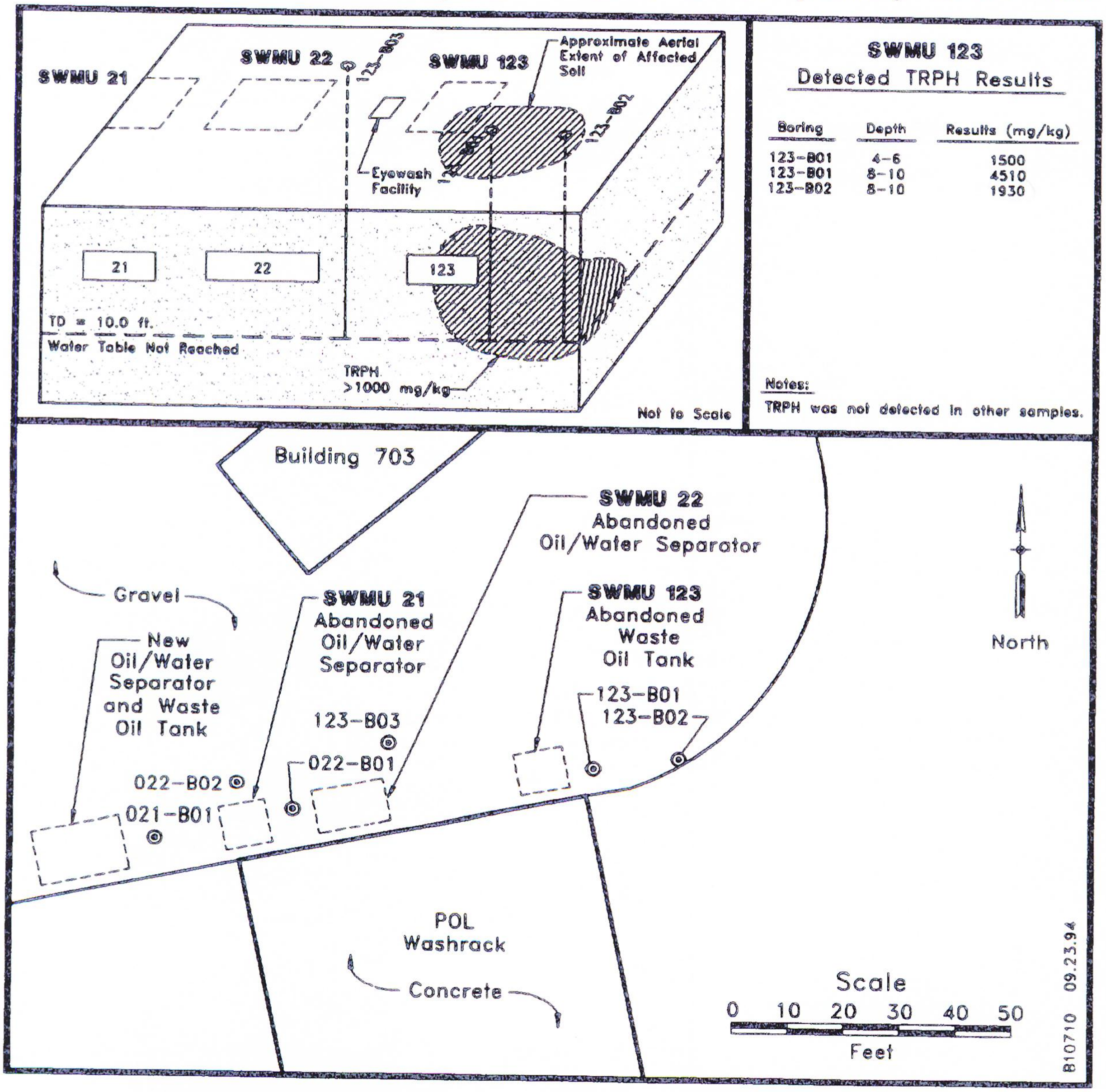


Figure 4.4-1. SWMUs 21, 22, and 123 Features and Sampling Locations

Table 4.4-1
Analytical Results for Soil Samples—SWMU 21

Location ID		021-B01		021-B01	
Sample ID		021-B01-01-01		021-B01-02-01	
Beg. Depth-End Depth (ft)		6.5-8.5		10.5-12.5	
E418.1 - Total Recoverable Petroleum Hydrocarbons (mg/kg)					
Hydrocarbons	[1000]	< DL	(33.7)	< DL	(34.5)
SW8240 - Volatile Organics (μg/kg)					
4-Methyl-2-pentanone (MIBK)	[$4x10^6$]	ND	(3.43)	2.58 BJ	(3.48)
Acetone	[$8x10^6$]	8.24 BJ	(20)	12.7 BJ	(20.3)
Methyl ethyl ketone	[$4.8x10^7$]	ND	(9.63)	6.33 BJ	(9.76)
Methylene chloride	[$9.3x10^4$]	1.04 J	(2.84)	1.02 J	(2.88)
Trichloroethene	[NS]	2.34 J	(4.34)	ND	(4.4)
SW6010 - Metals (mg/kg)					
Barium	[84.36,5600]	17.5	(0.0539)	38.2	(0.0532)
Chromium	[$6.6,8x10^4$]	3.68 B	(0.254)	4.97 B	(0.251)
Silver	[0.73,400]	0.645	(0.17)	< DL	(0.168)
SW7060 - Arsenic (mg/kg)					
Arsenic	[6.88,24]	1.37	(0.833)	< DL	(0.731)
SW7421 - Lead (mg/kg)					
Lead	[12.3,500]	1.76 S	(0.0843)	0.265 S	(0.0741)
SW7740 - Selenium (mg/kg)					
Selenium	[10.53,400]	3.81	(0.298)	4.18	(0.261)

Note: The UTLs and the trigger criteria are presented, respectively, in brackets [ ]; [ ] = trigger criteria for organics; [,] = UTL, trigger criteria for inorganics.

( ) = Detection limit.
B = Analyte detected in associated blank analyses.
DL = Detection limit.
J = Estimated concentration, analyte detected at concentration below the detection limit.
ND = Not detected.
NS = Not specified.
S = Analyte concentration obtained using the MSA.

Table 4.4-2
Analytical Results for Soil Samples—SWMU 22

Location ID		022-B01		022-B01		022-B02		022-B02	
Sample ID		022-B01-01-01		022-B01-02-01		022-B02-01-01		022-B02-02-01	
Beg. Depth-End Depth (ft)		6-8		10.5-12.5		6-8		10.5-12.5	
E418.1 - Total Recoverable Petroleum Hydrocarbons (mg/kg)									
Hydrocarbons	[1000]	< DL	(33.3)	< DL	(33.2)	< DL	(32.9)	< DL	(34.5)
SW8240 - Volatile Organics (µg/kg)									
2-Hexanone	[NS]	3.7 BJ	(7.6)	ND	(7.49)	ND	(7.46)	ND	(7.86)
4-Methyl-2-pentanone (MIBK)	[$4x10^6$]	2.91 BJ	(3.39)	ND	(3.34)	ND	(3.32)	ND	(3.5)
Acetone	[$8x10^6$]	147	(19.7)	166	(19.4)	7.97 BJ	(19.4)	515	(49.8)
Methyl ethyl ketone	[$4.8x10^7$]	4.95 BJ	(9.49)	8.01 BJ	(9.36)	ND	(9.32)	ND	(9.82)
Methylene chloride	[$9.3x10^4$]	1.01 J	(2.8)	1.49 J	(2.76)	0.815 J	(2.75)	1.1 J	(2.9)
Trichloroethene	[NS]	ND	(4.28)	2.75 J	(4.22)	ND	(4.2)	2.65 J	(4.43)
Xylene (total)	[$1.6x10^8$]	ND	(6)	0.774 J	(5.91)	ND	(5.89)	ND	(6.21)
SW6010 - Metals (mg/kg)									
Barium	[84.36,5600]	59.4	(0.0618)	23.4	(0.0538)	37.7	(0.0482)	23.5	(0.0464)
Chromium	[$6.6,8x10^4$]	7.23 B	(0.291)	4.17 B	(0.254)	5.93 B	(0.227)	3.08 B	(0.219)
Silver	[0.73,400]	< DL	(0.195)	0.2	(0.17)	< DL	(0.152)	0.451	(0.147)
SW7060 - Arsenic (mg/kg)									
Arsenic	[6.88,24]	1.51	(0.804)	< DL	(0.79)	4.26	(0.665)	< DL	(0.773)
SW7421 - Lead (mg/kg)									
Lead	[12.3,500]	2.77 S	(0.0814)	0.863 S	(0.08)	4.01 S	(0.135)	0.248 S	(0.0783)
SW7740 - Selenium (mg/kg)									
Selenium	[10.53,400]	4.64	(0.287)	3.52	(0.282)	3.97	(0.238)	3.84	(0.276)

Note: The UTLs and the trigger criteria are presented, respectively, in brackets [ ]; [ ] = trigger criteria for organics; [,] = UTL, trigger criteria for inorganics.

( ) = Detection limit.
B = Analyte detected in associated blank analyses.
DL = Detection limit.
J = Estimated concentration, analyte detected at concentration below the detection limit.
ND = Not detected.
NS = Not specified.
S = Analyte concentration obtained using the MSA.

Table 4.4-3
Analytical Results for Soil Samples—SWMU 123

Location ID	123-B01		123-B01		123-B02		123-B02		123-B03		123-B03	
Sample ID	123-B01-01-01		123-B01-02-01		123-B02-01-01		123-B02-02-01		123-B03-01-01		123-B03-02-01	
Beg. Depth-End Depth (ft)	4-6		8-10		4-6		8-10		6-8		10-12	
E418.1 - Total Recoverable Petroleum Hydrocarbons (mg/kg)												
Hydrocarbons [1000]	1500	(32.1)	4510	(68.5)	< DL	(31.9)	1930	(36)	< DL	(32.4)	< DL	(34.6)
SW8240 - Volatile Organics (ug/kg)												
1,1-Dichloroethene [$1.16X10^4$]	464 J	(833)	7210 J	(8930)	ND	(3.47)	569 J	(747)	ND	(3.1)	ND	(3.31)
Acetone [$8x10^6$]	ND	(1330)	ND	(14300)	778	(144)	ND	(1190)	124	(19.1)	28.8 B	(20.4)
Benzene [$2.4x10^4$]	742 J	(1150)	54000	(12300)	ND	(1.91)	12800	(1030)	ND	(1.3)	ND	(1.39)
Carbon disulfide [$8x10^6$]	ND	(1080)	ND	(11600)	13.2	(5.09)	ND	(967)	ND	(3.46)	ND	(3.69)
Ethyl benzene [$8x10^6$]	20500	(762)	229000	(8180)	ND	(2.01)	36800	(684)	ND	(1.25)	ND	(1.34)
Methylene Chloride [$9.3x10^4$]	ND	(1280)	ND	(13800)	ND	(1.75)	ND	(1150)	0.894 J	(2.71)	0.875 J	(2.89)
Toluene [$1.6x10^7$]	2280	(479)	345000	(5130)	ND	(1.89)	36300	(429)	ND	(2.58)	ND	(2.76)
Xylene (total) [$1.6x10^8$]	14600	(1490)	363000	(15900)	ND	(4.09)	66000	(1330)	ND	(5.81)	ND	(6.2)
SW8270 - Semivolatile Organics (ug/g)												
2-Methylnaphthalene [NS]	3.11	(0.859)	4.38	(0.951)	ND	(0.092)	1.43	(0.991)	ND	(0.0252)	ND	(0.027)
Dibenzofuran [NS]	ND	(0.655)	0.471 J	(0.725)	ND	(0.0702)	ND	(0.756)	ND	(0.0241)	ND	(0.0257)
Naphthalene [NS]	0.402 J	(0.747)	ND	(0.827)	ND	(0.08)	ND	(0.862)	ND	(0.0335)	ND	(0.0359)
SW6010 - Metals (mg/kg)												
Barium [84.36,5600]	76	(0.042)	28	(0.061)	31.3	(0.05)	32.1	(0.0485)	48.7	(0.0581)	29	(0.052)
Chromium [$6.6,8x10^4$]	21.1	(0.198)	6.18 B	(0.288)	7.46 B	(0.236)	4.08 B	(0.229)	7.23 B	(0.274)	2.63 B	(0.245)
Silver [0.73,400]	< DL	(0.133)	0.587 B	(0.193)	< DL	(0.158)	0.369 B	(0.153)	< DL	(0.184)	0.463	(0.164)
SW7060 - Arsenic (mg/kg)												
Arsenic [6.88,24]	1.75 B	(0.586)	< DL	(0.717)	0.923 B	(0.682)	< DL	(0.774)	3.15	(0.726)	< DL	(0.896)
SW7421 - Lead (mg/kg)												
Lead [12.3,500]	76.8 S	(1.52)	2.99 S	(0.0746)	3.42 S	(0.0738)	1.94 SB	(0.0659)	4.17 S	(0.147)	4.22 S	(0.0907)
SW7471 - Mercury (mg/kg)												
Mercury [NS]	0.0192 B	(0.0154)	0.0411 B	(0.0164)	< DL	(0.0154)	0.0326 B	(0.0174)	< DL	(0.0156)	< DL	(0.0167)
SW7740 - Selenium (mg/kg)												
Selenium [10.53,400]	< DL	(0.21)	< DL	(0.256)	< DL	(0.244)	0.38	(0.277)	3.58	(0.259)	4.29	(0.32)

Table 4.4-3 (Continued)

Note: The UTLs and the trigger criteria are presented, respectively, in brackets [ ]; [ ] = trigger criteria for organics; [,] = UTL, trigger criteria for inorganics.

Results greater than trigger criteria are shaded.
( ) = Detection limit.
B = Analyte also detected in laboratory method blank.
DL = Detection limit.
J = Estimated concentration, analyte detected at concentration below the detection limit.
ND = Not detected.
NS = Not specified.
S = Analyte concentration obtained using the Method of Standard Additions (MSA).

DRILLING LOG

1. COMPANY NAME Radian Corporation	2. DRILLING SUBCONTRACTOR Southwest Engineering, Inc.	HOLE NO. 123-B01 SHEET 1 OF 1 SHEETS
3. PROJECT Table 2 - RFI	4. LOCATION Holloman AFB	
5. NAME OF DRILLER Alex Sanchez	6. MANUFACTURERS DESIGNATION OF DRILL CME 55	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT Hollow Stem Auger 3.75" ID; 8.0" OD Split spoon (ASTM D1586-84) 3" ID/2" ID 140 lb. drop-hammer	8. HOLE LOCATION Easting=673441.13; Northing=554953.33 9. SURFACE ELEVATION 10. DATE STARTED 11/19/93 11. DATE COMPLETED 11/19/93	
12. OVERBURDEN THICKNESS NA	15. DEPTH GROUNDWATER ENCOUNTERED NONE	
13. DEPTH DRILLED INTO ROCK NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED NA	
14. TOTAL DEPTH OF HOLE 10.00 ft.	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES		
No			NA		
20. SAMPLES FOR CHEMICAL ANALYSIS	SW8240	Metals			21. TOTAL CORE REC.
Yes	SW8270	E418.1			NA
22. DISPOSITION OF HOLE	GROUTED	MONITORING WELL	OTHERS (SPECIFY)	23. SIGNATURE OF INSPECTOR	
Vertical	Grout			David R. Robbins	

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
	0		SILTY SAND (SM): dark brown (7.5YR 3/3), fine grained, with fine gravel, dry, nonplastic, loose. Strong grayish black staining, strong petroleum odor		>9000	3/0/1/3	
	2				>9000	1/1/1/1	
	4		SILTY SAND (SM): yellow (10YR 7/8), fine grained, with strong blackish gray staining, strong petroleum odor, wet, nonplastic, medium dense.		>9000	1/3/6/14	123-B01-01-01
	6				>9000	3/8/10/20	
	8		Total Depth = 10.0 ft.		>9000	3/8/20/17	123-B01-02-01
	10						

DRILLING LOG

HOLE NO.	123-B02
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
SHEET 1	OF 1 SHEETS
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger 3.75" ID; 8.0" OD Split spoon (ASTM D1586-84) 3" ID/2" ID 140 lb. drop-hammer
8. HOLE LOCATION	Easting=673444.16; Northing=554968.50
9. SURFACE ELEVATION	
10. DATE STARTED	11/19/93
11. DATE COMPLETED	11/19/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	NONE
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	10.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes: SW8240 Metals; SW8270 E418.1
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
	0		SILTY SAND (SM): dark brown (7.5YR 3/3), fine grained, moist, nonplastic, medium dense.				
			SILTY SAND (SM): reddish yellow (7.5YR 6/6), fine grained, moist, nonplastic, medium dense.	0.0	0.0	6/5/5/5	
	2			0.0	0.0	8/14/14/9	
	4		POORLY GRADED SAND (SP): red (2.5YR 4/6), fine grained, with fine gypsum crystals, moist, nonplastic, medium dense.	56.2	160.5		123-B02-01-01
			Blackish gray staining, moderate petroleum odor.				
	6			65.2	1225.0		
	8		CLAYEY SAND (SC): fine grained, with blackish gray staining, strong petroleum odor, moist, nonplastic.		>9000		123-B02-02-01
	10		Total Depth = 10.0 ft.				

B-3

CLOSURE REPORT FOR
REMEDIATION OF POL - CONTAMINATED SITES
AND OIL/WATER SEPARATOR REMOVALS
HOLLOMAN AIR FORCE BASE, NEW MEXICO
JULY - NOVEMBER 1995

Prepared for:

49 CES/CEV
Holloman Air Force Base, New Mexico

AND

HQ ACC/ESVR
Langley Air Force Base, Virginia

Prepared by:

EBASCO Services, Inc., dba
Foster Wheeler Environmental Corporation
143 Union Blvd., Suite 1010
Lakewood, Colorado 80228-1824

and

Groundwater Technology
Government Services, Inc.
2501 Yale Blvd., S.E.
Albuquerque, New Mexico 87106

Under Contract No. DACW-45-94 D0003
Delivery Order 6, Work Authorization Directive 13 and
Delivery Order 8, Work Authorization Directive 33

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

November 1995

TABLE 13-1
CHRONOLOGY OF ACTIVITIES DURING WASTE OIL TANK INVESTIGATION AND SITE RECLAMATION AT SWMU 123 - POL WASH RACK - BUILDING 704 HOLLOMAN AFB, NEW MEXICO

DATE	ACTIVITY	NOTES
17 AUG 95	- Mobilized personnel and equipment. - Started building bermed soil storage cell, lined with 40 mil plastic tarp. - Excavated approx. 50 CY of PCS. - Screened soils; range 43-1094 ppm. - Collected 4 sidewall and 1 bottom verification soil samples from the excavation.	No waste oil tank was discovered in area given in the plans during excavation activities. EBASCO, instructed GSI to collect verification samples and backfill the excavation despite soil screening levels above 1,000 ppm on 3 sides of the excavation.
18 AUG 95	- Backfilled (1st time) excavation with gravel up to 5' bgs and native soil to grade. - Re-excavated gravel and soil backfill. - Completed building soil storage cell.	EBASCO instructed GSI to excavate backfill. Adequate compaction of the final backfill from 7.5 to 5 ft. bgs could not be assured since workmen are not permitted in excavations deeper than 5 ft. bgs.
21 AUG 95	- Backfilled (2nd time) excavation with mixed gravel and native soil to grade. - Restore site and mobilize to SWMU 3.	

TABLE 13-2
SUMMARY OF NATIVE SOIL CONFIRMATION ANALYTICAL RESULTS AT SWMU 123 - BUILDING 704 HOLLOMAN AFB, NEW MEXICO

Sample No. SWMU-123-	-1-7	-2-7	-3-7	-4-7	-5-7
Sample Location	SE Corner	SW Corner	NE Corner	NW Corner	Center
Date Sampled	8/17/95	8/17/95	8/17/95	8/17/95	8/17/95
TRPH by 418.1 (mg/kg)	7,400	4,600	23	36	89
BTEX by 8021A					
Benzene (mg/kg)	39	5.1	<0.05	<0.05	<0.05
Toluene (mg/kg)	10	35	<0.10	<0.10	<0.10
Ethylbenzene (mg/kg)	32	81	<0.10	<0.10	<0.10
Xylenes (mg/kg)	140	140	<0.10	<0.10	<0.10

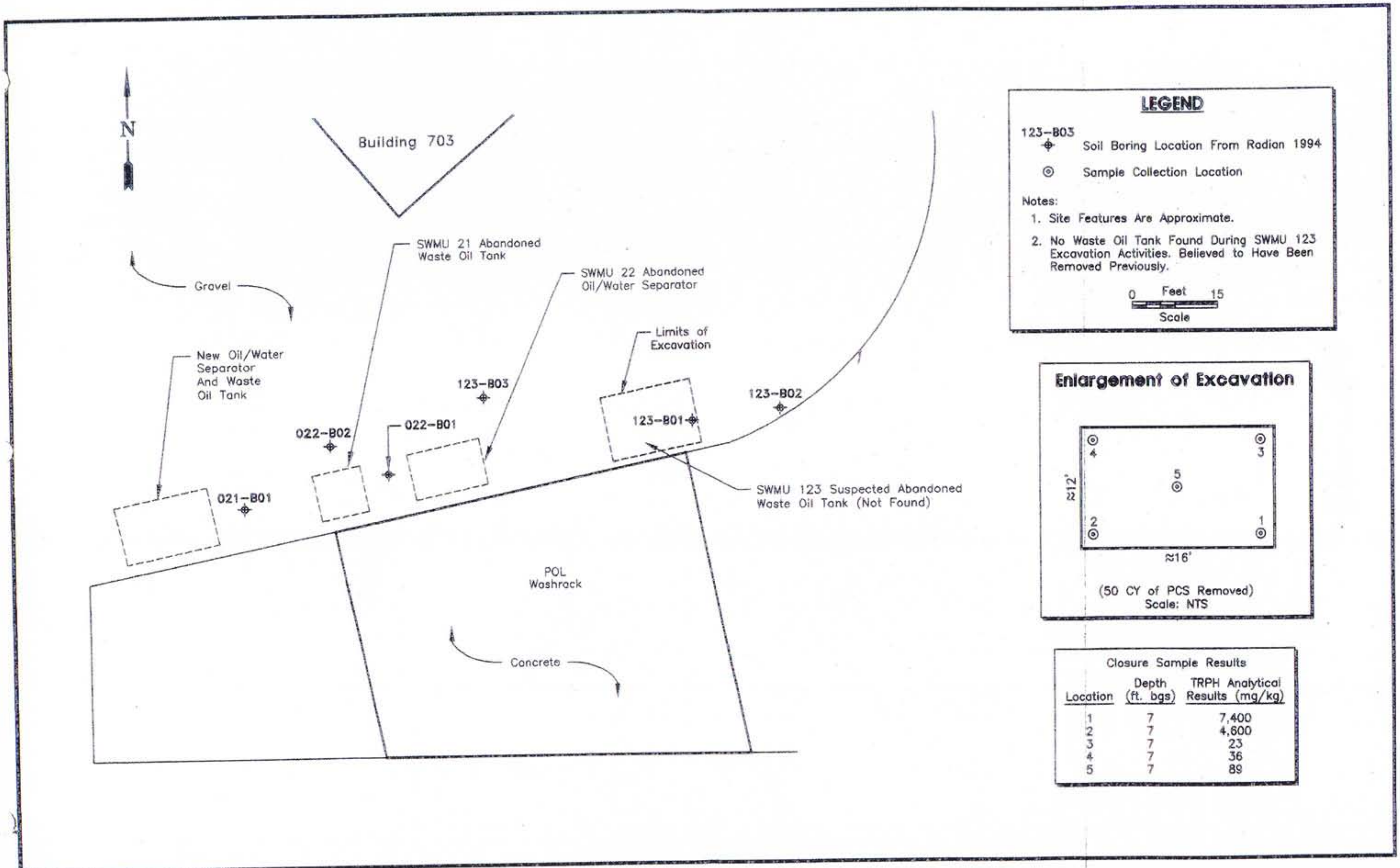
Notes:

< = Constituent not detected above laboratory quantitation limit

TABLE 13-3
SUMMARY OF STOCKPILE SOIL ANALYTICAL RESULTS WITH DUPLICATES AT SWMU 123 - BUILDING 704
HOLLOMAN AFB, NEW MEXICO
SEPTEMBER 1995

Sample No. SWMU-123	-SP (original) - -SP-DP (duplicate)		
Sample Type	Composite		
Date Sampled	8/22/95		
Results	Original	Duplicate	RPD
TRPH by 418.1 (mg/kg)	440	160	93%
Aromatic Volatiles by 8021A (mg/kg)			
Benzene	0.20	0.18	11
Toluene	<0.10	<0.10	0
Ethylbenzene	0.99	0.95	4.1
Xylenes	1.0	0.86	15
BTEX Total	2.2	2.0	9.5
TPH as Gasoline	270	260	3.7
Lead by 7421 (mg/kg)	21	22	4.6
Miscellaneous Waste Characterization Analysis			
Closed Cup Flashpoint by ASTM D-93 (°F)	>200	>200	0
Paint Filter by EPA 9095	No Liquids	No Liquids	NA
pH by EPA 9045A	7.3	7.2	1.4
Total Cyanide by EPA 9010A (mg/kg)	<2.0	<2.0	0
Reactivity Sulfide by SW 846 7.3.4.2 (mg/kg)	<25	<25	0

Notes: RPD = Relative Percent Difference
< = Constituents not detected above laboratory quantitiation limit
NA = Not Analayzed



Closure Sample Results

Location	Depth (ft. bgs)	TRPH Analytical Results (mg/kg)
1	7	7,400
2	7	4,600
3	7	23
4	7	36
5	7	89

B10710 (1:15)

Figure 13-1: Site Map
SWMU 123, Building 704 Waste Oil Tank

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

3. Generator's Name and Mailing Address: Holloman Air Force Base
Holloman Air Force Base, NM

Contract No.
DACW45-94-D-003/006

4. Generator's Phone (   )

5. Transporter 1 Company Name: [illegible] Environmental Services

6. US EPA ID Number: [illegible]

SWMU#123

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address: [illegible] Environmental Services -- [illegible]
1 mile North of Newman, NM
Newman, NM

10. US EPA ID Number

A. Transporter's Phone 505-392-4[illegible]

B. Transporter's Phone

C. Facility's Phone 505-392-4[illegible]

11. Waste Shipping Name and Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: WARREN NEFF — Signature: Warren Neff — Month Day Year: [illegible]

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: [illegible] — Signature: [illegible] — Month Day Year: [illegible] 04 [illegible]

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name — Signature — Month Day Year

GENERATOR / TRANSPORTER / FACILITY

GENERATOR'S COPY

[redacted] STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHL...

Vehicle Identification 540 112

Name of Shipper ____

Origin of Shipment ____ Destination of Shipment ____

7150

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all accessory pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed ____ Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER
ON ☐ OFF ☐

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE ____ B/L No. ____ (Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

3. Generator's Name and Mailing Address
Holloman Air Force Base
Holloman Air Force Base, NM

Contract No.
DACW45-94-D-003/006

4. Generator's Phone (   )

5. Transporter 1 Company Name
Rhino Environmental Services

6. US EPA ID Number
N/A

SWMU #123

7. Transporter 2 Company Name

8. US EPA ID Number

SWMU #129

9. Designated Facility Name and Site Address
Rhino Environmental Services--DP-994
1 mile North of Newman, NM
Newman, NM

10. US EPA ID Number

A. Transporter's Phone

B. Transporter's Phone 505-392-44[illegible]

C. Facility's Phone 505-392-48[illegible]

11. Waste Shipping Name and Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
Warren Neff	Warren Neff	[illegible]	[illegible]	[illegible]

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year

GENERATOR'S COPY

No. [redacted]

STATE CERTIFICATE OF WEIGHTS AND MEASURES,

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHino

Vehicle Identification 550 111

Name of Shipper

Origin of Shipment Destination of Shipment

70410

lbs. Gross Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE - MC - 19 AS AMENDED EFFECTIVE JUNE 1, 1970

Signed [signature] Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER

ON ☐ OFF ☒

500

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 10-4-95 B/L No. ________ (Driver's Signature)

B-4

FILE 17-G
j.m.

GROUNDWATER
TECHNOLOGY
GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
2501 Yale Boulevard SE, Suite 204 Albuquerque, NM 87106 USA
Tel: (505) 242-3113 Fax: (505) 242-1103

February 29, 1996

Job No. 830012211.01.030

Mr. Mark Mercier
Omaha District
U.S. Army Corps of Engineers
ATTN: CEMRO-ED-EA
215 North 17th Street
Omaha, Nebraska 68102

Re: ADDITIONAL CHARACTERIZATION OF POL-CONTAMINATED SITES SWMU-3, SWMU-8, SWMU-36, SWMU-123 AND OT-44 HOLLOMAN AIR FORCE BASE, NEW MEXICO
Delivery Order 11 Work Authorization Directive 1
Under Contract No. DACW45-94-D-0003

Dear Mr. Mercier:

Introduction

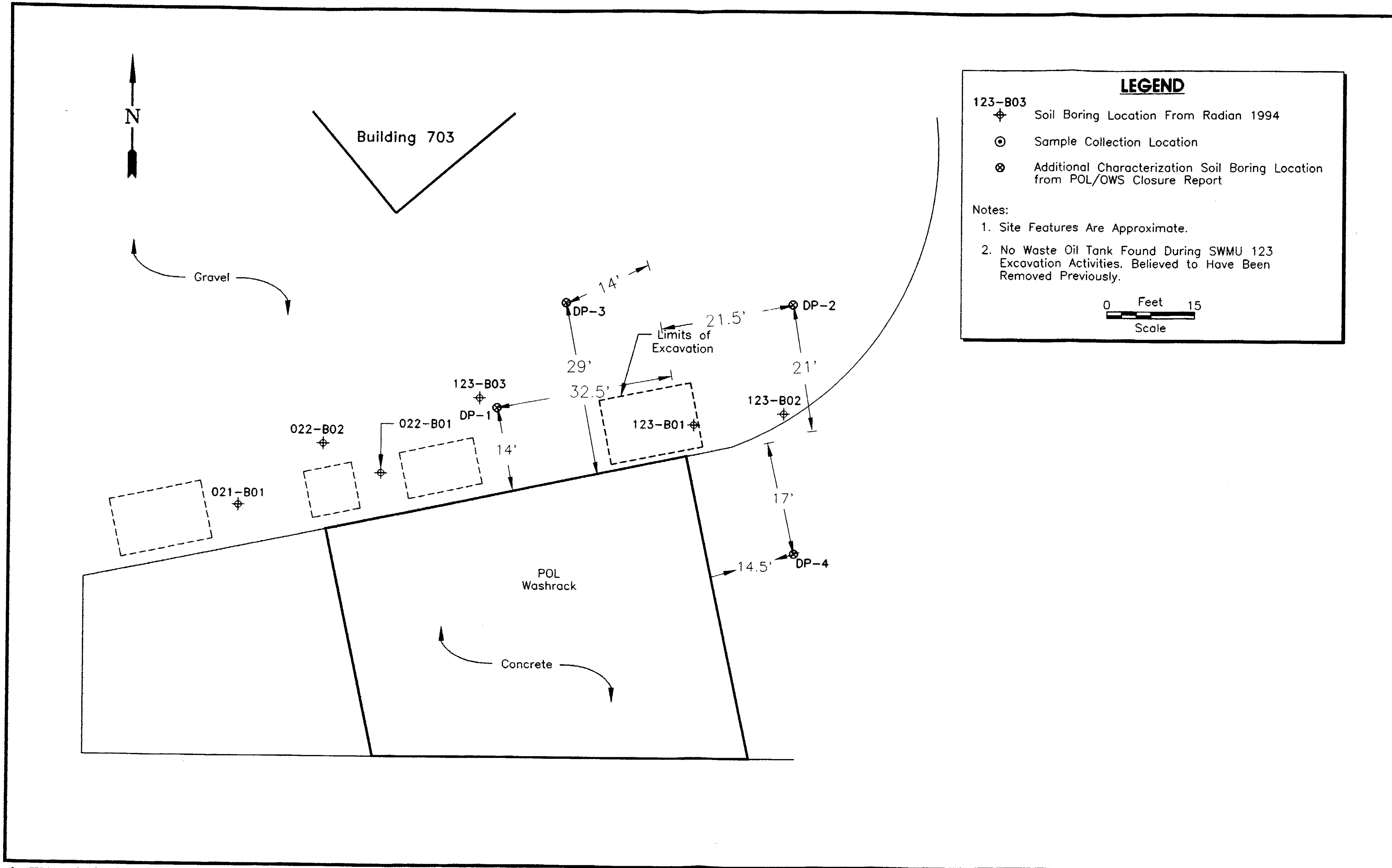
Additional characterization to support remedial design efforts for four Solid Waste Management Unit Sites (SWMUs) and one Installation Restoration Program (IRP) site was conducted between January 29, 1996 and February 2, 1996. The characterization was performed to determine the extent of soil in excess of 1,000 parts per million (ppm) at these sites. To accomplish this, soil samples were collected and analyzed at SWMU 3, SWMU 8, SWMU 36, SWMU 123, and Site OT-44 (AOC-P). Figure 1 is a map of the base indicating the locations of the five sites.

Soil samples were collected from each site using a direct push technology (DPT) soil sampling device, field screened for volatile organics constituents, and analyzed for total petroleum hydrocarbons (TPH) (gasoline and diesel range), total recoverable petroleum hydrocarbons (TRPH), and benzene, toluene, ethylbenzene and xylenes (BTEX). These data will be used to determine the approximate mass of petroleum-contaminated soil

TABLE 5
SUMMARY OF SOIL ANALYTICAL RESULTS
SWMU 123 BUILDING 704 OWS
HOLLOMAN AFB, NM
Delivery Order 11 Work Authorization Directive 1
February, 1996

SAMPLE NO. AND DEPTH (FEET)	SWMU-123-DP-1-8 (8' TO 9')	SWMU-123-DP-1-8-11 (11' TO 12')	SWMU-123-DP-3-6 (6' TO 7')	SWMU-123-DP-3-10 (10' TO 11')	SWMU-123-DP-4-7 (7' TO 8')	SWMU-123-DP-4-9 (9' TO 10')
PARAMETER						
Method 8015 TPH as Gasoline (mg/kg)	0.3J	0.7J	<10	<10	<10	202
Method 8015 TPH as Diesel (mg/kg)	<10	<10	<10	<10	<10	19
Method 418.1 TRPH (mg/kg)	<20	<20	<20	<20	76	114
Method 8020 (ug/kg)						
Benzene	<50	<50	<50	<50	<50	<400
Toluene	<100	<100	<100	<100	<100	<400
Ethylbenzene	<100	<100	<100	<100	<100	1300
Xylenes	<200	<200	<200	<200	800	2090
Total BTEX	--	--	--	--	800	3390

< = constituent not detected



2-4FEB96, 2/29/96 (1:15)

Figure 5: Site Map
SWMU 123, Building 704 Waste Oil Tank and Additional Characterization Sampling Locations.

HTRW DRILLING LOG

DISTRICT: SW		HOLE NUMBER: DP-1
1. COMPANY NAME: GTI-GSI	2. DRILL SUBCONTRACTOR: TEG	SHEET 1 OF SHEETS
3. PROJECT: DO 11 WAD1 8300122 11.01020	4. LOCATION: SWMU ~~3~~-123 Building 704 Holloman AFB	
5. NAME OF DRILLER: Kevin Vanderhey	6. MANUFACTURER'S DESIGNATION OF DRILL: Strataprobe	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" split spoon push rod	8. HOLE LOCATION: DP-1 See Below	
	9. SURFACE ELEVATION: —	
	10. DATE STARTED: 1/30/96	11. DATE COMPLETED: 1/30/96
12. OVERBURDEN THICKNESS: —	15. DEPTH GROUNDWATER ENCOUNTERED: 12'	
13. DEPTH DRILLED INTO ROCK: —	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14. TOTAL DEPTH OF HOLE: ~~12~~ 14'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

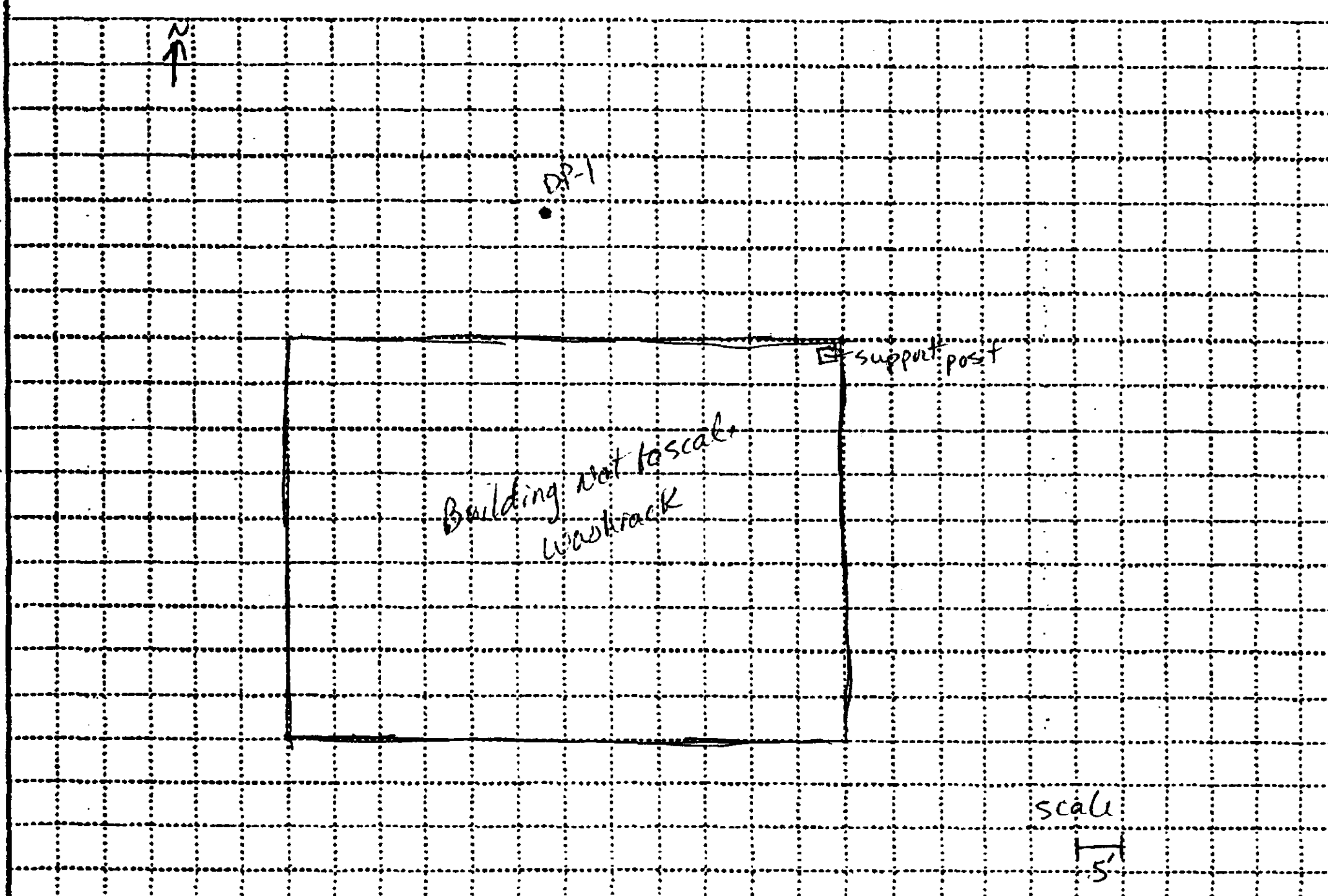
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	2	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
—	Bentonite	—	—	Tim Leiwalk

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT: DO 11 WAP1 8300122 11.01020

HOLE NO. DP-1

ENG FORM 5056-R, AUG 94

(Proponent: CECW-EG)

SWMU 123

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER
DP-1

PROJECT	INSPECTOR	SHEET	SHEETS
DO 11 WAD 1 830012211.01020	Tim Lewallen	2 OF	

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
0		Red Brown (5YR 4/3) Fine SAND some silt, trace clay trace gravel (dry, No odors) $CaCO_3$ present	0 ppm	—		soft	Recov 2'10"
1							
2		pink white (5YR 8/2) Fine SAND, some silt, trace clay (moist, No odors) $CaCO_3$ - gypsum	0 ppm	—		medium	
3		Pink (5YR 7/4) Fine SAND some silt. (moist, No odors) $CaCO_3$ - gypsum	0 ppm 0 ppm	—		~~medium~~ soft	Recov 2'
4							
5		yellow Red (5YR 4/6) Fine SAND and SILT, trace clay, (damp) No odors $CaCO_3$ - gypsum	0 ppm 0 ppm	—		medium	
6		yellow Red (5YR 4/6) Fine SAND and SILT, trace clay (moist) No odors $CaCO_3$ - gypsum	0 ppm 0 ppm	—		medium	Recov 2'8"
7		white (5YR 8/1) Fine SAND some silt, trace clay (moist) No odors $CaCO_3$ - gypsum	0 ppm	—	SM123-1-8	Hard	
8							
9		TL Disregard line	0 ppm			Hard	Recov. 2'8"
		white (5YR 8/1) Fine SAND some silt, trace clay (damp) No odors $CaCO_3$-gypsum		—			
10			0.0 ppm				

PROJECT	HOLE NO.
DO 11 WAD 1 830012211.01020	DP-1

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

TOTAL P.06

SWMU 123

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER: DP-1

PROJECT: POII WADI 830012211.01020

INSPECTOR: [illegible signature]

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
10		Changes color to Redyellow (5YR 7/6) content same as above (moist) no odors $CaCO_3$-gypsum				very hard	
11			0.0 ppm	—	SW123 -1-11		
		▽ water					
12		Redyellow (5YR 7/6) Fine SAND some silt, trace clay (wet) no odors $CaCO_3$-gypsum	0.0 ppm			very hard	Recov - 2'
13		turns (moist) and color changes to white (5YR 8/1) soil content same as above	0.0 ppm				
14			0.0 ppm				
		Bottom of hole Bentonite to surface					

PROJECT: POII WADI 830012211.01020

HOLE NO. DP-1

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

TOTAL P.06

SWMU 123-POL

HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT: SW	HOLE NUMBER: DP-4
1. COMPANY NAME: GTI-GSI	2. DRILL SUBCONTRACTOR: TEG	SHEET 1 OF 2 SHEETS

3. PROJECT: DO11 WAD1 830012211.01020	4. LOCATION: SWMU-123-POL Holloman AFB
5. NAME OF DRILLER: Kevin Vandriheu	6. MANUFACTURER'S DESIGNATION OF DRILL: Stratoprobe
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" splitspoon pushed	8. HOLE LOCATION: DP-4 see below
	9. SURFACE ELEVATION: —
	10. DATE STARTED: 1/31/96 / 11. DATE COMPLETED: 1/31/96
12. OVERBURDEN THICKNESS: —	15. DEPTH GROUNDWATER ENCOUNTERED: 10.5'
13. DEPTH DRILLED INTO ROCK: —	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 14'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

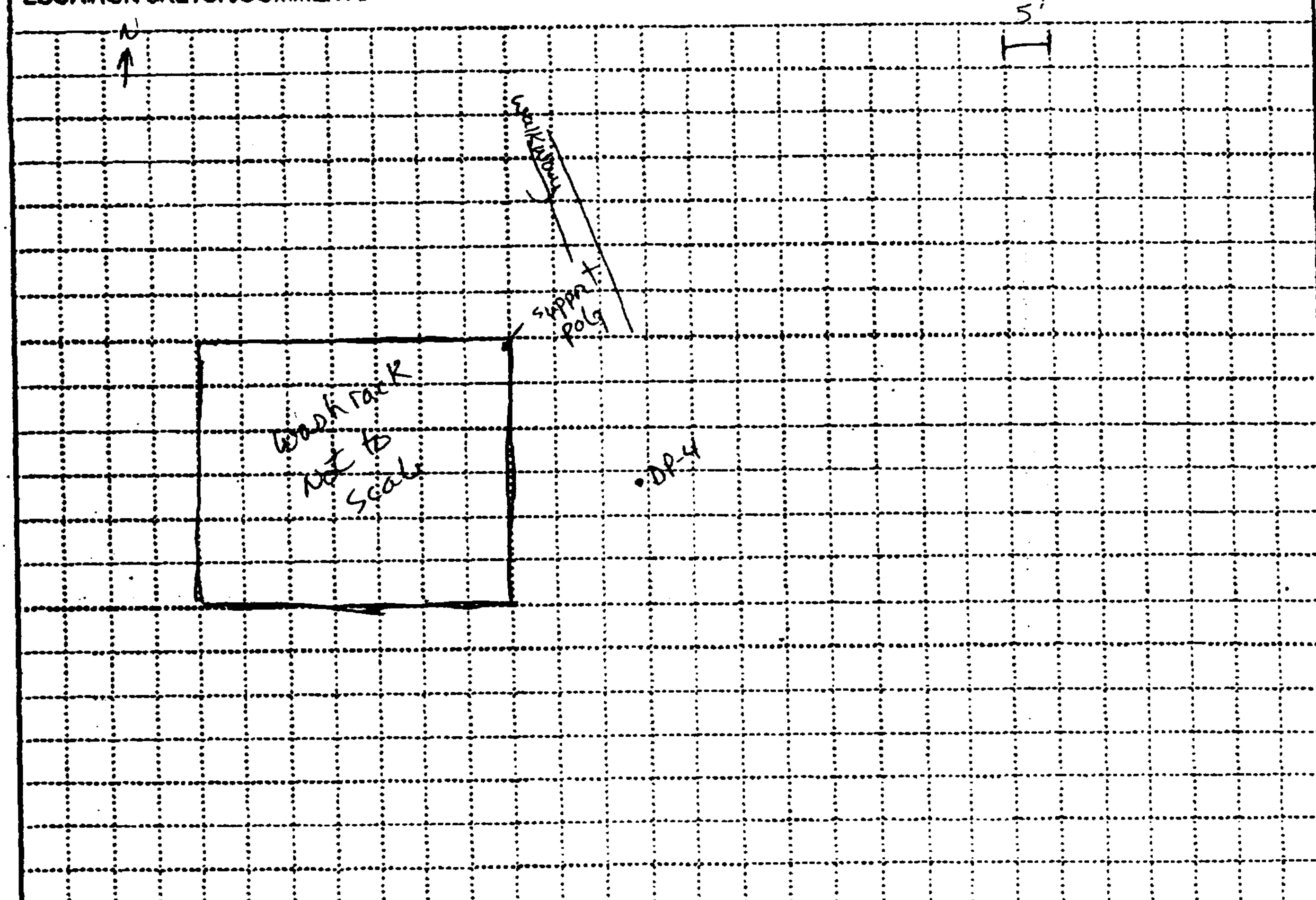
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	2	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
—	Bentonite		—	Jim Kiwall

LOCATION SKETCH/COMMENTS

SCALE: 5'



PROJECT	HOLE NO.
DO11 WAD1 830012211.01020	DP-4

SWMU-123

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: DP-4

PROJECT: DO11 WADI - 830012211.01020

INSPECTOR: Tim Lewallen

SHEET 2 OF 2 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
0, 1		Weak Red (2.5YR 5/3) Fine SAND trace silt, trace gravel. (dry, No odors) CaCO3 present - gypsum	0ppm	—		Soft	Recov 2'8"
2, 3		Pink (2.5YR 8/3) Fine SAND, Little silt, trace clay. (dry) (No odors) CaCO3 present - gypsum	0ppm, 0ppm	—		Soft	
4		Pink (2.5YR 8/3) Fine SAND Little silt, trace clay. (dry, No odors) CaCO3 present gypsum	0ppm	—		Soft	Recov 2'8"
5, 6		Weak Red (2.5YR 5/4) Fine SAND, Little silt, trace clay (dry, No odors) No CaCO3 - gypsum	0ppm, 0ppm	—		Soft	
7		Weak Red (2.5YR 5/4) Fine SAND Little silt, trace clay (dry, No odors) No CaCO3 gypsum	0ppm	—	SM123-4-7	~~Soft~~ medium	Recov 3'
8		Pink white (2.5YR 8/2) Fine SAND Little silt (dry, No odors) CaCO3 present - gypsum	0.9ppm	—		medium	
9		Light gray (2.5YR 7/1) Fine SAND Little silt, trace clay (moist) TPH odor, CaCO3 present - gypsum	3000ppm	—	SM123-4-9	Hard	
10, 11	water	~~Light~~ Gray (2.5YR 6/1) Fine sand Little silt, trace clay. (damp, TPH odor) No CaCO3 - gypsum	3ppm, 7ppm	—		Hard	Recov 3'
12		Light Gray (2.5YR 7/1) same as above	25ppm	—		Hard	
		Same as above		—		Hard	Recov 2'
13		Pink (2.5YR 8/3) Fine SAND, Little silt (wet) No odors CaCO3 present gypsum	3.4ppm	—		Hard	
14		Strong Brown (2.5YR 5/6) Fine SAND Little silt, trace clay, (moist, No odors) No CaCO3 present - gypsum	0.3ppm	—		Hard	

Bottom of Hole
Bentonite & water
to surface
Jet set

PROJECT: DO11 WADI 830012211.0102

HOLE NO. DP-4

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

TOTAL P.06

HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT: SW	HOLE NUMBER: DP-2
1. COMPANY NAME: GTI-GSI	2. DRILL SUBCONTRACTOR: TEG	SHEET 1 OF 2 SHEETS
3. PROJECT: DO11WAD1 830012211.01020	4. LOCATION: SWMU123 - POL Holloman AFB	
5. NAME OF DRILLER: Kevin Vanderhey	6. MANUFACTURER'S DESIGNATION OF DRILL: Strataprobe	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" split spoon push Rod	8. HOLE LOCATION: DP-2 See below	
	9. SURFACE ELEVATION: —	
	10. DATE STARTED: 1/31/96	11. DATE COMPLETED: 1/31/96
12. OVERBURDEN THICKNESS: —	15. DEPTH GROUNDWATER ENCOUNTERED: 12'	
13. DEPTH DRILLED INTO ROCK: —	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14. TOTAL DEPTH OF HOLE: 14'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

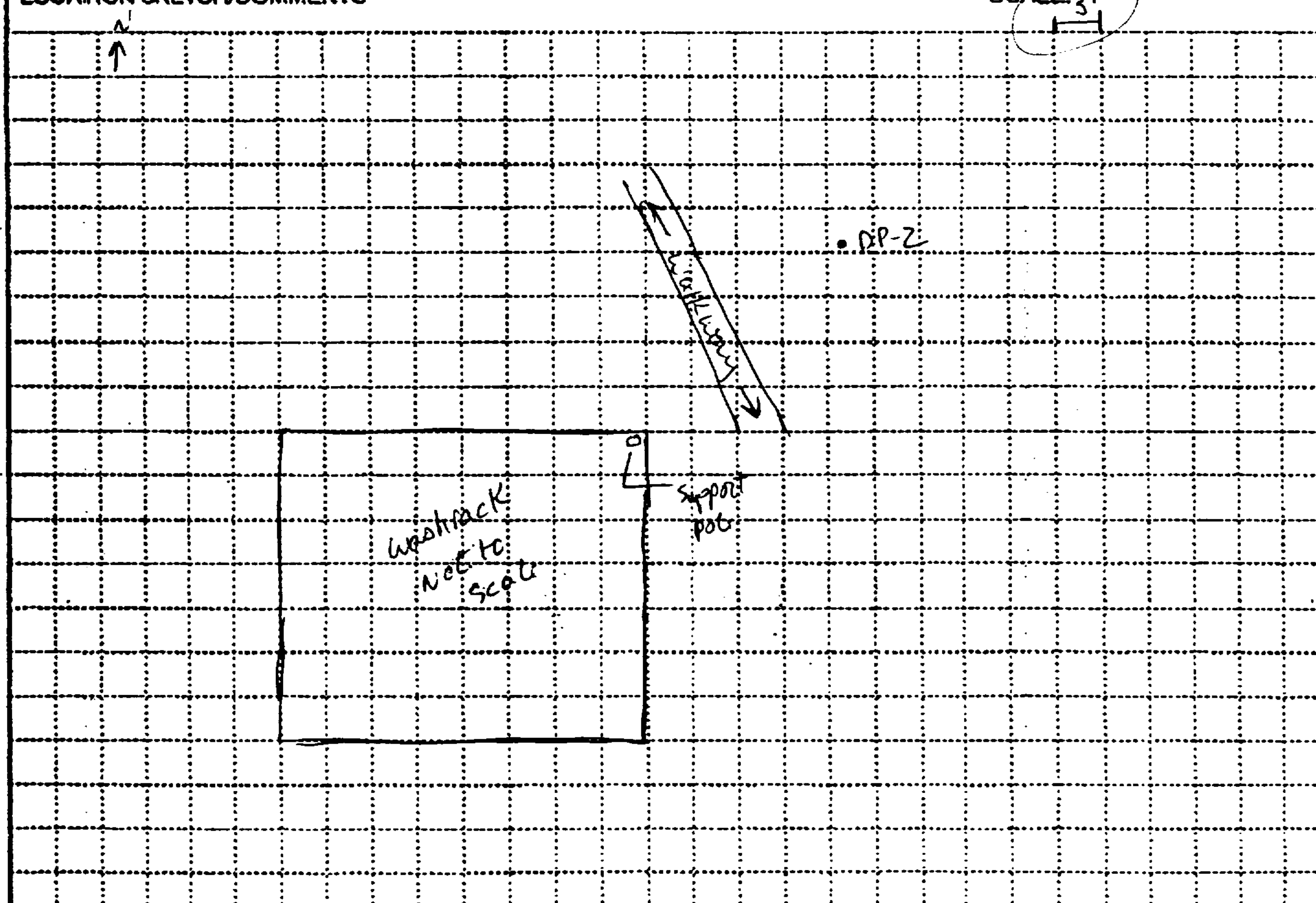
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	2	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
—	Bentonite	—	—	Tim Fewallen

LOCATION SKETCH/COMMENTS

SCALE: 5'



PROJECT	HOLE NO.
DO11WAD1 830012211.01020	DP-2

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

SWMU-123

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: DP-2

PROJECT: DOIIWADI 830012211.01020

INSPECTOR: Tim Lewallen

SHEET 2 OF 2 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
0–2		Red Brown (5YR 4/3) Fine SAND, trace silt, trace gravel (dry) (No odors) CaCO3 present, gypsum	0ppm	—		soft	Recov 3'
2–3		Red yellow (5YR 7/6) Fine SAND, some silt, trace clay, (dry, No odors) CaCO3 present - gypsum	0ppm / 0ppm	—		soft	
3–5		Red yellow (5YR 7/6) Fine SAND some silt, trace clay (dry, No odors) No CaCO3 Present - gypsum	0ppm / 0ppm	—		soft	Recov 3'
5–6		drk red (2.5YR 4/8) Fine SAND, trace silt, trace clay (dry, No odors) No CaCO3 present - gypsum	0ppm	—	SM123-2-11	medium	
6–8		drk Red (2.5YR 4/8) Fine SAND, trace silt, trace clay (dry, No odors) No CaCO3 - gypsum	0ppm / 2.2ppm	—		medium	Recov 2'
8–9		Red (2.5YR 5/6) Fine SAND little silt, trace clay (dry, No odors) CaCO3 present - gypsum	2.2ppm	—		medium	
9–12		Red pink (2.5YR 7/8 - 8/4) Fine SAND trace silt. (moist) (No odors) CaCO3 present - gypsum	2.2ppm / 2.2ppm / 2.2ppm	—	SM123-2-11	Hard	Recov. 3'
12–14	▽	Red (2.5YR 6/6) Fine SAND little silt, (damp) No odors CaCO3 present - gypsum	3.6ppm / 2.2ppm	—	~~[illegible]~~	Hard	Recov 2'

Bottom of Hole

Bentonite + water to surface

PROJECT: DOIIWADI 830012211.01020

HOLE NO. DP-2 SWMU123

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

TOTAL P.06

HTRW DRILLING LOG

DISTRICT: SW		HOLE NUMBER: DP-3
1. COMPANY NAME: GTI-GSI	2. DRILL SUBCONTRACTOR: TEG	SHEET 1 OF 2 SHEETS
3. PROJECT: DO11WAD1 830012211.01020	4. LOCATION: SWMU123-POL Holloman AFB	
5. NAME OF DRILLER:	6. MANUFACTURER'S DESIGNATION OF DRILL: Strataprobe	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" split spoon pushrod	8. HOLE LOCATION: DP-3 See Below	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 1/31/96	11. DATE COMPLETED: 1/31/96
12. OVERBURDEN THICKNESS:	15. DEPTH GROUNDWATER ENCOUNTERED: 11'	
13. DEPTH DRILLED INTO ROCK:	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:	
14. TOTAL DEPTH OF HOLE: ~~15~~ 14'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

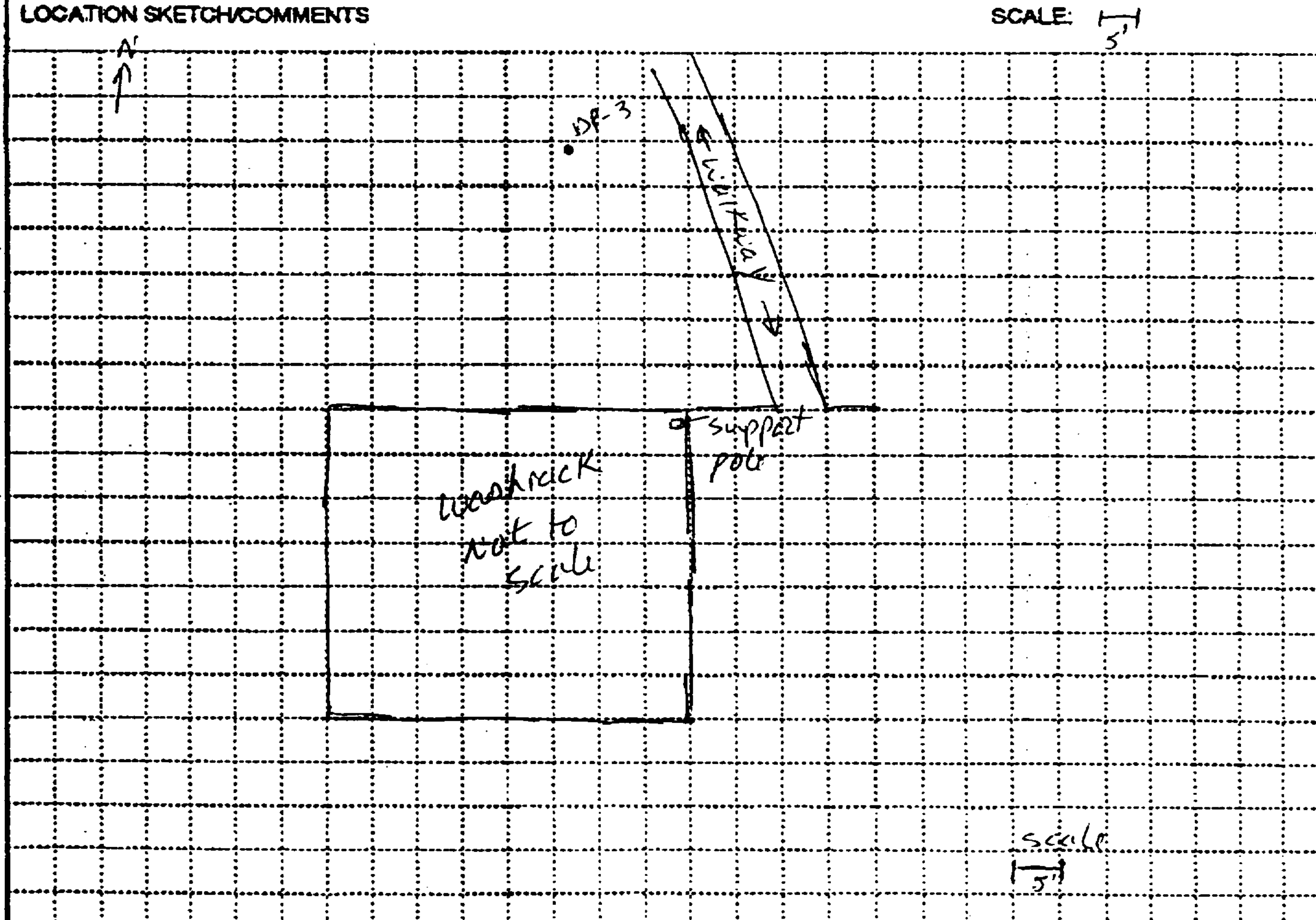
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	2					

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	Bentonite			Jim Lewalle

LOCATION SKETCH/COMMENTS

SCALE: 5'



PROJECT	HOLE NO.
DO11WAD1 830012211.01020	DP-3

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

SWMU123

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: DP-3

PROJECT: DOII WADI 83001 2211.01020

INSPECTOR: Tim Lewallen

SHEET 2 OF 2 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
0–1		Light red brown (5YR 4/3) Fine SAND Little silt, trace gravel (dry, No odors) trace of CaCO3 - Not gypsum	0ppm	—		soft	Recov 2'8"
1–3		Red Brown (5YR 5/4) Fine SAND, some silt, trace clay. (dry, No odors) CaCO3 present Some Gypsum	0ppm, 0ppm	—		soft	
3–4		same as above (dry, No odors)	0ppm	—		soft	Recov 3'
4		Pink (5YR 8/3) Fine SAND & SILT. trace clay (dry, No odors), CaCO3 - gypsum trace		—		soft	
5–6		Red yellow (5YR 6/8) Fine SAND, little silt. (dry, No odors) No CaCO3 - ~~gypsum~~ Gypsum ~~at bottom~~	0ppm, 0ppm	—	SM123-3-6	soft	
6		Same as above (dry, No odors)		—		Soft	Recov 2'8"
7–9		White (10YR 8/1) Fine SAND and SILT. trace clay. (dry, No odors) No CaCO3 present Gypsum	0ppm, 0ppm, 0ppm	—		medium	
9–11		Red Yellow (5YR 7/6) Fine SAND Some silt, trace clay. (damp) (No odors) CaCO3 present - gypsum	0ppm, 0ppm	—	SM123-3-10	medium	Recov 3'
11–12		Red Yellow (5YR 4/6) Fine SAND Little silt, trace clay (moist) (No odors) No CaCO3 - gypsum	0ppm	—		medium	
12–14		Red yellow (5YR 4/6) Fine SAND, Some silt, trace clay. (wet) (No odors) No CaCO3 - gypsum	0ppm, 0ppm	—		medium	Recov 2'

Bottom of Hole

Bentonite + water to surface

PROJECT: DOII WADI 83001 2211.01020

HOLE NO. DP-3

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

TOTAL P.06

B-5

FINAL CLOSURE REPORT ADDENDUM
FOR PHASE II
REMEDIATION OF POL-CONTAMINATED SITES AND OIL/WATER SEPARATOR AND WASTE OIL TANK REMOVALS
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:
49 CES/CEVR
Holloman Air Force Base, NM
and
HQ ACC/CEVC
Langley Air Force Base, VA

Prepared by:
Foster Wheeler Environmental Corporation
143 Union Boulevard, Suite 1010
Lakewood, Colorado 80228-1824

Under Contract No. DACW45-94-D0003

Delivery Order 11, Work Authorization Directive 3

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

December 1997

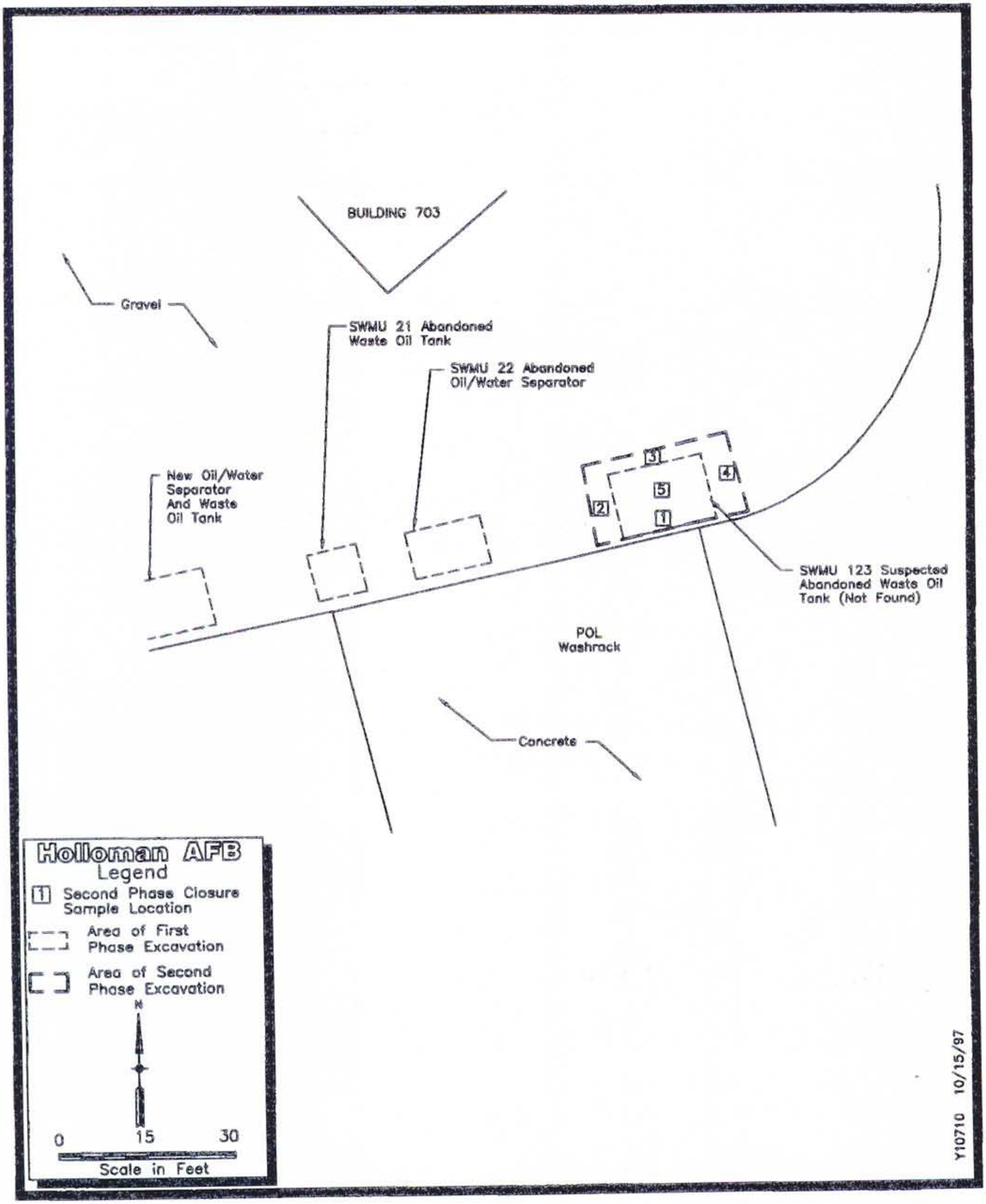


Figure 5-1. SWMU 123, Building 704 WOT Site Map

Table 5-1

Summary of Site Closure and Stockpile Sample Analytical Results for Soil at SWMU 123, Building 704 WOT

Sample I.D	SWMU123-01-09	SWM123-02-09	SWMU123-03-09	SWMU123-04-09	SWMU123-05-11	SWMU123-SP1*	SWMU123-SP2*
Figure I D.	1	2	3	4	5		
Date Sampled	4/8/97	4/8/97	4/8/97	4/8/97	4/8/97	4/8/97	4/8/97
TRPH by Method 418 1 (mg/kg)	4,100	<20	<20	<20	32	2,700	2,500
VOCs by Method 1311/8240 (mg/L)	NA	NA	NA	NA	NA	ND	ND
SVOCs by Method 1311/8270B (mg/L)	NA	NA	NA	NA	NA	ND	ND
VOCs by Method 8021A Benzene (mg/kg)	33	<0 05	<0.05	0.08	<0.05	5.2	1
Toluene (mg/kg)	240	<0.10	<0 10	<0.10	<0.10	17	8.1
Ethylbenzene (mg/kg)	320	<0.10	<0 10	<0 10	<0.10	26	18
Xylenes (total) (mg/kg)	480	<0.20	<0.20	<0.20	<0.20	46	34
Metals by Method 9010A Total Cyanide (mg/kg)	NA	NA	NA	NA	NA	<2 0	<2 0
Metals by Method 6010A (mg/kg)	NA	NA	NA	NA	NA		
Barium[1] (5,300)	NA	NA	NA	NA	NA	22	36
Chromium[2] (230)	NA	NA	NA	NA	NA	4 2	<3 0
Metals by Method 7421 Lead (2,000 mg/kg)	NA	NA	NA	NA	NA	2 7	2.1
Paint Filter by Method 9095	NA	NA	NA	NA	NA	NP	NP
Flash Point by Method ASTM D93 (°F)	NA	NA	NA	NA	NA	>200	>200
pH by Method 9045A	NA	NA	NA	NA	NA	7.4	7.4
Reactive Sulfide by SW846 Ch #7	NA	NA	NA	NA	NA	<25	<25

Notes
Shading denotes site closure samples
* = Soil stockpile sample
< = Constituent not detected above laboratory quantitation limit
() = EPA Region VI risk-based criteria for industrial land use
NA = Not analyzed
ND = Not detected
NP = Not present

1 = Risk-based value above expected saturation point, value shown is residential land use risk-based concentration
2 = Represents carcinogenic risk-based concentration

APPENDIX A

SWMU 123

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No. 0541

2. Page 1

3. Generator's Name and Mailing Address: Holloman Air Force Base, 49 CES/CEV, Holloman AFB, NM

4. Generator's Phone ( ) 505-475-5395

5. Transporter 1 Company Name: Rhino Environmental Servi...

6. US EPA ID Number: N/A

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address: Rhino Environmental Services, 2 mile NW of Newman, Otero County, NM

10. US EPA ID Number: DP1051

A. Transporter's Phone

B. Transporter's Phone 505

C. Facility's Phone

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils			11900	
b				
c				
d				

D. Additional Descriptions for Materials Listed Above

NON Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

FILL M

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: Michael A. Jacobs

Signature: Michael A Jacobs

Month Day Year: 19 1997

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Simmons 550111

Signature

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name

Signature

Month Day Year

GENERATOR'S COPY

Nº 6523 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rhenis

Vehicle Identification 550-111

Name of Shipper

Origin of Shipment — Destination of Shipment

27250

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment

lbs. Net — Net weight of the shipment

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE MC - 19 AS AMENDED EFFECTIVE JUNE 1, 1970

Signed M. Patrande
Weighmaster

The gross and tare weights were obtained at scales — NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒ Chg 5.00

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-29-97 B/L No. (Driver's Signature)

Nº 6528 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rh

Vehicle Identification 550-111

Name of Shipper

Origin of Shipment — Destination of Shipment

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

3_ 320

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE MC - 19 AS AMENDED EFFECTIVE JUNE 1, 1970

Signed
Weighmaster

The gross and tare weights were obtained at scales — NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒ Chg

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 26 97 B/L No. (Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No

Manifest Document No. 0543

2. Page 1 of

Truck ... 350111

3. Generator's Name and Mailing Address: Holloman Air Force Base, 49 CES/CEV, Holloman AFB NM

4. Generator's Phone ( ) 505-475-5395

5. Transporter 1 Company Name: Bluno Environmental Services

6. US EPA ID Number: N/A

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address: ... Environmental Services, ... W of Newman, Otero County, NM

10. US EPA ID Number: 1:21051

A. Transporter's Phone

B. Transporter's Phone

C. Facility's Phone

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated Soils	1	DT	45400	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above: Non-Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information: CELL M

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: Michael A. Jacobs — Signature: [signature] — Month Day Year: 4 30 ...

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Mi... D...r... T350111 — Signature: [signature] — Month Day Year: ... 30 ...

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name — Signature — Month Day Year

GENERATOR'S COPY

Nº 013226 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHINO

Vehicle Identification 550/111

Name of Shipper

Origin of Shipment Destination of Shipment

77720 lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only thereon, including full gasoline tank, and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

Signed Weighmaster

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE MC-L-19 AS AMENDED EFFECTIVE JUNE 1, 1970

The gross and tare weights were obtained at scales NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W. Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W. Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

5.00

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT

DATE 4-30-97 B/L No. (Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No

Manifest Document No. 0543

2. Page 1 of 1

Truck No

Generator's Name and Mailing Address
Holloman Air Force Base
49 CES CEV
Holloman AFB, NM

4. Generator's Phone ( ) 505-475-4365

5. Transporter 1 Company Name: Rhino Environmental Service
6. US EPA ID Number: N/A

7. Transporter 2 Company Name
8. US EPA ID Number

9. Designated Facility Name and Site Address
Rhino Environmental Services
2 mile NW of Newman Otero County, NM
10. US EPA ID Number: DP1051

A. Transporter's Phone
B. Transporter's Phone
C. Facility's Phone 4-0932

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils	1		44620	
b.				
c.				
d				

D. Additional Descriptions for Materials Listed Above
NON Hazardous Materials

E. Handling Codes for Wastes Listed Above

15 Special Handling Instructions and Additional Information
TELL M

16 GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: MICHAEL A. JACOBS
Signature: Michael A. Jacobs
Month 4 Day 30 Year 07

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Michael Sneedio #550-111
Signature: [signature]
Month 4 Day 30 Year 07

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Month Day Year

19 Discrepancy Indication Space

20 Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name
Signature
Month Day Year

GENERATOR
TRANSPORTER
FACILITY

GENERATOR'S COPY

Nº 013238 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rhino

Vehicle Identification 550-111

Name of Shipper

Origin of Shipment

Destination of Shipment

79,940 lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only aboard, including full gasoline tank and all necessary parts, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

M. Palermo

Weighmaster

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W. Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W. Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

RHG 500

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT

DATE 4-30-97 B/L No.

(Driver signature)

Please print or type.
(Form designed for use on elite (12-pitch) typewriter.)

NON-HAZARDOUS WASTE MANIFEST

1 Generator's US EPA ID No

Manifest Document No 0128

2 Page 1 of

Trucking 550111

3 Generator's Name and Mailing Address

123

4 Generator's Phone ( )

5 Transporter 1 Company Name | 6 US EPA ID Number

7 Transporter 2 Company Name | 8 US EPA ID Number

9. Designated Facility Name and Site Address | 10 US EPA ID Number

A Transporter's Phone

B Transporter's Phone

C Facility's Phone

11 Waste Shipping Name and Description	12 Containers No	12 Containers Type	13 Total Quantity	14. Unit Wt/Vol
a	1	[illegible]	43,700	
b				
c				
d				

GENERATOR

Additional Descriptions for Materials Listed Above

E Handling Codes for Wastes Listed Above

15 Special Handling Instructions and Additional Information

16 GENERATOR'S CERTIFICATION. I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste

Printed/Typed Name Warren Neff | Signature Warren Neff | Month Day Year 4 / 3 / 07

TRANSPORTER

17 Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name [illegible] | Signature [illegible] | Month Day Year [illegible]

18 Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

FAC

19 Discrepancy Indication Space

Facility Owner or Operator Certification of receipt of waste materials covered by this manifest except as noted in Item 19

Printed/Typed Name [illegible] | Signature [illegible] | Month Day Year

GENERATOR'S COPY

Ned12-BLS-C5 Rev 7/94

Nº 013204 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHINO

550/111

Vehicle Identification

Name of Shipper

Origin of Shipment

Destination of Shipment

6430

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

Signed Juan D— Weighmaster

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER
ON ☐ OFF ☒ 5.90

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-24-97 B/L No.

Michael — (Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.		Manifest Document No. 0037	2. Page 1 of
3. Generator's Name and Mailing Address	Holloman Air Force Base 49 CES/CEV Holloman AFB, NM		
4. Generator's Phone ( ) 505-475-5394			
5. Transporter 1 Company Name Gandy Environmental Services	6. US EPA ID Number		
7. Transporter 2 Company Name	8. US EPA ID Number		
9. Designated Facility Name and Site Address Gandy Environmental Services Little NW of Newman, Otero County, NM	10. US EPA ID Number		A. Transporter's Phone B. Transporter's Phone C. Facility's Phone

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils	1		43430	
b.				
c.				
d.				

Additional Descriptions for Materials Listed Above

Non Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

SFELL 31

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month Day Year
WARREN NEFF	[signature]	7 28 97

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year
Mike Shapiro Ssol III	[signature]	7 28 97

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month Day Year
Larry Dudding	[signature]	

GENERATOR'S COPY

Nº 013200 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rhino

550-111

Vehicle Identification

Name of Shipper

Origin of Shipment Destination of Shipment

75360 lbs. Gross Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE - MC - 55 AS AMENDED EFFECTIVE JUNE 1, 1970

Signed M. Patneaude Weighmaster

The gross and tare weights were obtained at scales NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒ Chg 500

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-23-91 B/L No. [illegible signature] (Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No 0332

2. Page 1 of

3. Generator's Name and Mailing Address: ... CES-CEV ... Holloman AFB NM

4. Generator's Phone ( ) 505-475-5395

5. Transporter 1 Company Name: Rhino Environmental Services

6. US EPA ID Number: N.A.

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address: Rhino Environmental Services, 2 mile NW of Newman, Otero County, NM

10. US EPA ID Number: DP1051

A. Transporter's Phone

B. Transporter's Phone

C. Facility's Phone

11. Waste Shipping Name and Description	12. Containers No	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils	1		~~43,070~~ 40,290	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

NON- Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

CELL M

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste

Printed/Typed Name: WARREN NEFF — Signature: Warren Neff — Month Day Year: 3 23 97

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Michael Brian Sso III — Signature: [signature] — Month Day Year: 3 23 97

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19

Printed/Typed Name: Larry Dunlap — Signature: [signature] — Month Day Year

12-BLS-C5 (Rev. 4/94)

GENERATOR'S COPY

Nº 013204 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHINO

Vehicle Identification 550/111

Name of Shipper

Origin of Shipment

Destination of Shipment

6430 lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

Signed Juan [signature] Weighmaster

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE - MC - 19 AS AMENDED EFFECTIVE JUNE 1, 1970

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒ $5.00

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-24-97 B/L No. [signature] (Driver's Signature)

Nº 013199 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHINO

Vehicle Identification 550/111

Name of Shipper

Origin of Shipment

Destination of Shipment

7,1020 lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

Signed Juan [signature] Weighmaster

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE - MC - 19 AS AMENDED EFFECTIVE JUNE 1, 1970

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒ $5.00

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-23-97 B/L No. Michael [signature] (Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No 0590 | 2. Page 1 of | Truck ID 550111

3. Generator's Name and Mailing Address: Holloman Air Force Base, 49 CES/CEV, Holloman AFB NM

Sums 123

4. Generator's Phone ( ) 505-475-5395

5. Transporter 1 Company Name: Rhino Environmental Services | 6. US EPA ID Number

7. Transporter 2 Company Name | 8. US EPA ID Number

9. Designated Facility Name and Site Address: Rhino Environmental Services, 2 mile NW of Newman, Otero County, NM | 10. US EPA ID Number DP1051

A. Transporter's Phone
B. Transporter's Phone
C. Facility's Phone

11. Waste Shipping Name and Description	12. Containers No	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils	1	B U L K	45520	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above: NON-Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information: CELL M

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste

Printed/Typed Name: Michael M Jacobs | Signature: Michael M Jacobs | Month Day Year: 1 4 29 97

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Michael A [illegible] 455 D115 | Signature: Michael Sorrano | Month Day Year: 4 29 97

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of waste materials covered by this manifest except as noted in Item 19

Printed/Typed Name | Signature | Month Day Year

12-BLS-C5 Rev 4/94

GENERATOR'S COPY

Nº 013220 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHINO

Vehicle Identification 550/111

Name of Shipper

Origin of Shipment

Destination of Shipment

77840	lbs. Gross	Gross weight of loaded vehicle, with driver only, thereon.
	lbs. Tare	Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.
	lbs. Net	Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE - MC - 19 AS AMENDED EFFECTIVE JUNE 1, 1970

Signed [signature] Weighmaster

The gross and tare weights were obtained at scales NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

$5.00

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-29-97 B/L No. [signature] (Driver's Sign.)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1 — 550111

3. Generator's Name and Mailing Address
Holloman Air Force Base
49 CES CEV
Holloman AFB, NM

4. Generator's Phone ( ) 505-475-5395

5. Transporter 1 Company Name: Rhino Environmental Services
6. US EPA ID Number: N/A

7. Transporter 2 Company Name
8. US EPA ID Number

9. Designated Facility Name and Site Address: Rhino Environmental Services, 2 miles NW of Newman, Otero County, NM
10. US EPA ID Number: EP1051

A. Transporter's Phone
B. Transporter's Phone
C. Facility's Phone

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils	1	D T	47890	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
Non-Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
[illegible]

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: MICHAEL A. JACOBS
Signature: Michael A. Jacobs
Month Day Year: 1 29 97

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Mike Serrano #550-111
Signature: [signature]
Month Day Year: [illegible]

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name
Signature
Month Day Year

GENERATOR'S COPY

N 019223 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rhino

Vehicle Identification 550-111

Name of Shipper

Origin of Shipment

Destination of Shipment

80210

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE - MC - 19 AS AMENDED EFFECTIVE JUNE 1, 1970

Signed M. Patneaude Weighmaster

The gross and tare weights were obtained at scales NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

Chg 500

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-29-97 B/L No. ______ (Driver's Signature)

RECEIVED MAY 06 1997

Published by J J KELLER & ASSOCIATES, INC., Neenah, WI 54957-0368 • 1-800-327-6868

Please print or type

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No

Manifest Document No 0544

2. Page 1 of

Truck No 550111

3. Generator's Name and Mailing Address: Holloman Air Force Base, 49 CES/CEV, Holloman AFB, NM

Smwu 1.25

4. Generator's Phone ( ) 505-475-5395

5. Transporter 1 Company Name: Rhino Environmental Servies

6. US EPA ID Number: N/A

7. Transporter 2 Company Name:

8. US EPA ID Number:

9. Designated Facility Name and Site Address: Rhino Environmental Services, 2 mile NW of Newman, Otero County, NM

10. US EPA ID Number: DP1051

A. Transporter's Phone

B. Transporter's Phone 505-842-6464

C. Facility's Phone 505-644-0932

11. Waste Shipping Name and Description	12. Containers No	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils	1	B T R	33800	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

NON- Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

CELL M

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste

Printed/Typed Name: Michael A Jacobs

Signature: [signature]

Month Day Year: 4 30 97

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Michael Sorano #550-111

Signature: [signature]

Month Day Year: 5 1 97

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name

Signature

Nº 013234

STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHINO

Vehicle Identification 550/111

Name of Shipper

Origin of Shipment

Destination of Shipment

#66120

lbs. Gross		Gross weight of loaded vehicle, with driver only, thereon.
lbs. Tare		Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.
lbs. Net		Net weight of the shipment.

Signed Oran D. (Weighmaster)

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION EX PARTE - MC - 19 AS AMENDED EFFECTIVE JUNE 1, 1970

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.) ✓
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M. ✓
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER

ON ☐ OFF ☒ 8 5.05

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 5-01-97 B/L No.

Driver Signature

B-6

22-6-2
JG

FOSTER WHEELER ENVIRONMENTAL CORPORATION

April 27, 1999
TERC-011.003-99X-006

Mr. George Fish
U.S. Army Corps of Engineers
Albuquerque District
P.O. Box Drawer A
Holloman AFB, NM 88330

Subject: TERC Contract No. DACW-45-94-D-0003, Delivery Order 11, WAD 3, Results of Additional Soil Sampling for Remediation of the POL-Contaminated SWMU 123, at Holloman AFB, New Mexico

Dear Mr. Fish:

Foster Wheeler Environmental Corporation is submitting two (2) copies of the following letter report that presents the results of additional soil sampling for remediation of the petroleum, oil, and lubricants (POL)-contaminated Solid Waste Management Unit (SWMU) 123, Holloman Air Force Base (AFB), New Mexico. Analytical results from soil samples collected during Phases I and II revealed concentrations of total recoverable petroleum hydrocarbons (TRPH) and benzene that were above the established Holloman AFB cleanup standards of 1,000 milligrams per kilogram (mg/kg) for TRPH and 25 mg/kg for benzene. The New Mexico Environment Department (NMED) requested further investigation of soil contamination underneath the concrete pad before considering a no further action (NFA) for the site. Therefore, an additional six soil borings were drilled and sampled through the washrack concrete pad. Results of these additional soil sampling events are detailed in Section 5 and Section 6. The site history, previous field activities and analytical results conducted during Phases I and II, summary of additional soil sampling and analytical results performed January 22, 1999 to February 12, 1999, and site recommendations are presented in this letter report.

143 Union Boulevard, Suite 1010, Lakewood, CO 80228-1824
Tel: 303-988-2202 Fax: 303-980-3539

Figure 1-1 Site Location Map and Phase I and II Sampling Points

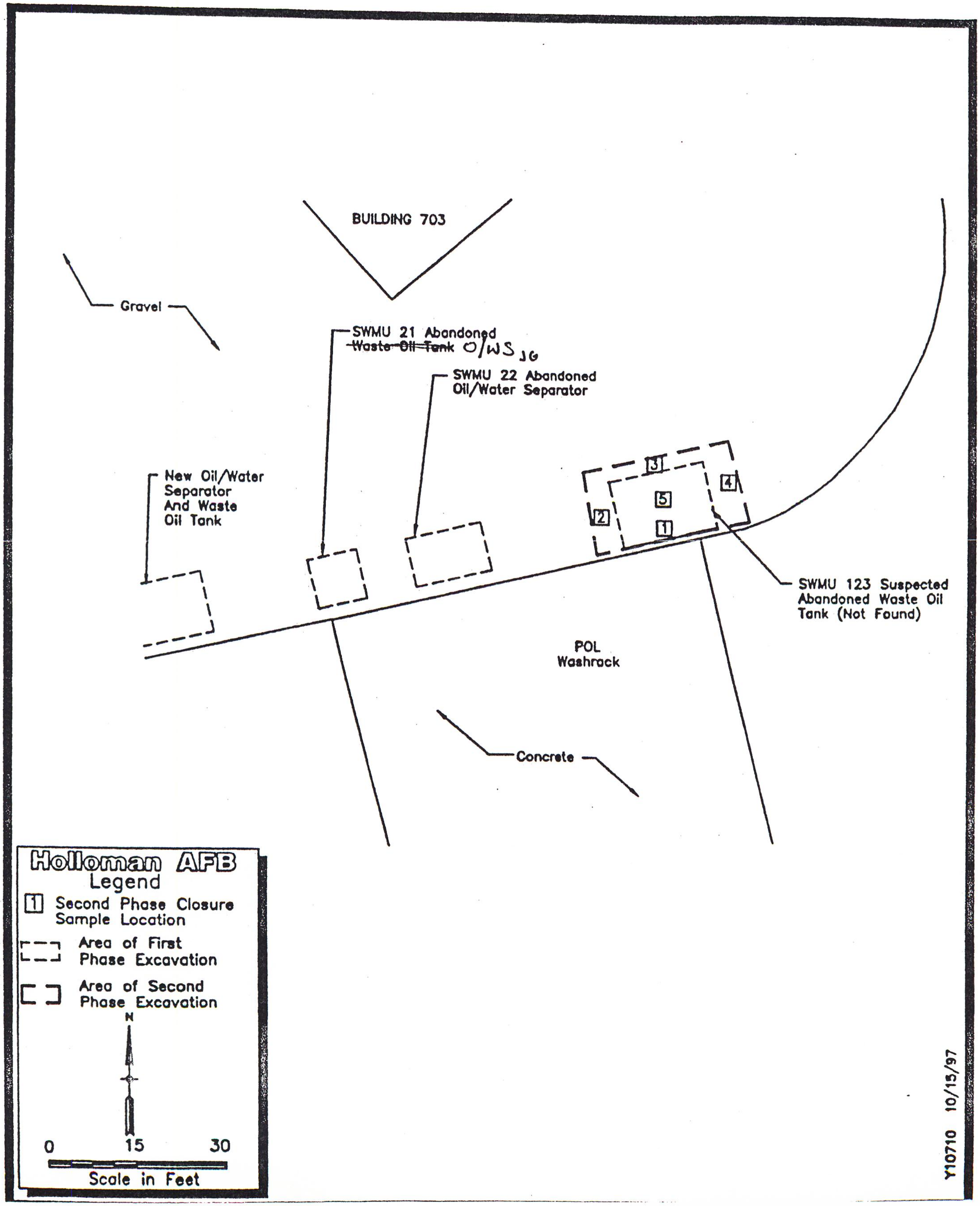
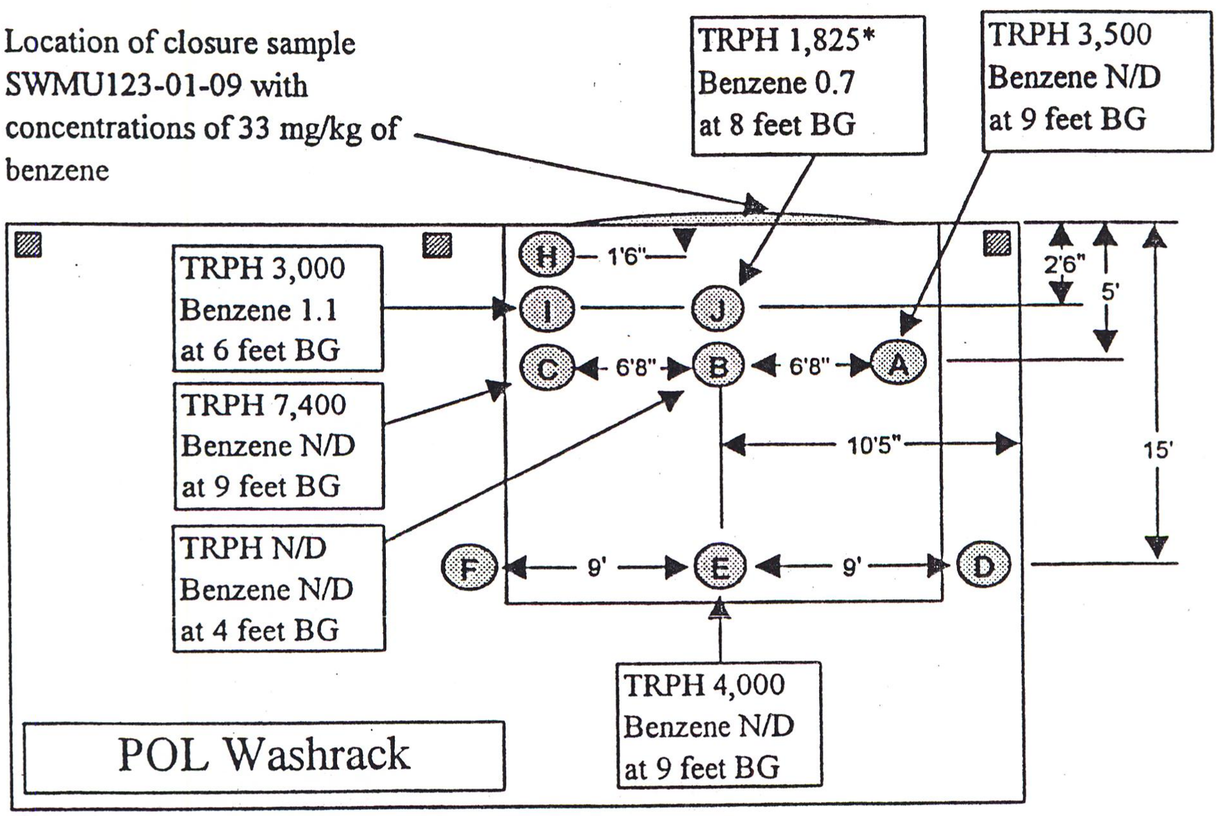


Figure 4-1 Concrete Pad Boring and Soil Sampling Locations



Notes:

Borings D, F, and H could not be bored through or sampled because they were located over footers in the concrete pad.

* Chemical concentrations are in milligrams per kilogram

BG = below ground

N/D = nondetect

mg/kg = milligrams per kilogram

TRPH = Total Recoverable Petroleum Hydrocarbons

Table 6-1 Soil Sample Analytical Results Summary

Sample Number	Date Sampled	TRPH (mg/kg)	Benzene (mg/kg)	Ethyl benzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)
SWMU123-SB-A-7	01/21/99	3,680	N/D	N/D	0.5	21
SWMU123-SB-A-9	01/27/99	3,500	N/D	61	21	110
SWMU123-SB-B-4	01/22/99	N/D	N/D	0.02	0.01	0.02
SWMU123-SB-C-2	01/22/99	144	0.02	0.9	0.3	1.2
SWMU123-SB-C-6	01/22/99	N/D	N/D	0.03	0.02	0.06
SWMU123-SB-C-9	01/27/99	7,400	N/D	110	190	270
SWMU123-SB-E-2	01/22/99	90	N/D	0.2	0.02	0.2
SWMU123-SB-E-6	01/22/99	N/D	N/D	N/D	N/D	1.6
SWMU123-SB-E-9	01/27/99	4,000	N/D	42	15	69
SWMU123-SB-I-2	02/11/99	304	0.5	9.6	7.9	9.9
SWMU123-SB-I-6	02/11/99	3,000	1.1	22	32	46
SWMU123-SB-J-2	02/12/99	48	0.04	0.3	0.7	0.5
SWMU123-SB-J-8	02/12/99	1,825	0.7	24	26	47

Notes:
N/D = nondetect
mg/kg = milligrams per kilogram
SWMU = Solid Waste Management Unit
TRPH = Total Recoverable Petroleum Hydrocarbons

B-7

SITE INVESTIGATION REPORT

SWMU 123

HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49CES/CEV
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers
Omaha, Nebraska
Under Contract No. DACA45-03-D-0008
Delivery Order No. 02, WAD 05

Prepared by:

Bhate Environmental Associates, Inc.
1608 13th Avenue South, Suite 300
Birmingham, Alabama 35205

Bhate Project No. 9030092.05

November 2004

TABLES

Table 5-1 Water Levels and Free Product Levels

SWMU 123 Site Monitoring Report Holloman AFB, New Mexico Bhate Project No. 9030092.05						
WELL ID:	Top Casing Elevation (ft amsl)	Depth to Groundwater (ft)	Groundwater Elevation (ft amsl)	Depth to Free Product (ft)	Measured Product Thickness (ft)	True Product Thickness[1] (ft)
MW-1	4092.17	10.73	4081.44	10.26	0.11	0.02
MW-2	4092.27	11.24	4081.03	NFP	0.00	0.00
MW-3	4091.98	10.70	4081.28	NFP	0.00	0.00
MW-4	4092.67	11.02	4081.65	NFP	0.00	0.00
MW-5	4091.95	10.88	4081.07	NFP	0.00	0.00
ft = feet; ft amsl = feet above mean sea level; NFP = no free product						

[1] True Product Thickness Calculation (after Pastrovich 1979)

$H_f = H_o(P_w - P_o)/P_o$

Where: H_f = thickness of hydrocarbon liquid in adjacent formation

H_o = hydrocarbon thickness measured in well (0.11 ft = 3.3528 cm

P_w = density of water 1.0 gm/cm3

P_o = density of hydrocarbon (0.84 gm/cm3, after Abdul et al. (1989) 0.84 gm/cm3

H_f = 0.638628571 cm

H_f = 0.0209524 ft

Table 5-2. Free Product Removal Summary

SWMU 123 Site Monitoring Report Holloman AFB, New Mexico Bhate Project No. 9030092.05			
Date	Bailing Duration	Free ProductThicknes	
		Before	After
9/22/2004	15 mins		0.36 ft
9/23/2004	15 mins	0.53 ft	0.08 ft
9/24/2004	15 mins	0.17 ft	0.09 ft
9/27/2004	15 mins	0.27 ft	0.14 ft
10/6/2004	-	0.11 ft	
ft = feet; mins = minutes			

Table 5-3 Total Dissolved Solids in Groundwater

SWMU 123 Site Monitoring Report Holloman AFB, New Mexico Bhate Project No. 9030092.05			
Location	**Groundwater Total Dissolved Solids Concentrations (mg/L)**	**Date Sampled**	**Method**
MW-1	3,010	7/16/04	160.1
MW-2	3,640	7/16/04	160.1
MW-3	3,230	7/16/04	160.1
MW-4	5,720	7/16/04	160.1
MW-5	6,050	7/16/04	160.1
Average	4,330		
mg/L = milligrams per liter; NMWQCC = New Mexico Water Quality Control Commission; MW = Monitoring Well; AFB = Air Force Base;			

Table 5-4 Groundwater Analytical Results

SWMU 123 RCRA Facility Investigation
Holloman AFB, New Mexico
Bhate Project No. 9030232

Chemical	Groundwater Screening Levels				Dilution	10x	10x	1x	10x	1x	1x	1x	1x	1x	1x	1x
					SDG No.	129202	129202	137431	129364	137431	129364	137431	129365	137431	129365	137431
	NMWQCC[1]	Basewide UTL[2]	EPA MCL[3]	Region 6[4]	Sample No.	MW-1	MW-1a	MW-1	MW-2	MW-2	MW-3	MW-3	MW-4	MW-4	MW-5	MW-5
					Date Sampled	5/11	5/11	9/29	5/12	9/29	5/12	9/29	5/13	9/29	5/13	9/29
					Date Rcvd.	5/12	5/12	9/30	5/14	9/30	5/14	9/30	5/14	9/30	5/14	9/30
Carbon Chain (µg/kg)																
C06 - C10 (DRO)	NA	NA	NA	NA		8.4	9.3		0.52	2.10	ND	0.26	ND	ND	ND	.10j
C10 - C22 (GRO)	NA	NA	NA	NA		26.0	25.0		1.50	0.55	ND	0.26	ND	ND	ND	ND
C22 - C32 (ORO)	NA	NA	NA	NA		ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Total (C10 - C32)	NA	NA	NA	NA		34.4	34.3		2.0	2.7	ND	0.5	ND	ND	ND	ND
VOCs (µg/l)																
1,2,4-Trimethylbenzene	NV	NA	NV	12		**429**	**481**		ND	45J	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene*	NV	NA	NV	12		**112**	**127**		ND	10J	ND	ND	ND	ND	ND	ND
Benzene	10	NA	5	0.35		**2,280**	**2,520**		**1,080**	**1,340**	ND	3.2	ND	ND	ND	ND
Ethylbenzene*	750	NA	700	1,300		**1,460**	**1,670**		337	416	ND	21	ND	ND	ND	ND
Isopropylbenzene*	NV	NA	NV	NV		122	139		17J	22J	ND	11	ND	ND	ND	ND
n-Propylbenzene*	NV	NA	NV	61		**153**	**174**		13J	21J	ND	1.5J	ND	ND	ND	ND
Naphthalene[1*]	NV	NA	NV	6.2		**129**	**142**		ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene*	NV	NA	NV	NV		34J	38J		ND	14J	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	NV	NA	NV	61		29J	30J		ND	ND	ND	8.3	ND	ND	ND	ND
Toluene*	750	NA	1,000	720		**7,330**	**7,490**		ND	10J	ND	ND	ND	ND	ND	ND
Xylenes, total*	620	NA	10,000	200		**2,560**	**2,920**		136	125	ND	ND	ND	ND	ND	ND
SVOCs (µg/l)																
2,4-Dimethylphenol	NV	NA	NV	730		27	31		ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	NV	NA	NV	NV		38	57		ND	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol	NV	NA	NV	1,800		105	115	**FREE PRODUCT**	ND	ND	ND	ND	ND	ND	ND	ND
4-Methylphenol	NV	NA	NV	180		62	71		ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	NV	NA	NV	6.2		**55**	**76**		ND	ND	ND	ND	ND	ND	ND	ND
Phenol	5	NA	NV	11,000		**29**	**34**		ND	ND	ND	ND	ND	ND	ND	ND
Metals (mg/l)																
Antimony	NV	0.0896	0.006	0.015		ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	0.1	0.0723	0.01	0.045		0.014	0.020		0.070	0.068	0.061	0.020	0.068	0.017	0.078	0.027
Barium	1	0.0929	2	2.6		0.165	0.190		0.081	0.216	0.026	0.051	0.032	0.105	0.049	0.195
Beryllium	NV	0.0038	0.004	0.073		ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	0.01	0.0083	0.005	0.018		ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Chromium(Total)	0.05	0.2340	0.1	0.11		0.034	0.039		0.029	0.037	0.010	.007J	0.023	0.017	0.025	0.034
Cobolt	0.05	0.0200	NV	0.73		0.009	0.010		0.004	0.011	ND	ND	ND	.003J	ND	0.010
Copper	NV	0.0386	1.3	1.4		0.016	0.017		0.011	0.049	0.008	0.042	0.120	0.042	0.015	0.049
Lead	0.05	0.0199	0.015	0.015		0.021	0.025		ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum	1.0	NV	NV	0.18		0.051	0.056		0.043	0.045	0.037	0.023	0.117	0.079	0.110	0.065
Nickel	0.2	0.0436	NV	0.73		.019J	0.023		0.015	0.025	0.003	.004J	0.004	.008J	0.006	0.021
Selenium	0.05	0.0793	0.05	0.18		ND	ND		**0.182**	ND	**0.161**	ND	**0.253**	ND	**0.261**	ND
Silver	0.05	0.0073	NV	0.18		0.016	0.004		ND	ND	0.004	ND	ND	ND	ND	ND
Thallium	NV	0.0943	0.002	0.003		ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	NV	0.4344	NV	0.037		**0.038**	0.035		**0.056**	**0.104**	ND	0.031	**0.075**	**0.116**	**0.151**	**0.213**
Zinc	10	0.2534	NV	11		0.116	0.182		0.085	0.056	0.030	ND	0.038	0.026	0.163	0.095
Mercury (Total)	0.002	0.00003	0.002	0.011		ND	ND		ND	ND	ND	ND	ND	ND	ND	ND

BOLD = Exceeds a screening action level; J denotes value between MDL and Detection Limit for Reporting (DLR); EPA = Environmental Protection Agency; NMWQCC = New Mexico Water Quality Commission; SDG = Sample Delivery Group; µg/L = micrograms per liter; VOCs = Volatile Organic Compounds; SVOCs = Semi Volatile Organic Compounds; MW = Monitoring Well; AFB = Air Force Base; NA = Not Applicable; NV = No Value

Exceeds NMWQCC Standard
Exceeds EPA MCL or Region 6 Action Level
Exceeds EPA MCL or Region 6 Action Level but is below UTL

J denotes value between MDL and Detection Limit for Reporting (DLR).
* Saturated concentration was used when calculating HAFB site specific SSL values.
[1] Denotes New Mexico Water Quality Control Human Health Standard(NMAC 20.6.2.310, Subsections A and B)
[2] Radian 1993 Basewide Background Study, Table 2-3 Summary Statistics for Total Metals in Groundwater, Upper Tolerance Limit (UTL)
[3] US Environmental Protection Agency Maximum Concentration Limit
[4] US EPA Region 6 Human Health Media-Specific Screening Levels(EPA, October 30, 1996)

Table 5-5. Soil Boring Analytical Results

SWMU 123 Site Monitoring Report Holloman AFB, New Mexico Bhate Project No. 9030092.05																									
Chemical	Soil Screening Levels		Dilution	1x	1000x	100x	1000x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x
			SDG No.	127927	128239	127927	128239	127979	128239	127979	128239	127979	128239	127979	128239	127979	128239	127979	128044	127979	128044	127927	128044	127927	128044
			Sample No.	**SB01-10**	**SB01-10**	**SB01-12**	**SB01-12**	**SB02-7**	**SB02-7**	**SB-02-7a**	**SB-02-7a**	**SB02-11**	**SB02-11**	**SB03-10**	**SB03-10**	**SB03-11**	**SB03-11**	**SB04-6**	**SB04-6**	**SB04-11**	**SB04-11**	**SB05-10**	**SB05-10**	**SB05-11**	**SB05-11**
	NMED[1] Residential (mg/kg)	Basewide UTL[2]	Date Sampled	4/15	4/20	4/15	4/20	4/16	4/20	4/16	4/20	4/16	4/20	4/16	4/20	4/16	4/20	4/16	4/19	4/16	4/19	4/15	4/19	4/15	4/19
			Date Rcvd	4/17	4/23	4/17	4/23	4/20	4/23	4/20	4/23	4/20	4/23	4/20	4/23	4/20	4/23	4/20	4/21	4/20	4/21	4/17	4/21	4/17	4/21
TPH (Carbon Chain)				**TPH in mg/kg**																					
C06 - C10 (DRO)		NV		800	ANR	1,330	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR
C10 - C22 (GRO)		NV		2,270	ANR	2,610	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR
C22 - C32 (ORO)		NV		ND	ANR	ND	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR
Total TPH (C10 - C32)	940	NV		3,070		3,940																			
VOCs				**VOCs in mg/kg**																					
1,2,4-Trimethylbenzene	52.2	NV		39.2	53.7	16.3	44.9	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene*	22.3	NV		13.4	19.4	5.62	15.8	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND
Benzene	27	NV		ND	26.9	3.09	22.5	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND
Ethylbenzene*	10,600	NV		52.7	98.1	23.6	76.6	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	3.4J	ND	2.3J	ND
Isopropylbenzene*	700	NV		10.3	15.30	3.98	12.1	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND
n-Propylbenzene*	53.2	NV		15.6	2.37	6.21	19.5	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND
Naphthalene[1*]	71.9	NV		5.67	9.89	2.38	8.53	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND
p-Isopropyltoluene*	NV	NV		3.94	8.24	2.65	6.95	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND
sec-Butylbenzene	NV	NV		5.28	ND	2.65	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND
Toluene*	248	NV		5.28	195	36.7	158	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	4.9J	ND	3.0J	ND
Xylenes, total*	132	NV		95.2	170	41.4	138	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	4.9J	ND	2.4J	ND
SVOCs				**SVOCs in mg/kg**																					
2-Methylnaphthalene	NV	NV		8.34	ND	14.7	ND	ND	ND	ANR	ND	ND	ND	ND	ND	ND	ND	ND	ANR	ND	ANR	ND	ANR	ND	ANR
Naphthalene	71.9	NV		3.41	ND	5.85	ND	ND	ND	ANR	ND	ND	ND	ND	ND	ND	ND	ND	ANR	ND	ANR	ND	ANR	ND	ANR
Metals				**Metals in mg/kg**																					
Antimony	31.3	7.2844		ND	ANR	ND	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ND	ANR	ND	ANR
Arsenic	3.9	6.8833		0.27	ANR	0.56	ANR	3.4	ANR	3.0	ANR	2.13	ANR	2.62	ANR	2.06	ANR	2.11	ANR	1.79	ANR	1.58	ANR	1.19	ANR
Barium	5,450	84.3632		18.6	ANR	22.9	ANR	24.1	ANR	44.7	ANR	26.7	ANR	56.4	ANR	19.1	ANR	28.3	ANR	17.5	ANR	60.8	ANR	28.7	ANR
Beryllium	156	0.4000		ND	ANR	ND	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	0.2	ANR	ND	ANR
Cadmium	74.1	1.0359		0.27	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR
Chromium(Total)	234	6.6049		1.59	ANR	2	ANR	7.04	ANR	7.24	ANR	2.64	ANR	2.19	ANR	1.83	ANR	3.32	ANR	2.0	ANR	5.40	ANR	3.45	ANR
Cobalt	1,520	2.4852		0.64	ANR	0.77	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	2.49	ANR	1.09	ANR
Copper	3,130	4.8438		0.83	ANR	0.97	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	2.69	ANR	1.44	ANR
Lead	400	-2.3221		ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR
Molybdenum	391	5.4258		ND	ANR	ND	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ND	ANR	ND	ANR
Nickel	1,560	5.6125		1.48	ANR	1.78	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	4.22	ANR	2.54	ANR
Selenium	391	10.5310		4.06	ANR	2.7	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	3.12	ANR	1.71	ANR
Silver	391	0.7342		ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR
Thallium	5.16	11.3153		0.12	ANR	0.11	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	0.14	ANR	0.15	ANR
Vanadium	548	15.4597		2.49	ANR	2.49	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	14.5	ANR	8.47	ANR
Zinc	23,500	20.2464		3.79	ANR	5	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	14.0	ANR	8.62	ANR
Mercury (Total)	100,000	-0.0006		ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR

RCRA 8 metals

Exceeds NMED Soil Screening Level

BOLD = Exceeds a screening action level; SDG = Sample Delivery Groupmg/kg = milligrams per kilogram; VOCs = Volatile Organic Compounds; SVOCs = Semi Volatile Organic Compounds; SB = Soil Boring; AFB = Air Force Base; ANR = Analysis Not Requested; NV = No Value; ND = Not Detected; mg/kg = milligrams per kilogram.

NOTE: SDG 128044 was collected to replace samples. All samples in this SDG replace those from earlier SDGs. Samples: SB4-6, SB4-11, SB5-10 and SB5-11

NOTE: SDG 128239 was collected to replace samples. All samples in this SDG replace those from earlier SDGs. Samples: SB-1-10, SB1-12, SB2-7, SB2-7a, SB2-11, SB3-10, and SB3-11

J denotes value between MDL and Detection Limit for Reporting (DLR).

* Saturated concentration was used when calculating HAFB site specific SSL values.

[1] Denotes February 2004 NMED SSL values.

[2] Radian 1993 Basewide Background Study, Table 2-1 Summary Statistics for Soil, Upper Tolerance Limit (UTL)

Table 5-6. DPT Soil Analytical Results

SWMU 123 Site Monitoring Report
Holloman AFB, New Mexico
Bhate Project No. 9030092.05

Chemical	Soil Screening Levels: NMED[1] Residential (mg/kg)	Soil Screening Levels: Basewide UTL[2]																	
			Dilution	1x	1x	1x	1x	1x	1x	1x	10x	100x	10x	1x	1000x	1x	1000x	1x	1000x	1x
			SDG No.	127927	128044	128253	127927	128044	128253	128044	127927	128044	127927	127979	128239	127979	128239	127979	128239	127979
			Sample No.	**DP01-4**	**DP01-4**	**DP01-4**	**DP01-11**	**DP01-11**	**DP01-11**	**DP02-9**	**DP02-9**	**DP02-10**	**DP02-10**	**DP03-10**	**DP03-10**	**DP03-11**	**DP03-11**	**DP04-10**	**DP04-10**	**DP04-11**
			Date Sampled	4/15	4/19	4/23	4/15	4/19	4/19	4/19	4/15	4/19	4/15	4/16	4/20	4/16	4/20	4/16	4/20	4/16
			Date Rcvd.	4/17	4/21	4/24	4/17	4/21	4/24	4/21	4/17	4/21	4/17	4/20	4/23	4/20	4/23	4/20	4/23	4/20
TPH (Carbon Chain)														**TPH in mg/kg**						
C06 - C10 (DRO)	NV	NV		ND	ANR	ANR	ND	ANR	ANR	ANR	12	ANR	61	238	ANR	114	ANR	535	ANR	1,050
C10 - C22 (GRO)	NV	NV		ND	ANR	ANR	ND	ANR	ANR	ANR	8.9	ANR	71	150	ANR	162	ANR	481	ANR	1,270
C22 - C32 (ORO)	NV	NV		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ND	ANR	ND	ANR	ND	ANR	ND
Total (C6 - C32)	940	NV									20.9		132	388		276		**1,016**		**2,320**
VOCs														**VOCs in mg/kg**						
1,2,4-Trimethylbenzene	52.2	NV		ND	ND	ANR	ND	ND	ND	ND	0.174	ND	4.35	ANR	13.5	ANR	9.87	ANR	21.8	ANR
1,3,5-Trimethylbenzene*	22.3	NV		ND	ND	ANR	ND	ND	ND	ND	0.054	ND	1.31	ANR	5.03	ANR	3.81J	ANR	7.68	ANR
Benzene	27	NV		ND	ND	ANR	ND	ND	ND	ND	ND	ND	ND	ANR	2.36J	ANR	2.14J	ANR	ND	ANR
Ethylbenzene*	10,600	NV		.0017J	ND	ANR	.0012J	ND	ND	ND	0.249	3.25	3.63	ANR	17.2	ANR	13.2	ANR	42	ANR
Isopropylbenzene*	700	NV		ND	ND	ANR	ND	ND	ND	ND	0.132	1.46	0.767	ANR	2.59	ANR	1.96J	ANR	7.17	ANR
n-Propylbenzene*	53.2	NV		ND	ND	ANR	ND	ND	ND	ND	0.229	2.16	1.29	ANR	4.73	ANR	3.43J	ANR	11.1	ANR
Naphthalene[1*]	71.9	NV		ND	ND	ANR	ND	ND	ND	ND	0.093	ND	0.764	ANR	ND	ANR	ND	ANR	4.86J	ANR
p-Isopropyltoluene*	NV	NV		ND	ND	ANR	ND	ND	ND	ND	.027J	ND	0.397	ANR	1.2J	ANR	.896J	ANR	3.29J	ANR
sec-Butylbenzene	NV	NV		ND	ND	ANR	ND	ND	ND	ND	0.13	ND	0.305	ANR	ND	ANR	ND	ANR	ND	ANR
Toluene*	248	NV		.0021J	ND	ANR	.0021J	ND	ND	ND	ND	ND	.017J	ANR	17.8	ANR	14.3	ANR	4.32J	ANR
Xylenes, total*	132	NV		.0017J	ND	ANR	.0012J	ND	ND	ND	0.133	ND	3.52	ANR	29.3	ANR	21.2	ANR	56	ANR
SVOCs														**SVOCs in mg/kg**						
Diethylphthalate	48,000	NV		ND	ANR	ANR	ND	ANR	ANR	ANR	1.42	ANR	ND	ND	ANR	ND	ANR	ND	ANR	ND
2-Methylnaphthalene	NV	NV		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	1.13	ANR	0.493	ANR	3.40	ANR	4.59
Naphthalene	71.9	NV		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	0.627	ANR	.279J	ANR	1.21	ANR	2.21
Metals														**Metals in mg/kg**						
Antimony	31.3	7.2844		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Arsenic	3.9	6.8833		1.45	ANR	ANR	0.25	ANR	ANR	ANR	0.71	ANR	0.18	1.57	ANR	1.59	ANR	1.69	ANR	1.31
Barium	5,450	84.3632		43.5	ANR	ANR	25	ANR	ANR	ANR	15.1	ANR	15.1	30.00	ANR	32.90	ANR	16.00	ANR	21.7
Beryllium	156	0.4000		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Cadmium	74.1	1.0359		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ND	ANR	ND	ANR	ND	ANR	ND
Chromium(Total)	234	6.6049		6.75	ANR	ANR	3.05	ANR	ANR	ANR	1.84	ANR	1.61	2.33	ANR	2.57	ANR	1.34	ANR	2.87
Cobolt	1,520	2.4852		2.7	ANR	ANR	1.04	ANR	ANR	ANR	0.85	ANR	0.64	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Copper	3,130	4.8438		3.13	ANR	ANR	1.4	ANR	ANR	ANR	1.04	ANR	0.53	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Lead	400	-2.3221		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ND	ANR	ND	ANR	ND	ANR	ND
Molybdenum	391	5.4258		0.59	ANR	ANR	ND	ANR	ANR	ANR	0.55	ANR	ND	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Nickel	1,560	5.6125		4.85	ANR	ANR	2.17	ANR	ANR	ANR	1.77	ANR	1.34	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Selenium	391	10.5310		2.65	ANR	ANR	3.96	ANR	ANR	ANR	3.72	ANR	3.32	ND	ANR	ND	ANR	ND	ANR	ND
Silver	391	0.7342		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ND	ANR	ND	ANR	ND	ANR	ND
Thallium	5.16	11.3153		0.36	ANR	ANR	0.18	ANR	ANR	ANR	0.13	ANR	0.12	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Vanadium	548	15.4597		11.9	ANR	ANR	5.16	ANR	ANR	ANR	5.87	ANR	4.25	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Zinc	23,500	20.2464		19.1	ANR	ANR	7.81	ANR	ANR	ANR	3.92	ANR	3.59	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Mercury (Total)	100,000	-0.0006		ND	ANR	ANR	ND	ANR	ANR	ANR	ND	ANR	ND	ND	ANR	ND	ANR	ND	ANR	ND
PCBs (mg/kg)																				
1016						ND			ND											
1221						ND			ND											
1232						ND			ND											
1242						ND			ND											
1248						ND			ND											
1254						ND			ND											
1260						ND			ND											

Chemical																	
Dilution	1000x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x
SDG No.	128239	128108	128239	128108	128239	128108	128239	128108	128239	128045	128045	128045	128045	128108	128239	128108	128239
Sample No.	**DP04-11**	**DP05-9-1345**	**DP05-9**	**DP05-10-1345**	**DP05-10**	**DP06-7-1325**	**DP06-7**	**DP06-10-1325**	**DP06-10**	**DP07-9**	**DP07-10**	**DP08-8**	**DP08-9**	**DP09-7-1627**	**DP09-7**	**DP09-9-1627**	**DP09-9**
Date Sampled	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20	4/20
Date Rcvd.	4/23	4/22	4/23	4/22	4/23	4/22	4/23	4/22	4/23	4/21	4/21	4/21	4/21	4/22	4/23	4/22	4/23
TPH (Carbon Chain)																	
C06 - C10 (DRO)	ANR	ND	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	9.50	ND	NA	ND	NA
C10 - C22 (GRO)	ANR	7.7	ANR	ND	ANR	ND	NA	7.4	NA	ND	ND	ND	11.00	ND	NA	ND	NA
C22 - C32 (ORO)	ANR	24.0	ANR	ND	ANR	ND	NA	44.0	NA	ND	ND	ND	ND	ND	NA	ND	NA
Total (C6 - C32)		31.7						51.4		ND	ND	ND	20.50				
VOCs																	
1,2,4-Trimethylbenzene	17.1	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
1,3,5-Trimethylbenzene*	5.87	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
Benzene	ND	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
Ethylbenzene*	31.7	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
Isopropylbenzene*	5.45	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
n-Propylbenzene*	8.39	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
Naphthalene[1*]	4.29J	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
p-Isopropyltoluene*	2.54J	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
sec-Butylbenzene	ND	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
Toluene*	3.05J	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
Xylenes, total*	41.5	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA	ND
SVOCs																	
Diethylphthalate	ANR	ND	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA
2-Methylnaphthalene	ANR	ND	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA
Naphthalene	ANR	ND	ANR	ND	ANR	ND	NA	ND	NA	ND	ND	ND	ND	ND	NA	ND	NA
Metals																	
Antimony	ANR	ANR	ANR	ANR	ANR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	ANR	3.67	ANR	3.47	ANR	**4.81**	NA	**4.95**	NA	2.24	2.34	2.45	1.88	**4.72**	NA	**4.27**	NA
Barium	ANR	58.1	ANR	39.6	ANR	66.7	ANR	77.1	ANR	43.5	17.6	23.4	20.7	37.1	ANR	41.6	ANR
Beryllium	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Cadmium	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	ND	ND	ND	ANR	ND	ANR
Chromium(Total)	ANR	6.25	ANR	2.21	ANR	8.34	ANR	8.19	ANR	3.34	1.14	2.24	2.23	5.39	ANR	7.65	ANR
Cobolt	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ND	ND	ANR	ANR	ANR	ANR
Copper	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Lead	ANR	1.12	ANR	ND	ANR	2.41	ANR	2.51	ANR	ND	ND	ND	ND	0.54	ANR	1.77	ANR
Molybdenum	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Nickel	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Selenium	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	0.631	ND	ND	ND	ANR	ND	ANR
Silver	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ANR	ND	ND	0.74	0.203	ND	ANR	ND	ANR
Thallium	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Vanadium	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Zinc	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR	ANR
Mercury (Total)	ANR	ND	ANR	ND	ANR	ND	ANR	0.22	ANR	ND	ND	ND	ND	ND	ANR	ND	ANR
PCBs (mg/kg)																	

RCRA 8 metals

Exceeds NMED Soil Screening Level

BOLD = Exceeds a screening action level; SDG = Sample Delivery Group; mg/kg = milligrams per kilogram; VOCs = Volatile Organic Compounds; SVOCs = Semi Volatile Organic Compounds; SB = Soil Boring; AFB = Air Force Base; ANR = Analysis Not Requested; NV = No Value; ND = Not Detected; mg/kg = milligrams per kilogram.

NOTE: SDG 128044 was collected to replace samples. All samples in this SDG replace those from earlier SDGs. Samples: DP1-4, DP1-11, DP2-9, and DP2-10

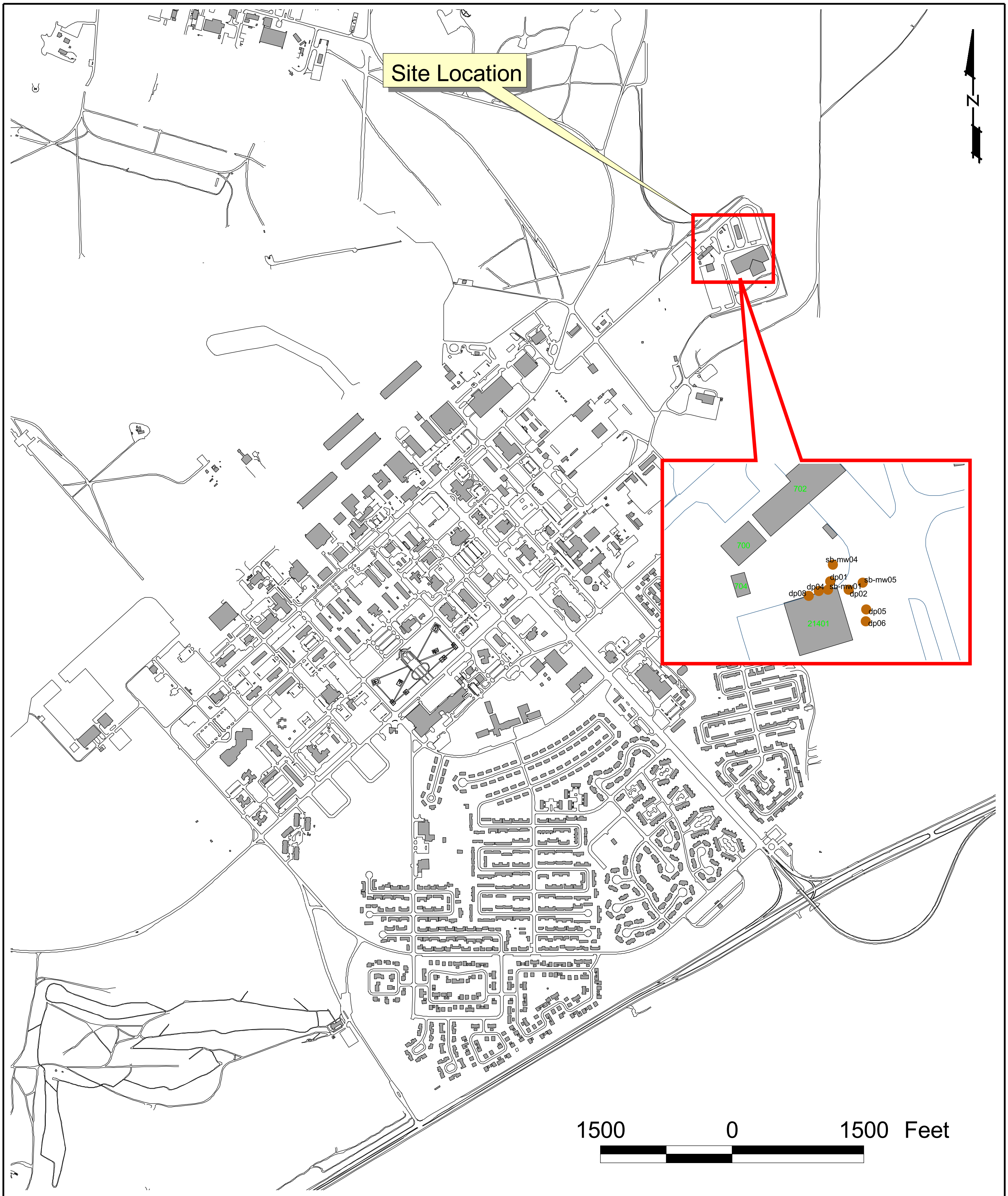
NOTE: SDG 128239 was collected to replace samples. All samples in this SDG replace those from earlier SDGs. Samples: DP3-10, DP3-11, DP4-10, DP4-11, DP5-9, DP5-10, DP6-7, DP6-10, DP9-7, and DP9-9

J denotes value between MDL and Detection Limit for Reporting (DLR).

* Saturated concentration was used when calculating HAFB site specific SSL values.

[1] Denotes February 2004 NMED SSL values.

FIGURES



BHATE
Environmental Engineers and Scientists

Site Location Map

PROJECT NO.	SCALE	DATE	DRAWN BY:
9040024	1"=1500'	10/22/04	cm
			DRAWING NO: gis_1

SWMU 123
Holloman Air Force, New Mexico

Figure 2-1

BHATE
Environmental Engineers and Scientists

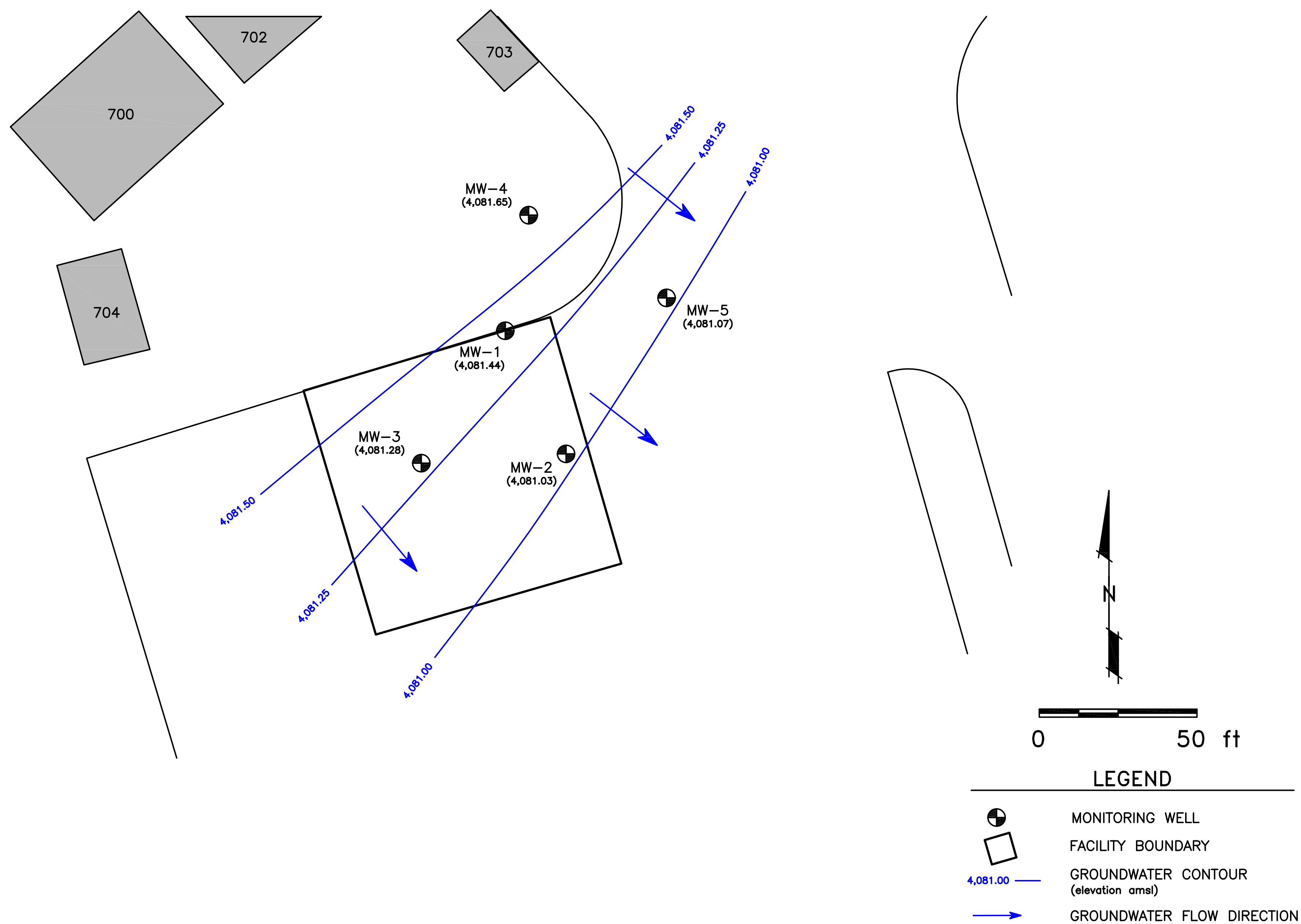
SWMU 123 SAMPLING LOCATIONS

PROJECT NO.	SCALE	DATE	DRAWN BY: MRM
9030092	SHOWN	10/22/04	DRAWING NO: 9030092-02

HOLLOMAN AIR FORCE BASE
SWMU 123

HOLLOMAN, NEW MEXICO

Figure 4-1



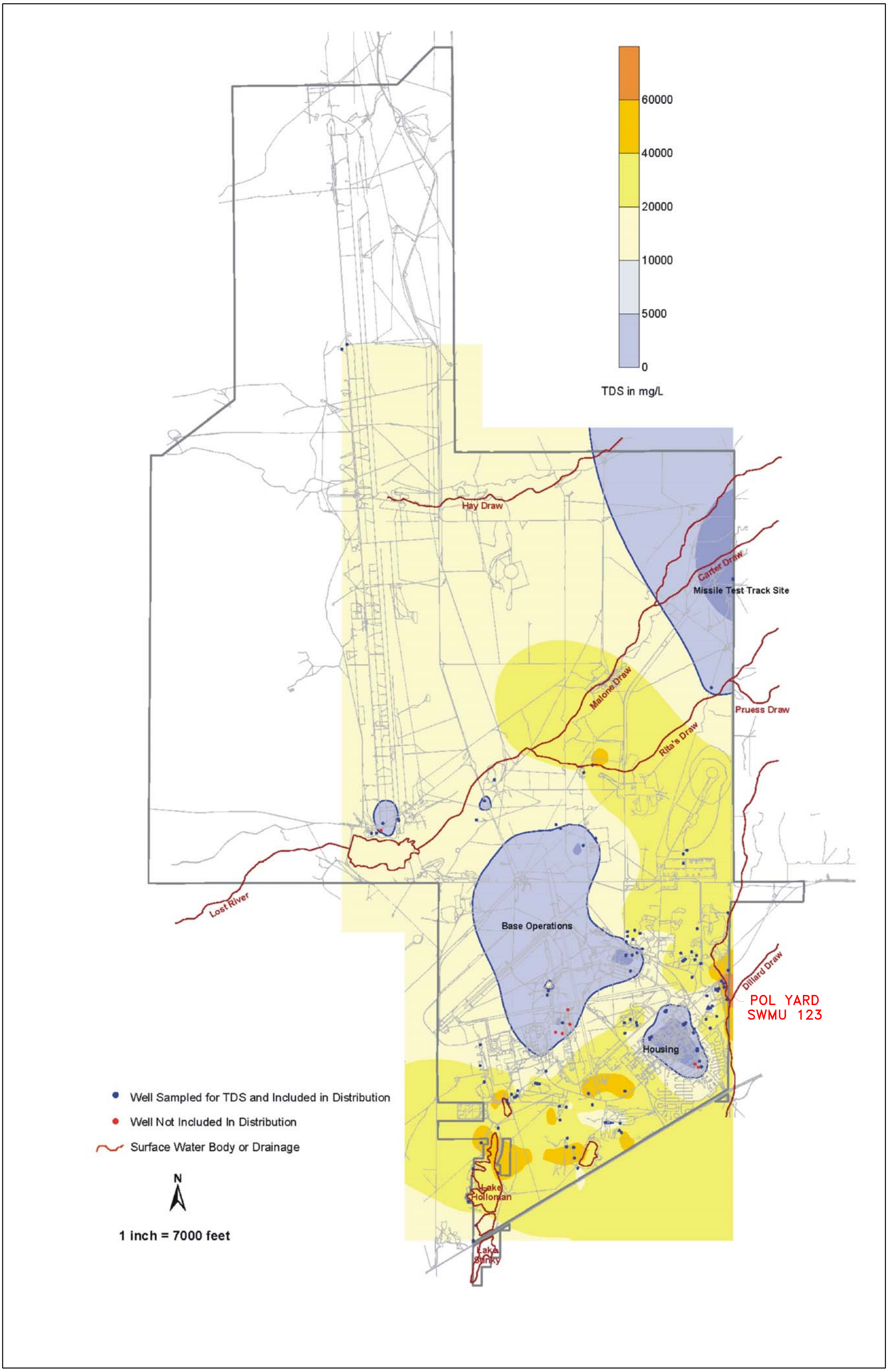
BHATE
Environmental Engineers and Scientists

GROUNDWATER POTENTIOMETRIC SURFACE

PROJECT NO.	SCALE	DATE	DRAWN BY: MRM
9030092	SHOWN	10/17/04	DRAWING NO: 9030092−07

HOLLOMAN AIR FORCE BASE
SWMU 123
HOLLOMAN, NEW MEXICO

Figure 5−1



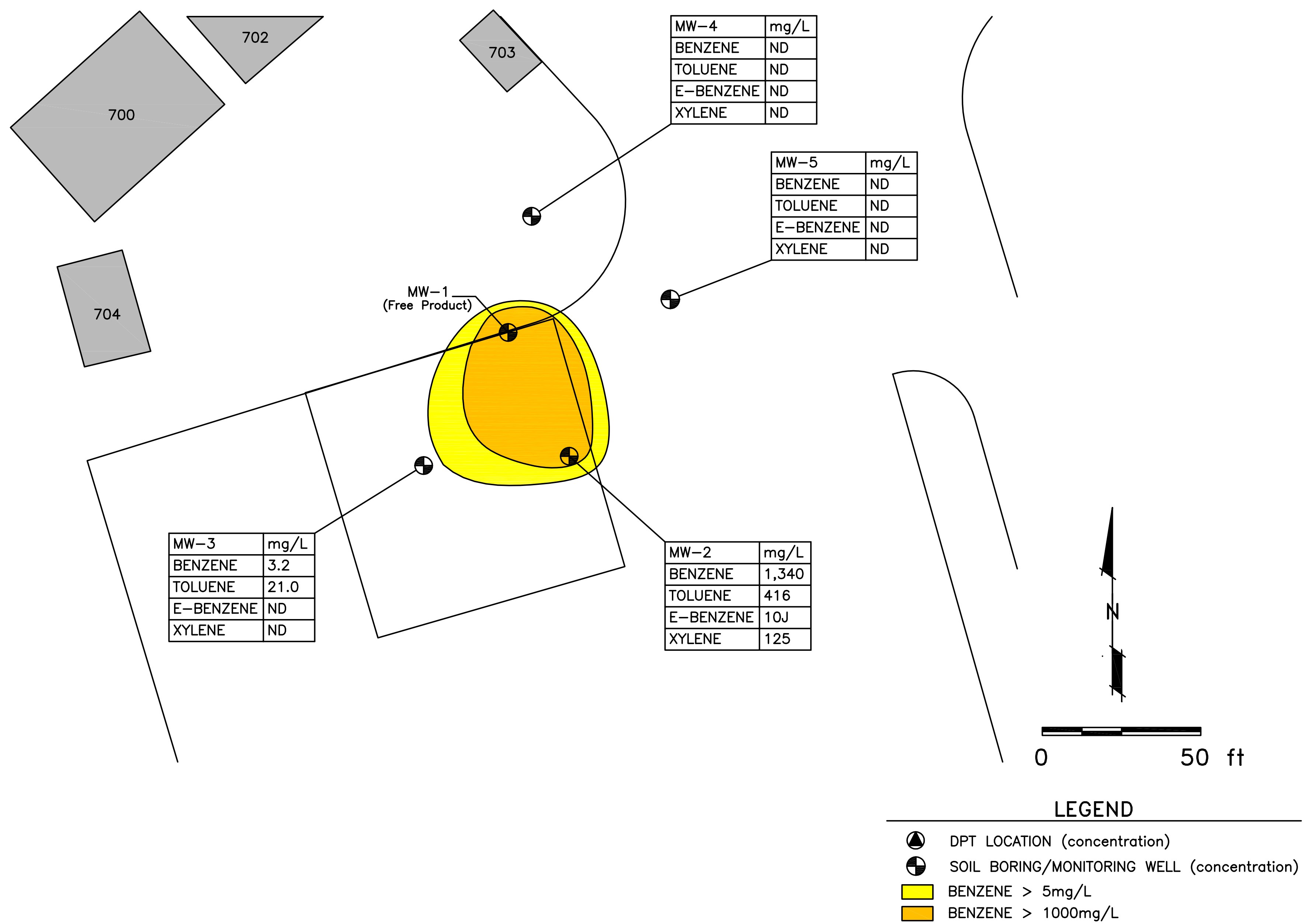
Environmental Engineers and Scientists

TOTAL DISSOLVED SOLIDS

PROJECT NO.	SCALE	DATE	DRAWN BY:
9030092	AS SHOWN	10/22/04	MRM
			DRAWING NO: 9030092-08

HOLLOMAN AIR FORCE BASE
SWMU 123
HOLLOMAN, NEW MEXICO

Figure 5-2



BHATE
Environmental Engineers and Scientists

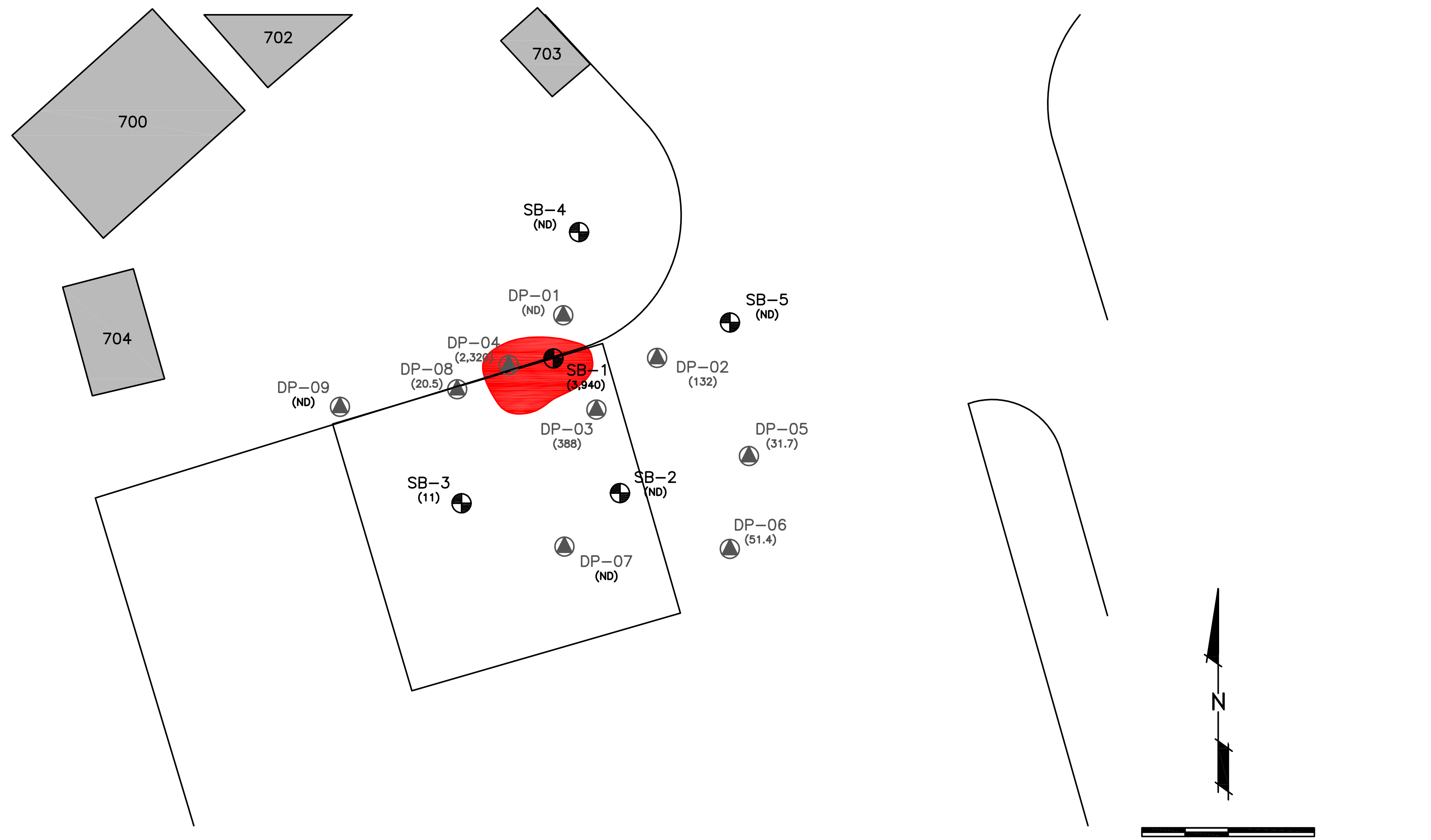
GROUNDWATER HYDROCARBON CONTAMINATION
BENZENE CONCENTRATIONS

PROJECT NO.	SCALE	DATE	DRAWN BY:
9030092	SHOWN	10/22/04	MRM
			DRAWING NO: 9030092–04

HOLLOMAN AIR FORCE BASE
SWMU 123

HOLLOMAN, NEW MEXICO

Figure 5–3



LEGEND

DPT LOCATION (concentration)
SOIL BORING/MONITORING WELL (concentration)
TPH > 940mg/kg

BHATE
Environmental Engineers and Scientists

SOIL HYDROCARBON CONTAMINATION
TPH CONCENTRATIONS

PROJECT NO.	SCALE	DATE	DRAWN BY: MRM
9030092	SHOWN	10/22/04	DRAWING NO: 9030092–05

HOLLOMAN AIR FORCE BASE
SWMU 123
HOLLOMAN, NEW MEXICO

Figure 5–4

APPENDIX A

HTW SOIL BORING LOGS

AND

WELL CONSTRUCTION DIAGRAMS

HTW DRILLING LOG

HOLE NO: SWMU123-DP06

1. COMPANY NAME: BHATE	2. DRILLING CONTRACTOR: BHATE	SHEET 1 OF 2 SHEETS
3. PROJECT: SWMU123	4. LOCATION: HOLLOMAN AFB, NM POL YARD	
5. NAME OF DRILLER: MARK MUMBY	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE 66DT	
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT: Direct Push Technology; 48 INCH MACROCORE SAMPLER	8. HOLE LOCATION: North East	
	9. SURFACE ELEVATION (ft. NGVD)	
	10. DATE STARTED: 16-Apr-2004	11. DATE COMPLETED: 16-Apr-2004
12. OVERBURDEN THICKNESS: 12.0 ft	15. DEPTH GROUNDWATER ENCOUNTERED: 11.0 ft	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 12.0 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
None						
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE REC %
Yes	8260B	6010B	8270C	8015B	9045B/C	
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
	X			JERRY PELFREY		

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	0	0.0-0.6, Silty sand (SM), dark brown (7.5 YR 3/3), fine grained, dry		NA		NA	
		0.6-6.4, Silty sand (SM), reddish yellow (7.5 YR 6/6), fine grained, dry to moist					
	1		PID/PPM FID/PPM No results due to no recovery				
	2		PID/PPM 190 FID/PPM 0.01				
	3		PID/PPM 358 FID/PPM 0.03				
	4		PID/PPM 316 FID/PPM 0.0				
	5						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
SWMU123	JERRY PELFREY	SWMU123-DP06	2 OF 3 SHEETS

ELEV (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	Field Screening Results (d)	Geotech Sample or Core Box No (e)	Analytical Sample No. (f)	Blow Counts (g)	REMARKS (h)
	5		PID/PPM 347 FID/PPM 0.0				
	6	5.9-9.9, Poorly graded sand (SP), red (2.5 YR 4/6), gypsum crystals at top, moist	PID/PPM 1186 FID/PPM 0.0				
	7		PID/PPM 478 FID/PPM 0.04		SWMU123 -DP06-7		
	8		PID/PPM 390 FID/PPM 0.0				
	9		PID/PPM 172 FID/PPM 0.0				
	10	9.9-12.0, Clayey sand (SC), red (2.5YR 4/6), very fine grained, wet to moist, low plasticity	PID/PPM 225 FID/PPM 0.0		SWMU123 -DP06-10		
	11		PID/PPM 23.35 FID/PPM 0.0				Groundwater
	12		PID/PPM 103 FID/PPM 0.0 NO FURTHER READINGS PAST 12 FT				End of Boring
	13						
	14						

HTW DRILLING LOG

1. COMPANY NAME BHATE	2. DRILLING CONTRACTOR BHATE	HOLE NO SWMU123-DP07 SHEET 1 OF 2 SHEETS
3. PROJECT SWMU123	4. LOCATION HOLLOMAN AFB, NM POL YARD	
5. NAME OF DRILLER MARK MUMBY	6. MANUFACTURER'S DESIGNATION OF DRILL GEOPROBE 66DT	
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT Direct Push Technology 48 INCH MACROCORE SAMPLER	8. HOLE LOCATION North East 9. SURFACE ELEVATION (ft. NGVD)	
	10. DATE STARTED 20-Apr-2004	11. DATE COMPLETED 20-Apr-2004
12. OVERBURDEN THICKNESS 12.0 ft	15. DEPTH GROUNDWATER ENCOUNTERED 11.0 ft	
13. DEPTH DRILLED INTO ROCK NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED NA	
14. TOTAL DEPTH OF HOLE 12.0 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
None						
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE REC %
Yes	8260B	6010B	8270C	8015B	9045B/C	
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
	X			JERRY PELFREY		

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	0	0.0-0.4, Silty sand (SM), dark brown (7.5 YR 3/3), fine grained, dry		NA		NA	
		0.4-6.0 Silty sand (SM), reddish yellow (7.5 YR 6/6), very fine grained, moist					
	1		PID/PPM FID/PPM No results due to no recovery				
	2		PID/PPM 441 FID/PPM 0.0				
	3		PID/PPM 729 FID/PPM 0.07				
	4		PID/PPM 248 FID/PPM 0.02				
	5						

HTW DRILLING LOG

HOLE NO	SHEET	PROJECT	INSPECTOR
SWMU123-DP07	2 OF 2 SHEETS	SWMU123	JERRY PELFREY

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No e	Analytical Sample No. f	Blow Counts g	REMARKS h
	5		PID/PPM 419 FID/PPM 0.0				
	6	6.0-10.0, Poorly graded sand (SP), red (2.5 YR 4/6), w gypsum crystals, moist	PID/PPM 253 FID/PPM 0.01				
	7		PID/PPM 321 FID/PPM 0.07				
	8		PID/PPM 420 FID/PPM 0.07				
	9		PID/PPM 420 FID/PPM 0.01		SWMU123 -DP07-9		
	10	10.0-12.0, Clayey sand (SC), red (2.5YR 4/6), very fine grained, wet to moist, low plasticity	PID/PPM 188 FID/PPM 0.0		SWMU123 -DP07-10		
	11		PID/PPM 190 FID/PPM 0.0				Groundwater
	12		PID/PPM 179 FID/PPM 0.0 NO FURTHER READINGS PAST 12 FT				End of Boring
	13						
	14						

HTW DRILLING LOG

HOLE NO. SWMU123-DP08				
1. COMPANY NAME: BHATE	2. DRILLING CONTRACTOR: BHATE		SHEET 1 OF 2 SHEETS	
3. PROJECT: SWMU123	4. LOCATION: HOLLOMAN AFB, NM POL YARD			
5. NAME OF DRILLER: MARK MUMBY	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE 66DT			
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT: Direct Push Technology; 48 INCH MACROCORE SAMPLER	8. HOLE LOCATION: North East			
	9. SURFACE ELEVATION (ft. NGVD)			
	10. DATE STARTED: 20-Apr-2004		11. DATE COMPLETED: 20-Apr-2004	
12. OVERBURDEN THICKNESS: 10.5 ft	15. DEPTH GROUNDWATER ENCOUNTERED: 10.5 ft			
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA			
14. TOTAL DEPTH OF HOLE: 10.5 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
None						
20. SAMPLES FOR CHEMICAL ANALYSIS	**VOC**	**METALS**	**OTHER (SPECIFY)**	**OTHER (SPECIFY)**	**OTHER (SPECIFY)**	**21. TOTAL CORE REC %**
Yes	8260B	6010B	8270C	8015B	9045B/C	
22. DISPOSITION OF HOLE	**BACKFILLED**	**MONITORING WELL**	**OTHER (SPECIFY)**	**23. SIGNATURE OF INSPECTOR**		
	X			JERRY PELFREY		

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No f	Blow Counts g	REMARKS h
	0	0.0-0.4, Silty sand (SM), dark brown (7.5 YR 3/3), fine grained, dry		NA		NA	
		0.3-5.7 Silty sand (SM), reddish yellow (7.5 YR 6/6), very fine grained, moist					
	1		PID/PPM FID/PPM No results due to no recovery				
	2		PID/PPM 773 FID/PPM 0.02				
	3		PID/PPM 1285 FID/PPM 0.02				
	4		PID/PPM 1426 FID/PPM 0.02				
	5						

HTW DRILLING LOG

HOLE NO: SWMU123-DP08

PROJECT: SWMU123

INSPECTOR: JERRY PELFREY

SHEET 2 OF 2 SHEETS

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No e	Analytical Sample No. f	Blow Counts g	REMARKS h
	5		PID/PPM 989 FID/PPM 0.01				
		5.7-9.4, Poorly graded sand (SP), red (2.5 YR 4/6), w gypsum crystals, moist					
	6		PID/PPM 538 FID/PPM 0.0				
	7		PID/PPM 1062 FID/PPM 0.0				
	8		PID/PPM 455 FID/PPM 0.01		SWMU123 -DP08-8		
	9		PID/PPM 769 FID/PPM 0.27		SWMU123 -DP08-9		
		9.4-12.0, Clayey sand (SC), red (2.5YR 4/6), very fine grained, wet to moist to moist, low plasticity					
	10		PID/PPM 898 FID/PPM 0.31				Groundwater
	11		PID/PPM 454 FID/PPM 0.74				
	12		PID/PPM 496 FID/PPM 0.06 NO FURTHER READINGS PAST 12 FT				End of Boring
	13						
	14						

HTW DRILLING LOG

HOLE NO: SWMU123-DP09	SHEET 1 OF 2 SHEETS	
1. COMPANY NAME: BHATE	2. DRILLING CONTRACTOR: BHATE	
3. PROJECT: SWMU123	4. LOCATION: HOLLOMAN AFB, NM POL YARD	
5. NAME OF DRILLER: MARK MUMBY	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE 66DT	
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT: Direct Push Technology; 48 INCH MACROCORE SAMPLER	8. HOLE LOCATION: North East	
	9. SURFACE ELEVATION (ft. NGVD)	
	10. DATE STARTED: 20-Apr-2004	11. DATE COMPLETED: 20-Apr-2004
12. OVERBURDEN THICKNESS: 12.0 ft	15. DEPTH GROUNDWATER ENCOUNTERED: 10.5 ft	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 12.0 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
None						
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE REC %
Yes	8260B	6010B	8270C	8015B	9045B/C	
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
	X			JERRY PELFREY		

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	0	0.0-0.5, Silty sand (SM), dark brown (7.5 YR 3/3), fine grained, dry	Field screeening performed by sight and smell	NA		NA	
		0.5-5.6 Silty sand (SM), reddish yellow (7.5 YR 6/6), very fine grained, moist					
	1						
	2						
	3						
	4						
	5						

PROJECT: SWMU123

HOLE NO: SWMU123-DP09

HTW DRILLING LOG

HOLE NO
SWMU123-DP09

PROJECT	INSPECTOR	SHEET 2 OF 2 SHEETS
SWMU123	JERRY PELFREY	

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No e	Analytical Sample No. f	Blow Counts g	REMARKS h
	5		Field screeening performed by sight and smell				
		5.6-9.1, Poorly graded sand (SP), red (2.5 YR 4/6), w gypsum crystals, moist					
	6						
	7				SWMU123 -DP09-7		
	8						
	9	9.1-12.0, Clayey sand (SC), red (2.5YR 4/6), very fine grained, wet to moist to moist, low plasticity			SWMU123 -DP09-9		
	10						Groundwater
	11						End of Boring
	12		Field screeening performed by sight and smell				
	13						
	14						

HTW DRILLING LOG

HOLE NO. SWMU123-MW01			
1. COMPANY NAME: BHATE	2. DRILLING CONTRACTOR: BHATE	SHEET 1 OF 3 SHEETS	
3. PROJECT: SWMU123	4. LOCATION: HOLLOMAN AFB, NM POL YARD		
5. NAME OF DRILLER: MARK MUMBY	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE 66DT		
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT: Direct Push Technology; 48 INCH MACROCORE SAMPLER	8. HOLE LOCATION: North East		
	9. SURFACE ELEVATION (ft. NGVD): 4092.392		
	10. DATE STARTED: 15-Apr-2004	11. DATE COMPLETED: 15-Apr-2004	
12. OVERBURDEN THICKNESS: 20.0 ft	15. DEPTH GROUNDWATER ENCOUNTERED: 13.0		
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 9.7 ft 24 hrs		
14. TOTAL DEPTH OF HOLE: 20.0 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)		

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
None						
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE REC %
Yes	8260B	6010B/7471A	8270C	8015B	9045B/C	
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
		X		JERRY PELFREY		

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	0	0.0-4.4, Silty sand (SM), dark brown (7.5YR 3/3), fine grained, medium dense, gray discoloration from 3.0, strong hydrocarbon odor					
	1						
	2						
	3						
	4						
		4.4-7.7, Silty sand (SM), gray discoloration, very fine grained, dry to moist, medium dense, strong hydrocarbon odor					
	5						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
SWMU123	JERRY PELFREY	SWMU123-MW01	SHEET 2 OF 3 SHEETS

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	5						
	6						
	7						
		7.7-10.9, Poorly graded sand (SP), gray discoloration, moist					
	8						
	9						
	10						
	11	10.9-20.0, Clayey sand (SC), gray to 13.5 ft, turns to red (2.5YR 4/6), very fine grained, moist to wet to moist, low plastcity					
	12						
	13						Groundwater
	14						

HTW DRILLING LOG

HOLE NO.	SHEET
SWMU123-MW01	SHEET 3 OF 3 SHEETS

PROJECT
SWMU123

INSPECTOR
JERRY PELFREY

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	14						
	15						
	16						
	17						
	18						
	19						End Of Boring
	20						
	21						
	22						

HTW DRILLING LOG

HOLE NO. SWMU123-MW02	SHEET 1	OF 3 SHEETS

1. COMPANY NAME: BHATE	2. DRILLING CONTRACTOR: BHATE
3. PROJECT: SWMU123	4. LOCATION: HOLLOMAN AFB, NM POL YARD
5. NAME OF DRILLER: MARK MUMBY	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE 66DT
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT: Direct Push Technology; 48 INCH MACROCORE SAMPLER	8. HOLE LOCATION: North East
	9. SURFACE ELEVATION (ft. NGVD): 4092.312
	10. DATE STARTED: 16-Apr-2004 / 11. DATE COMPLETED: 16-Apr-2004
12. OVERBURDEN THICKNESS: 19.0 ft	15. DEPTH GROUNDWATER ENCOUNTERED: 12.5 ft
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 11.8 ft 85 minutes
14. TOTAL DEPTH OF HOLE: 19.0 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
None						
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE REC %
Yes	8260B	6010B/7471A	8270C	8015B	9045B/C	
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		
		X		JERRY PELFREY		

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	0	0.0-1.2, Silty sand (SM), dark brown (7.5YR 3/3), fine grained, dry, medium dense					
	1	1.2-7.1, Silty sand (SM), reddish yellow (7.5YR 6/6, very fine grained, dry, medium dense					
	2						
	3						
	4						
	5						

HTW DRILLING LOG

HOLE NO. SWMU123-MW02

PROJECT SWMU123

INSPECTOR JERRY PELFREY

SHEET 2 OF 3 SHEETS

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	5						
	6						
	7	7.1-10.5, Poorly graded sand (SP), red (2.5YR 4/6), gypsum crystals, moist					
	8						
	9						
	10	10.5-19.0, Clayey sand (SC), red (2.5YR 4/6), very fine grained, moist to wet to moist, low plasticity					
	11						
	12						Groundwater
	13						
	14						

HTW DRILLING LOG

HOLE NO.	SWMU123-MW02
PROJECT	SWMU123
INSPECTOR	JERRY PELFREY
SHEET 3	OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	14						
	15						
	16						
	17						
	18						
							End Of Boring
	19						
	20						
	21						
	22						

HTW DRILLING LOG

HOLE NO.	SWMU123-MW03
SHEET 1	OF 3 SHEETS

1. COMPANY NAME: BHATE	2. DRILLING CONTRACTOR: BHATE
3. PROJECT: SWMU123	4. LOCATION: HOLLOMAN AFB, NM POL YARD
5. NAME OF DRILLER: MARK MUMBY	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE 66DT
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT: Direct Push Technology; 48 INCH MACROCORE SAMPLER	8. HOLE LOCATION: North East
	9. SURFACE ELEVATION (ft. NGVD): 4092.552
	10. DATE STARTED: 16-Apr-2004 / 11. DATE COMPLETED: 16-Apr-2004
12. OVERBURDEN THICKNESS: 18.5 ft	15. DEPTH GROUNDWATER ENCOUNTERED: 12.0 ft
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 12.0 ft
14. TOTAL DEPTH OF HOLE: 18.5 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES		
None					

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE REC %
Yes	8260B	6010B/7471A	8270C	8015B	9045B/C	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		JERRY PELFREY

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	0	0.0-0.5, Silty sand (SM), dark brown (7.5 YR 3/3), fine grained, dry					
		0.5-6.4, Silty sand (SM), reddish yellow (7.5 YR 6/6), fine grained, moist					
	1						
	2						
	3						
	4						
	5						

PROJECT: SWMU123

HOLE NO: SWMU123-MW03

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.
SWMU123	JERRY PELFREY	SWMU123-MW03
		SHEET 2 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	5						
	6						
		5.9-10.2, Poorly graded sand (SP), red (2.5 YR 4/6), gypsum crystals at top, moist to wet					
	7						
	8						
	9						
	10						
		10.2-18.5, Clayey sand (SC), red (2.5YR 4/6), very fine grained, wet to moist, low plasticity					
	11						Groundwater
	12						
	13						
	14						

HTW DRILLING LOG

HOLE NO.	SHEET
SWMU123-MW03	3 OF 3 SHEETS

PROJECT	INSPECTOR
SWMU123	JERRY PELFREY

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	14						
	15						
	16						
	17						
	18						End Of Boring
	19						
	20						
	21						
	22						

HTW DRILLING LOG

HOLE NO.	SWMU123-MW04
1. COMPANY NAME	BHATE
2. DRILLING CONTRACTOR	BHATE
SHEET	1 OF 3 SHEETS
3. PROJECT	SWMU123
4. LOCATION	HOLLOMAN AFB, NM POL YARD
5. NAME OF DRILLER	MARK MUMBY
6. MANUFACTURER'S DESIGNATION OF DRILL	GEOPROBE 66DT
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT	Direct Pusk Technologfy 48 INCH MACROCORE SAMPLER
8. HOLE LOCATION	North East
9. SURFACE ELEVATION (ft. NGVD)	4092.432
10. DATE STARTED	16-Apr-2004
11. DATE COMPLETED	16-Apr-2004
12. OVERBURDEN THICKNESS	20.0 ft
13. DEPTH DRILLED INTO ROCK	NA
14. TOTAL DEPTH OF HOLE	20.0 ft
15. DEPTH GROUNDWATER ENCOUNTERED	11.5 ft
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	11.5 ft 1hr
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE REC %
Yes	8260B	6010B/7471A	8270C	8015B	9045B/C	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		JERRY PELFREY

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	0	0.0-0.5, Backfill					
		0.5-1.6. Silty sand (SM), dark brown (7.5 YR 3/3), fine grained, dry					
	1						
		1.6-5.5, Silty sand (SM); reddish yellow (7.5 YR 6/6), fine grained, moist					
	2						
	3						
	4						
	5						

HTW DRILLING LOG

PROJECT SWMU123	INSPECTOR JERRY PELFREY	HOLE NO SWMU123-MW04 SHEET 2 OF 3 SHEETS

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	5						
		5.5-9.9, Poorly graded sand (SP), red (2.5YR 4/6), gypsum crystals, moist					
	6						
	7						
	8						
	9						
		9.5-20.00, Clayey sand (SC),red (2.5YR 4/6), very fine grained, moist to wet, low plasticity					
	10						
	11						Groundwater
	12						
	13						
	14						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.
SWMU123	JERRY PELFREY	SWMU123-MW04
		SHEET 3 OF 3 SHEETS

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	14						
	15						
	16						
	17						
	18						
	19						End Of Boring
	20						
	21						
	22						

HTW DRILLING LOG

HOLE NO	SWMU123-MW05
1. COMPANY NAME	BHATE
2. DRILLING CONTRACTOR	BHATE
SHEET	1 OF 3 SHEETS
3. PROJECT	SWMU123
4. LOCATION	HOLLOMAN AFB, NM POL YARD
5. NAME OF DRILLER	MARK MUMBY
6. MANUFACTURER'S DESIGNATION OF DRILL	GEOPROBE 66DT
7. SIZES & TYPES OF DRILLING & SAMPLING EQUIPMENT	Direct Push Technology 48 INCH MACROCORE SAMPLER
8. HOLE LOCATION	North East
9. SURFACE ELEVATION (ft. NGVD)	4092.012
10. DATE STARTED	15-Apr-2004
11. DATE COMPLETED	15-Apr-2004
12. OVERBURDEN THICKNESS	20.0 ft
15. DEPTH GROUNDWATER ENCOUNTERED	11.0 ft
13. DEPTH DRILLED INTO ROCK	20.0 ft
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	11.0 ft 20 hrs
14. TOTAL DEPTH OF HOLE	20.0 ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NO			

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE REC %
YES	8260B	6010B/7471A	8270C	8015B	9045B/C	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		JERRY PELFREY

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	0	0.0-0.8, Silty sand (SM): dark brown (7.5YR 3/3, fine grained, moist, low plasticity, dense		NA		NA	SB05 was augered to become MW05
	1	0.8-4.5, Silty sand (SM): reddish yellow (7.5YR 6/6), fine grained, moist, low plasticity, dense	PID/PPM 12.64 FID/PPM 7.71				
	2		PID/PPM 9.73 FID/PPM 6.98				
	3		PID/PPM 8.86 FID/PPM 6.54				
	4		PID/PPM 8.30 FID/PPM 6.28				
		4.5-11.5, Poorly graded sand (SP), red (2.5 YR 4/6), very fine grained w gypsum crystals,					
	5						

HTW DRILLING LOG

HOLE NO	SHEET	PROJECT	INSPECTOR
SWMU123-MW05	2 OF 3 SHEETS	SWMU123	JERRY PELFREY

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	5		PID/PPM 8.25 FID/PPM 6.08				
	6		PID/PPM 8.53 FID/PPM 6.31				
	7		PID/PPM 8.63 FID/PPM 8.62				
	8		PID/PPM 8.75 FID/PPM 7.09				
	9		PID/PPM 8.59 FID/PPM 6.44				
	10		PID/PPM 8.54 FID/PPM 11.12		SWMU123 -SB05-10		
	11		PID/PPM 8.84 FID/PPM 30.34		SWMU123 -SB05-11		Groundwater
		11.5-20.0, Clayey sand (SC), red (2.5YR 4/6), very fine grained, moist, low plasticity dense					
	12		PID/PPM 8.78 FID/PPM 25.5				
	13		PID/PPM 8.86 FID/PPM 17.70				
	14						

HTW DRILLING LOG

HOLE NO	SHEET	PROJECT	INSPECTOR
SWMU123-MW05	2 OF 3 SHEETS	SWMU123	JERRY PELFREY

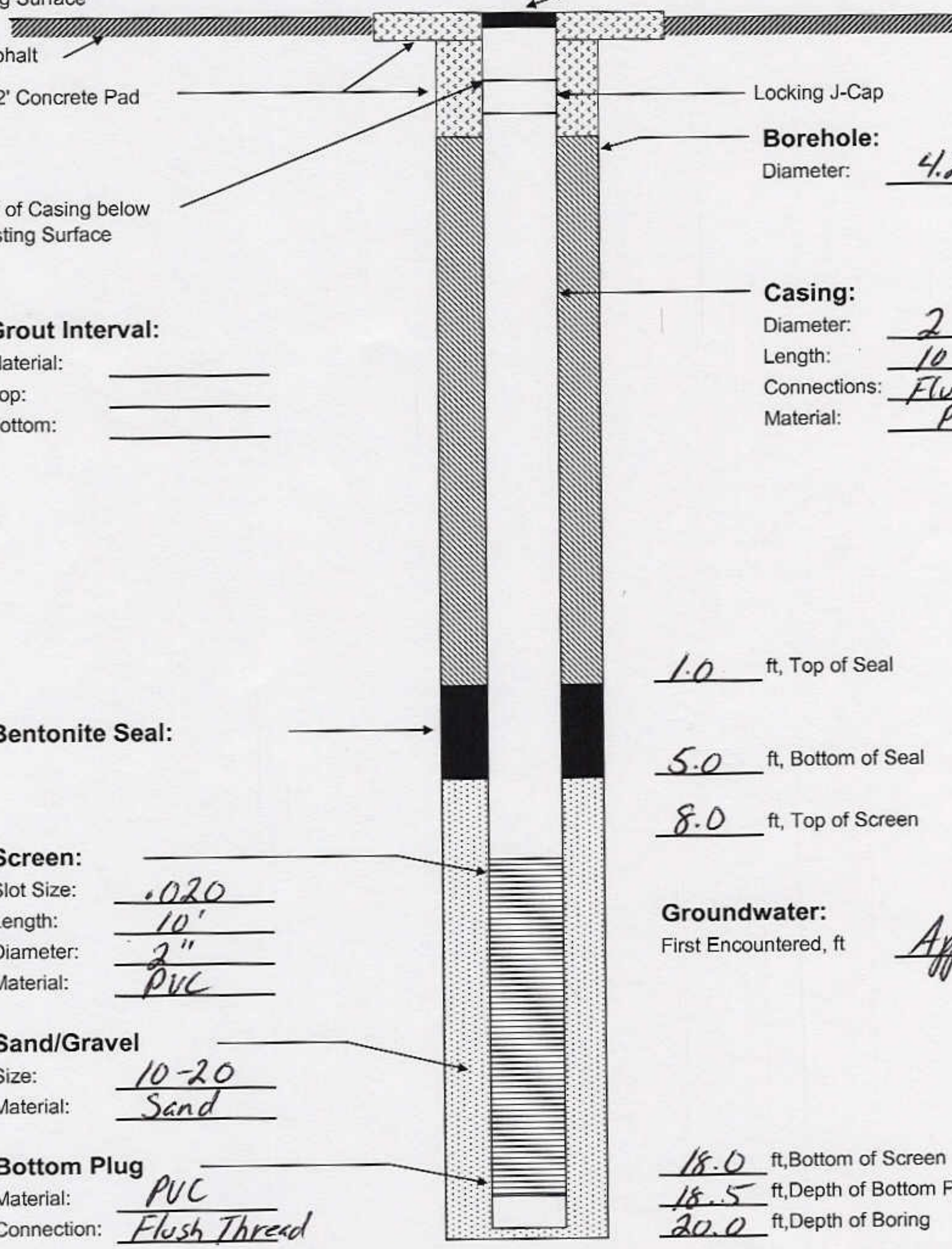
ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	Field Screening Results d	Geotech Sample or Core Box No. e	Analytical Sample No. f	Blow Counts g	REMARKS h
	14		PID/PPM 8.25 FID/PPM 6.08				
	15		PID/PPM 8.53 FID/PPM 6.31				
	16		PID/PPM 8.63 FID/PPM 8.62				
	17		PID/PPM 8.75 FID/PPM 7.09				
	18		PID/PPM 8.59 FID/PPM 6.44				
	19		PID/PPM 8.54 FID/PPM 11.12		SWMU123 -SB05-10		
	20		PID/PPM 8.84 FID/PPM 30.34		SWMU123 -SB05-11		Groundwater
		11.5-20.0, Clayey sand (SC), red (2.5YR 4/6), very fine grained, moist, low plasticity dense					
	21		PID/PPM 8.78 FID/PPM 25.5				
	22		PID/PPM 8.86 FID/PPM 17.70				

(5)

Bhate Environmental Associates

Project:	SWMU 123	Well/Boring No.:	SB01 / MW01
Project No.:		Geologist:	M.F. Mumby
Boring Location:	P.O.L. Bldg	Date(s):	4/19/04
Drilling Method:	4.25" Solid Stem Auger	Drilling Contractor:	Bhate

NOT TO SCALE



Borehole:
Diameter: 4.25"

Casing:
Diameter: 2"
Length: 10'
Connections: Flush Thread
Material: PVC

Grout Interval:
Material:
Top:
Bottom:

1.0 ft, Top of Seal

Bentonite Seal:

5.0 ft, Bottom of Seal

8.0 ft, Top of Screen

Screen:
Slot Size: .020
Length: 10'
Diameter: 2"
Material: PVC

Groundwater:
First Encountered, ft: Approx 10.5'

Sand/Gravel
Size: 10-20
Material: Sand

Bottom Plug
Material: PVC
Connection: Flush Thread

18.0 ft, Bottom of Screen
18.5 ft, Depth of Bottom Plug
20.0 ft, Depth of Boring

Comments:

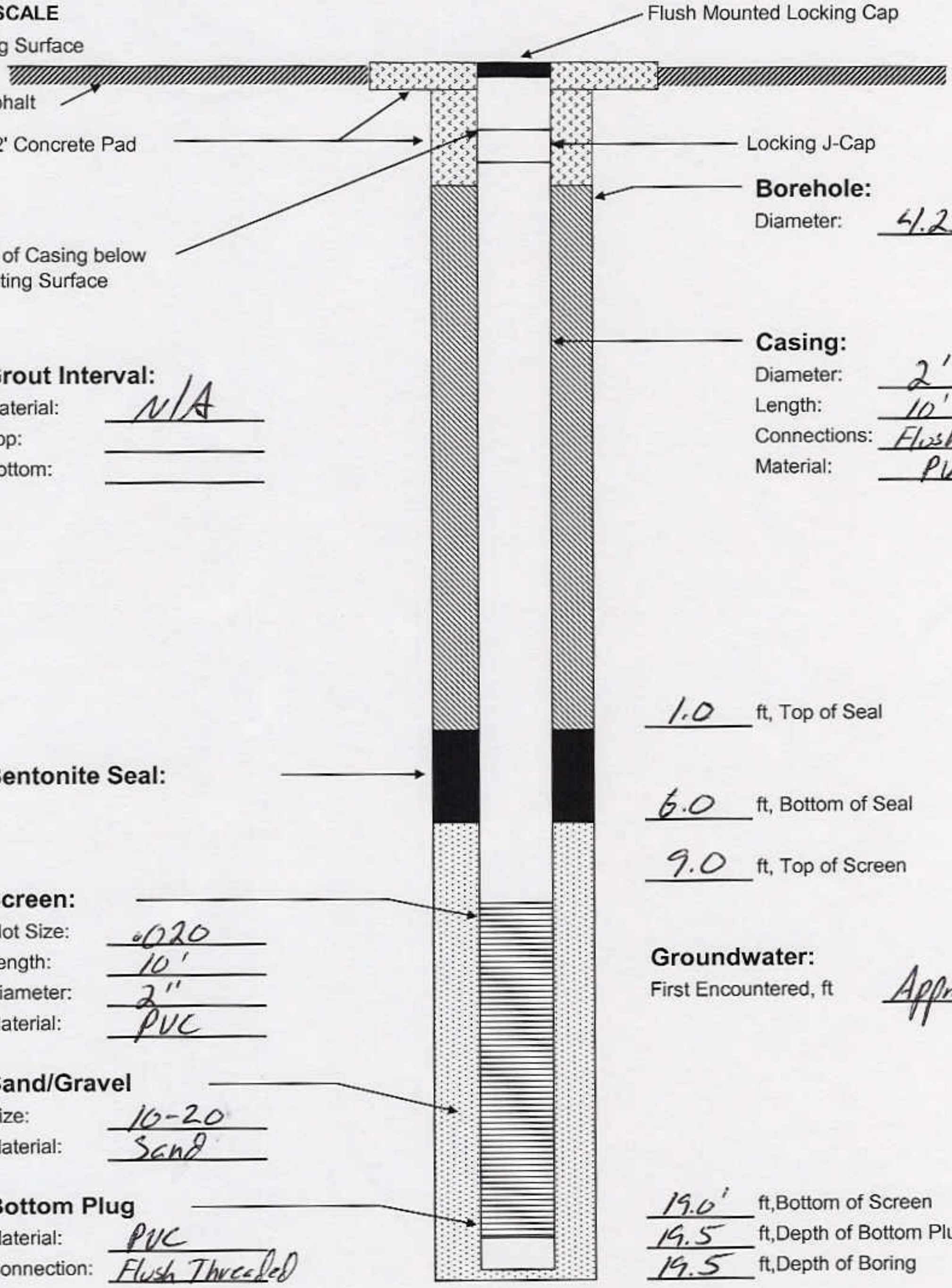
Screened Int 9-19'
T.O.S. 6
T.o.B. 1.0'

(3)

Bhate Environmental Associates

Project:	SWMU 123	Well/Boring No.:	SB02/MW02
Project No.:		Geologist:	M.E. Mumby
Boring Location:	P.O.L. Shelter	Date(s):	4/17/04
Drilling Method:	4.25" Solid Stem Auger	Drilling Contractor:	Bhate

NOT TO SCALE



Borehole:
Diameter: 4.25"

Casing:
Diameter: 2"
Length: 10'
Connections: Flush Thread
Material: PVC

Grout Interval:
Material: N/A
Top:
Bottom:

1.0 ft, Top of Seal

Bentonite Seal:

6.0 ft, Bottom of Seal

9.0 ft, Top of Screen

Screen:
Slot Size: .020
Length: 10'
Diameter: 2"
Material: PVC

Groundwater:
First Encountered, ft Approx 11.5-12.0

Sand/Gravel
Size: 10-20
Material: Sand

Bottom Plug
Material: PVC
Connection: Flush Threaded

19.0' ft, Bottom of Screen
19.5 ft, Depth of Bottom Plug
19.5 ft, Depth of Boring

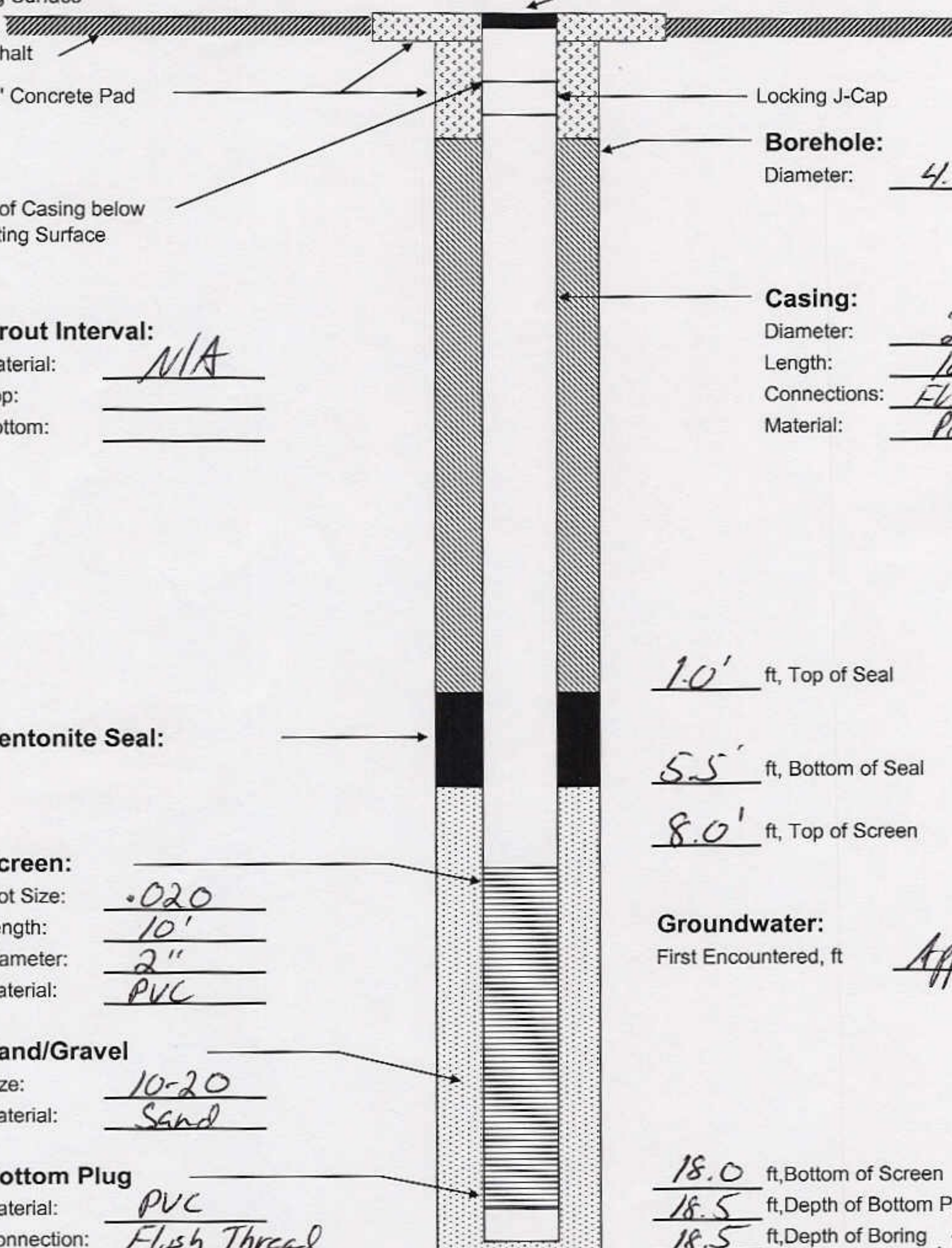
Comments:

Screened 8-18.0'
T.O.S. 5'6"
T.O.B. 1.0'

Bhate Environmental Associates

Project:	SWMU 123	Well/Boring No.:	SB03/MW0#3
Project No.:		Geologist:	M.E. Mumby
Boring Location:	P.O.L. Building	Date(s):	4/17/04
Drilling Method:	Solid Stem Auger 4.25	Drilling Contractor:	Bhate

NOT TO SCALE



Borehole:
Diameter: 4.25"

Casing:
Diameter: 2"
Length: 10'
Connections: Flush Thread
Material: PVC

Grout Interval:
Material: N/A
Top:
Bottom:

1.0' ft, Top of Seal

Bentonite Seal:

5.5' ft, Bottom of Seal

8.0' ft, Top of Screen

Screen:
Slot Size: .020
Length: 10'
Diameter: 2"
Material: PVC

Groundwater:
First Encountered, ft Approx 11.5'

Sand/Gravel
Size: 10-20
Material: Sand

Bottom Plug
Material: PVC
Connection: Flush Thread

18.0 ft, Bottom of Screen
18.5 ft, Depth of Bottom Plug
18.5 ft, Depth of Boring (Refusal)

Comments:

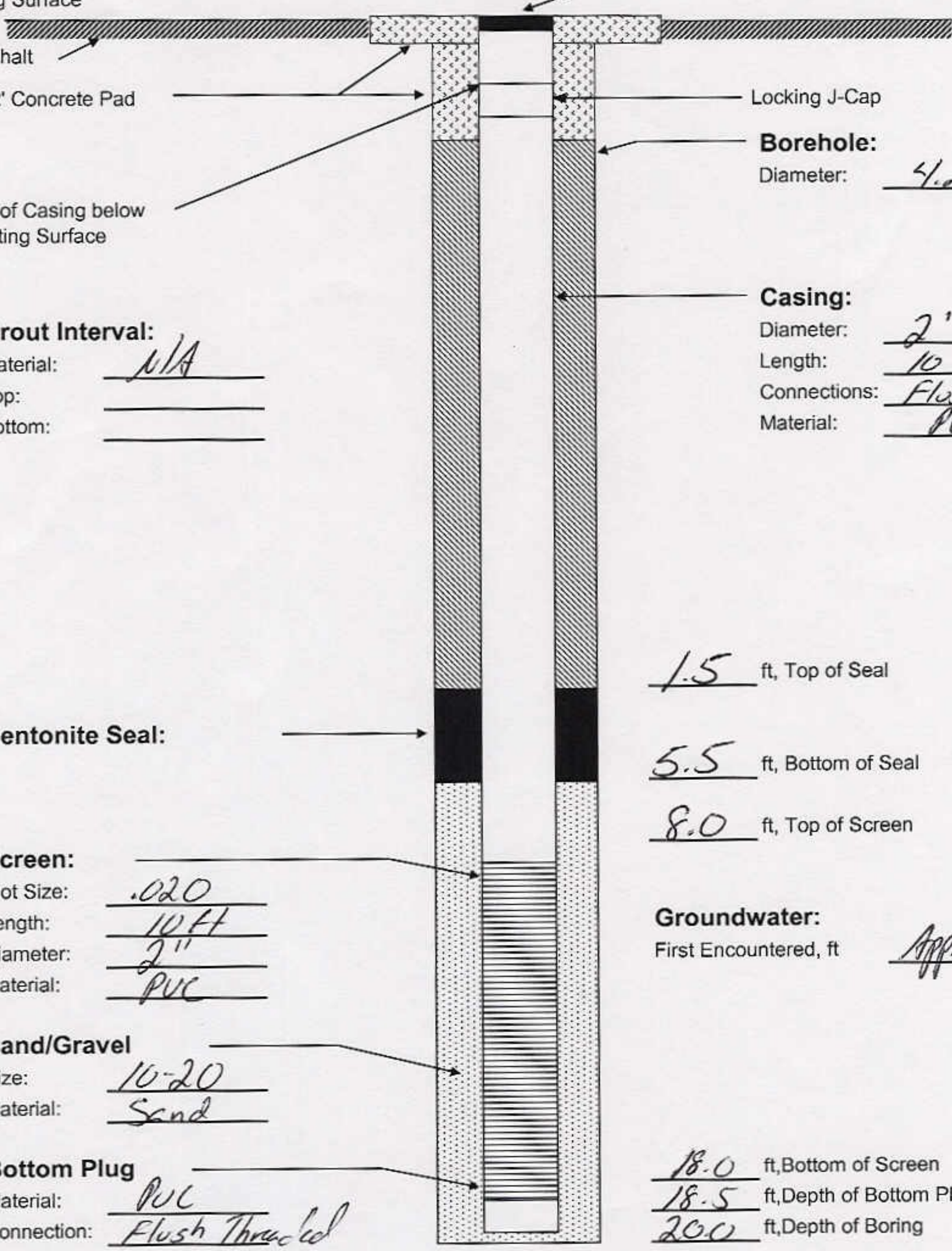
1. Screened Int 8-18.0'
2. T.O.S 5.5
3. T.O.B 1.5

(1)

Bhate Environmental Associates

Project:	SWMU 123	Well/Boring No.:	SB04/MW04
Project No.:		Geologist:	M. F. Mumby
Boring Location:	P.O.L Bldg	Date(s):	4/17/04
Drilling Method:	Solid Stem Auger 4.25"	Drilling Contractor:	Bhate

NOT TO SCALE



Borehole:
Diameter: 4.25"

Casing:
Diameter: 2"
Length: 10'
Connections: Flush Thread
Material: PVC

Grout Interval:
Material: N/A
Top:
Bottom:

1.5 ft, Top of Seal

Bentonite Seal:

5.5 ft, Bottom of Seal

8.0 ft, Top of Screen

Screen:
Slot Size: .020
Length: 10 ft
Diameter: 2"
Material: PVC

Groundwater:
First Encountered, ft: Approx 11.0'

Sand/Gravel
Size: 10-20
Material: Sand

Bottom Plug
Material: PVC
Connection: Flush Threaded

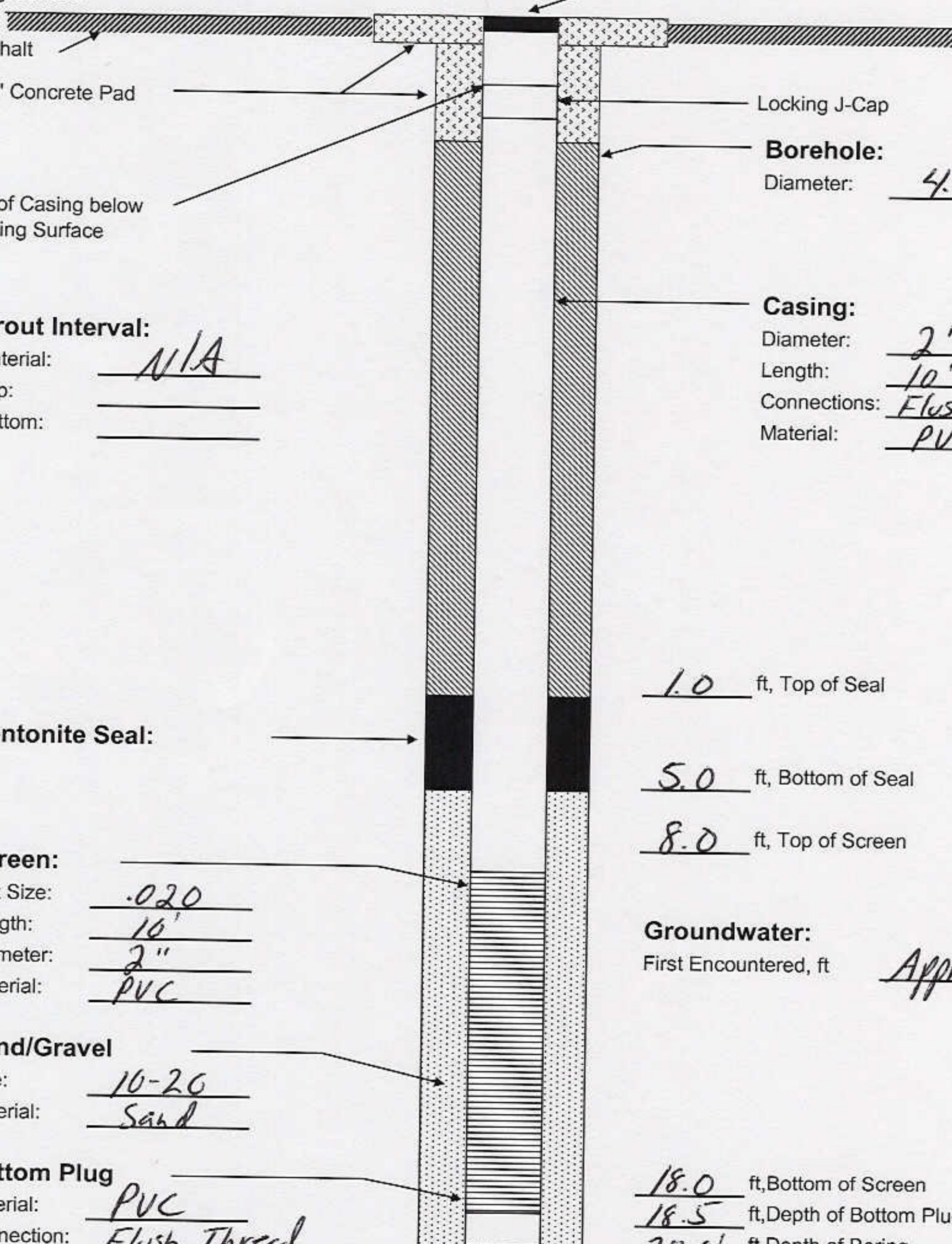
18.0 ft, Bottom of Screen
18.5 ft, Depth of Bottom Plug
20.0 ft, Depth of Boring

Comments:

Bhate Environmental Associates

Project:	SWMU 123	Well/Boring No.:	SB05/MW05
Project No.:		Geologist:	M.F. Mumby
Boring Location:	P.O.L. Bldg	Date(s):	4/19/04
Drilling Method:	4.25" Solid Stem Auger	Drilling Contractor:	Bhate

NOT TO SCALE



Existing Surface

Flush Mounted Locking Cap

Asphalt

2'x2' Concrete Pad

Locking J-Cap

Top of Casing below Existing Surface

Borehole:
Diameter: 4.25"

Casing:
Diameter: 2"
Length: 10'
Connections: Flush Thread
Material: PVC

Grout Interval:
Material: N/A
Top:
Bottom:

1.0 ft, Top of Seal

Bentonite Seal:

5.0 ft, Bottom of Seal

8.0 ft, Top of Screen

Screen:
Slot Size: .020
Length: 10'
Diameter: 2"
Material: PVC

Groundwater:
First Encountered, ft: Approx 11.0'

Sand/Gravel
Size: 10-20
Material: Sand

Bottom Plug
Material: PVC
Connection: Flush Thread.

18.0 ft, Bottom of Screen
18.5 ft, Depth of Bottom Plug
20.0' ft, Depth of Boring

Comments:

APPENDIX D

NON-AQUEOUS PHASE LIQUID FORENSICS ANALYSIS

ZymaX FORENSICS

September 27, 2004

Ms. Kristen Walker
Associated Laboratories
806 N. Batavia
Orange, CA. 92868

Project No.: 556700

Dear Ms. Walker,

Enclosed are analytical results for one NAPL sample ID LR-136832 submitted to ZymaX on September 22, 2004. The data were obtained from C3-C44 whole oil analysis by high resolution GC-FID.

My preliminary conclusion based on the analytical data indicates that the sample probably contains a mixture of gasoline, Jet fuel (or naphtha), and a mid-distillate (kerosene or diesel #1).

A detailed interpretive report discussing the chemical data, fuel type and estimate of their exposure time can be provided.

The project was performed at ZymaX forensics as Laboratory No.37316.

Please call us at **805.544.4696** if you have any questions regarding the analytical results, or you require a cost estimate for the report.

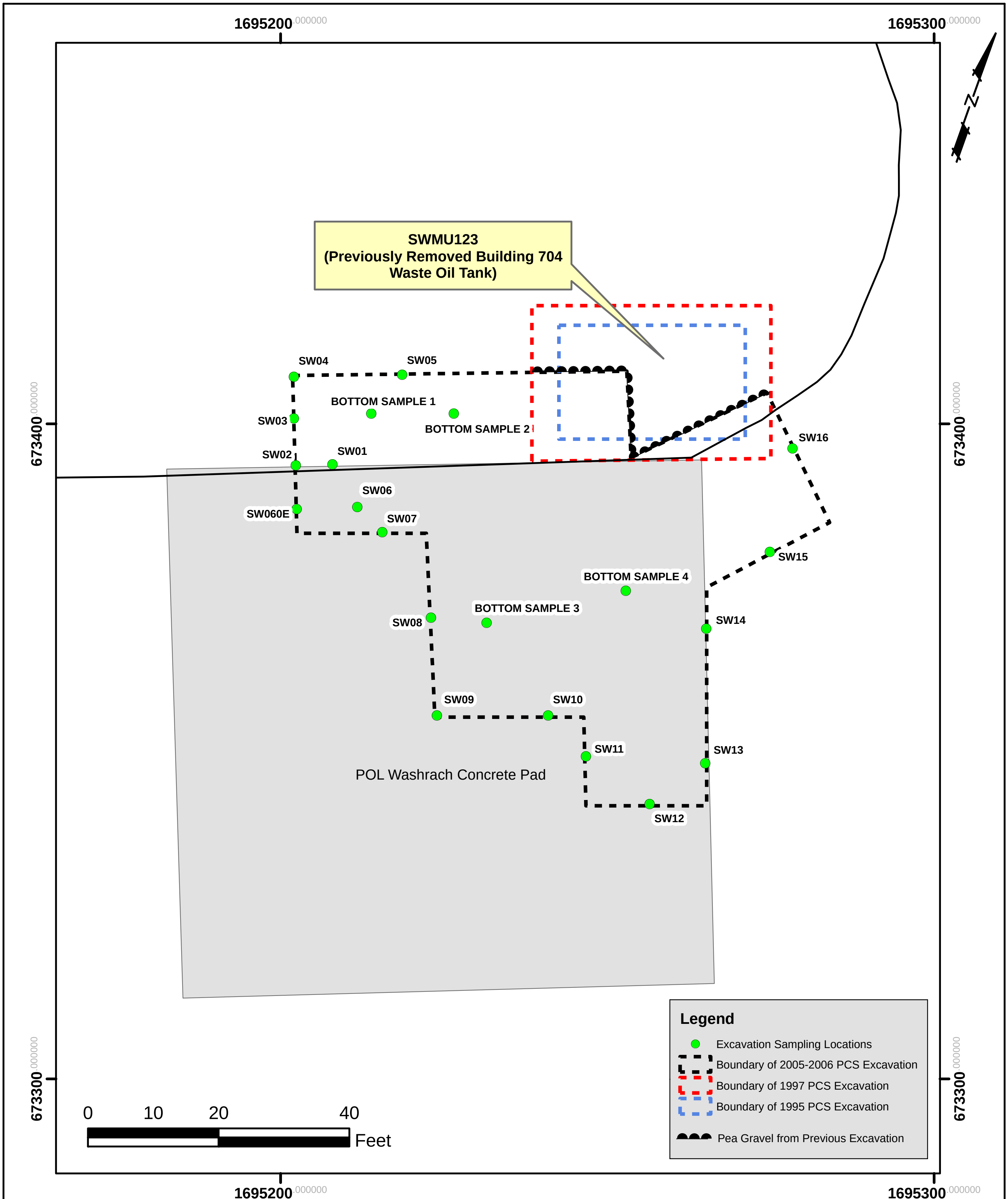
Respectfully,
ZymaX forensics

Shan-Tan Lu, Ph.D.
Director of Petroleum Geochemistry

805.544.4696
www.ZymaXusa.com

71 Zaco Lane
San Luis Obispo CA 93401
fax 805.544.8226

B-8



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

SWMU 123
Excavation Area
(January 2006)

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
9050197	1"=20'	8/26/08	cm	fig_1

SWMU 123
Voluntary Corrective Measures
Holloman AFB, New Mexico

Figure 1

Table 1
SWMU-123 Stockpiled Soil Analytical Data (October-December 2005)
Holloman AFB, New Mexico

Client Sample ID:	**Soil Screening Levels**	SWMU123-OB5-1,4		SWMU123-PCS6-4,11		SWMU123-OB18		SWMU123-PCS15	
Lab Sample ID:	**NMED**	F36078-1		F36078-2		F37043-1		F37043-2	
Date Sampled:	**Residential[1]**	10/25/2005		10/25/2005		12/2/2005		12/2/2005	
Analyte		**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**
Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Benzene	10.3	2.1	U	1400	U	2.0	U	1270	J
n-Butylbenzene	62.1	2.1	U	5590		2.0	U	7180	
sec-Butylbenzene	60.6	2.1	U	8420		2.0	U	5700	
Ethylbenzene	128	2.1	U	47400		5.6		39000	
Hexane	38	2.1	U	2270	J	2.0	U	1120	J
Isopropylbenzene	271	2.1	U	14700		2.0	U	9890	
p-Isopropyltoluene	NV	2.1	U	5370		2.0	U	3570	
Naphthalene	79.5	2.1	U	3540		2.0	J	7260	
n-Propylbenzene	62.1	2.1	U	21600		2.3	J	15600	
1,2,4-Trimethylbenzene	58	2.1	U	36300		5.2		37500	
Toluene	252	2.1	U	12800		6.7		30500	
m,p-Xylene	82	2.7	U	29600		8.3	J	46500	
o-Xylene	99.5	2.1	U	12500		3.3	J	22800	
Semi-Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
2,4-Dinitrotoluene	122	70	U	80	U	79	U	572	
Fluorene	2660	35	U	65.4	J	39	U	173	J
2-Methylnaphthalene	NV	35	U	1920		39	U	5330	
Naphthalene	79.5	35	U	816		39	U	2380	
Phenanthrene	1830	35	U	40	U	39	U	174	J
Total Petroleum Hydrocarbons	**mg/kg**	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
TPH-GRO (C6-C10)	880 [3]	2.9	U	**3220**		3.3	U	**1840**	
TPH (C10-C22)	880 [3]	5.2	U	549		6.0	U	**1100**	
TPH (>C22-C36)	880 [3]	27.2		60	U	6.0	U	NA	
General Chemistry		**%**		**%**		**%**		**%**	
Solids, Percent	NV	94.2		83.3		82.9		77.3	

Notes:
NMED = New Mexico Environmental Department
TPH = Total Petroleum Hydrocarbons
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
NV = No Value
NA = Not Analyzed
Q = Qualifier
U = Not detected
J = Estimated result. Result is between the Method Detection Limit (MDL) and the Reporting Limit (RL), and/or qualified by the validating chemist (see Appendix H).
[1]NMED, June 2006. Technical Background Document for Development of Soil Screening Levels, Revision 4.0. (Residential Soil)
[2] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
[3] NMED, October 2006. TPH Screening Guidelines (Diesel #2/crankcase oil, Residential Direct Exposure)
Bold value indicate analytes above NMED Soil Screening Levels (Rev 4.0, Jun 2006) or combined TPH results above NMED TPH Screening Guidelines for Diesel #2/crankcase oil (Table 2b., Oct 2006)

Table 2
SWMU 123 Excavation Soil Analytical Data (October 2005-January 2006)
Holloman AFB, New Mexico

Client Sample ID:	Soil Screening Levels	SWMU123-SW01-6		SWMU123-SW02-6		SWMU123-SW03-6		SWMU123-SW04-6		SWMU123-SW05-6		SWMU123-SW06	
Lab Sample ID:	NMED	F35744-1		F35744-2		F35744-3		F35744-4		F35744-5		F37432-1	
Date Sampled:	Residential[1]	10/13/2005		10/13/2005		10/13/2005		10/13/2005		10/13/2005		12/19/2005	
Analyte		**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**
Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Acetone	28100	29	U	31	U	31	U	28	U	31	U	75.2	J
Benzene	10.3	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
n-Butylbenzene	62.1	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
sec-Butylbenzene	60.6	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	13.9	
Chloroform	4	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
Ethylbenzene	128	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
Ethyl methacrylate	52.7	5.8	U	6.2	U	6.2	U	5.7	U	6.3	U	7.6	U
Hexane	38	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
Isopropylbenzene	271	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
p-Isopropyltoluene	NV	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
Naphthalene	79.5	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
n-Propylbenzene	62.1	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
Styrene	100	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
1,2,4-Trimethylbenzene	58	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
1,3,5-Trimethylbenzene	24.8	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
Toluene	252	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
m,p-Xylene	82	2.9	U	3.1	U	3.1	U	2.8	U	3.1	U	3.8	U
o-Xylene	99.5	2.3	U	2.5	U	2.5	U	2.3	U	2.5	U	3.1	U
Semi-Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Benzo(g,h,i)perylene	NV	84	U	88	U	86	U	78	U	86	U	89	U
Diethyl phthalate	48900	110	U	1510		110	U	98	U	110	U	110	U
bis(2-Ethylhexyl)phthalate	347	210	U	220	U	220	U	200	U	220	U	659	
Fluorene	2660	42	U	53.2	J	43	U	39	U	43	U	45	U
2-Methylnaphthalene	NV	42	U	292		43	U	39	U	43	U	45	U
Naphthalene	79.5	42	U	50.9	J	43	U	39	U	43	U	45	U
Total Petroleum Hydrocarbons	**mg/kg**	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
TPH-GRO (C6-C10)	880 [3]	3.7	U	3.9	U	4.2	U	3.4	U	3.7	U	77	U
TPH (C10-C22)	880 [3]	6.4	U	6.7	U	6.5	U	5.9	U	6.4	U	130	U
TPH (>C22-C36)	880 [3]	6.4	U	6.7	U	6.5	U	5.9	U	6.4	U	818	
General Chemistry		**%**		**%**		**%**		**%**		**%**		**%**	
Solids, Percent	NV	77.8		74.4		75.9		83.2		77.2		74.3	

Notes:

NMED = New Mexico Environment Department

TAL = Target Analyte List
UTL = Upper Tolerance Limit
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
NV = No Value
Q = Qualifier
U = Not detected
J = Indicates an estimated value

[1]NMED, June 2006. Technical Background Document for Development of Soil Screening Levels, Revision 4.0.

[2] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)

[3] NMED, October 2006. TPH Screening Guidelines (Diesel #2/crankcase oil, Residential Direct Exposure)

Bold value indicate analytes above NMED Soil Screening Levels (Rev 4.0, Jun 2006) or combined TPH results above NMED TPH Screening Guidelines for Diesel #2/crankcase oil (Table 2b., Oct 2006)

Table 2
SWMU 123 Excavation Soil Analytical Data (October 2005-January 2006)
Holloman AFB, New Mexico

Client Sample ID:	**Soil Screening Levels**	SWMU123-SW06-OE		SWMU123-SW07		SWMU123-SW08		SWMU123-SW08-OE		SWMU123-SW09		SWMU123-SW09-FD	
Lab Sample ID:	**NMED**	F37721-1		F37432-2		F37432-3		F37741-3		F37432-4		F37432-5	
Date Sampled:	**Residential**[1]	1/9/2006		12/19/2005		12/19/2005		1/9/2006		12/19/2005		12/19/2005	
Analyte		**Result**[2]	**Q**	**Result**[2]	**Q**	**Result**[2]	**Q**	**Result**[2]	**Q**	**Result**[2]	**Q**	**Result**[2]	**Q**
Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Acetone	28100	30	U	34	U	37	U	38.4	J	28	U	29	U
Benzene	10.3	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
n-Butylbenzene	62.1	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
sec-Butylbenzene	60.6	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
Chloroform	4	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
Ethylbenzene	128	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
Ethyl methacrylate	52.7	5.9	U	6.8	U	7.4	U	5.5	U	5.5	U	5.7	U
Hexane	38	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
Isopropylbenzene	271	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
p-Isopropyltoluene	NV	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
Naphthalene	79.5	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
n-Propylbenzene	62.1	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
Styrene	100	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
1,2,4-Trimethylbenzene	58	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
1,3,5-Trimethylbenzene	24.8	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
Toluene	252	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
m,p-Xylene	82	3.0	U	3.4	U	3.7	U	2.7	U	2.8	U	2.9	U
o-Xylene	99.5	2.4	U	2.7	U	2.9	U	2.2	U	2.2	U	2.3	U
Semi-Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Benzo(g,h,i)perylene	NV	89	U	83	U	81	U	79	U	82	U	85	U
Diethyl phthalate	48900	110	U	100	U	100	U	98	U	100	U	110	U
bis(2-Ethylhexyl)phthalate	347	220	U	974		200	U	200	U	210	U	210	U
Fluorene	2660	44	U	42	U	41	U	39	U	41	U	42	U
2-Methylnaphthalene	NV	44	U	42	U	41	U	73.6	J	41	U	42	U
Naphthalene	79.5	44	U	42	U	41	U	106	J	41	U	42	U
Total Petroleum Hydrocarbons	**mg/kg**	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
TPH-GRO (C6-C10)	880 [3]	14.9		5.2	U	78	U	3.2	U	3.5	U	70	U
TPH (C10-C22)	880 [3]	17.2		31	U	6.2	U	5.9	U	6.1	U	6.4	U
TPH (>C22-C36)	880 [3]	16.6		296		13.0		17.9		7.53	J	6.4	U
General Chemistry		**%**		**%**		**%**		**%**		**%**		**%**	
Solids, Percent	NV	73.2		80.1		79.8		82.7		79.6		78.4	

Notes:

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TAL = Target Analyte List
UTL = Upper Tolerance Limit
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
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Q = Qualifier
U = Not detected
J = Indicates an estimated value

[1]NMED, June 2006. Technical Background Document for Development of Soil Screening Levels, Revision 4.0.

[2] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)

[3] NMED, October 2006. TPH Screening Guidelines (Diesel #2/crankcase oil, Residential Direct Exposure)

Bold value indicate analytes above NMED Soil Screening Levels (Rev 4.0, Jun 2006) or combined TPH results above NMED TPH Screening Guidelines for Diesel #2/crankcase oil (Table 2b., Oct 2006)

Table 2
SWMU 123 Excavation Soil Analytical Data (October 2005-January 2006)
Holloman AFB, New Mexico

Client Sample ID:	**Soil Screening Levels**	SWMU123-SW010		SWMU123-SW011		SWMU123-SW012		SWMU123-SW013		SWMU123-SW014		SWMU123-SW15	
Lab Sample ID:	**NMED**	F37432-6		F37432-7		F37432-8		F37432-9		F37432-10		F37783-1	
Date Sampled:	**Residential[1]**	12/19/2005		12/19/2005		12/19/2005		12/19/2005		12/19/2005		1/11/2006	
Analyte		**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**
Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Acetone	28100	53.7	J	37.2	J	31	U	35	U	44.4	J	27	U
Benzene	10.3	54.9		14.3		5.5	J	2.8	U	2.7	U	2.2	U
n-Butylbenzene	62.1	2.7	U	2.6	U	2.5	U	2.8	U	12.3		2.2	U
sec-Butylbenzene	60.6	2.7	U	2.6	U	2.5	U	2.8	U	57.8		2.2	U
Chloroform	4	2.7	U	2.6	U	2.5	U	2.8	U	2.7	U	2.2	U
Ethylbenzene	128	2.7	U	2.6	U	2.5	U	2.8	U	11.3		2.2	U
Ethyl methacrylate	52.7	6.6	U	6.4	U	6.2	U	7.0	U	6.7	U	5.4	U
Hexane	38	2.7	U	2.6	U	2.5	U	2.8	U	2.7	U	2.2	U
Isopropylbenzene	271	2.7	U	2.6	U	2.5	U	2.8	U	19.7		2.2	U
p-Isopropyltoluene	NV	2.7	U	2.6	U	2.5	U	2.8	U	2.7	U	2.2	U
Naphthalene	79.5	2.7	U	2.6	U	2.5	U	2.8	U	2.7	U	2.2	U
n-Propylbenzene	62.1	2.7	U	2.6	U	2.5	U	2.8	U	21.8		2.2	U
Styrene	100	2.7	U	2.6	U	2.5	U	2.8	U	2.7	U	2.2	U
1,2,4-Trimethylbenzene	58	2.7	U	2.6	U	2.5	U	2.8	U	2.7	U	2.2	U
1,3,5-Trimethylbenzene	24.8	2.7	U	2.6	U	2.5	U	2.8	U	2.7	U	2.2	U
Toluene	252	2.7	U	2.6	U	4.9	J	2.8	U	2.7	U	2.2	U
m,p-Xylene	82	3.3	U	3.2	U	6.5	J	3.5	U	3.3	U	2.7	U
o-Xylene	99.5	2.7	U	2.6	U	2.5	U	2.8	U	2.7	U	2.2	U
Semi-Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Benzo(g,h,i)perylene	NV	89	U	92	U	91	U	88	U	92	U	78	U
Diethyl phthalate	48900	110	U	110	U	110	U	110	U	110	U	98	U
bis(2-Ethylhexyl)phthalate	347	220	U	230	U	230	U	220	U	230	U	200	U
Fluorene	2660	45	U	46	U	45	U	44	U	46	U	39	U
2-Methylnaphthalene	NV	45	U	46	U	45	U	44	U	47.8	J	39	U
Naphthalene	79.5	45	U	46	U	45	U	44	U	46	U	39	U
Total Petroleum Hydrocarbons	**mg/kg**	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
TPH-GRO (C6-C10)	880 [3]	91	U	4.2	U	4.2	U	4.1	U	67.3		3.6	U
TPH (C10-C22)	880 [3]	6.8	U	6.9	U	6.8	U	6.7	U	57.6		6.0	U
TPH (>C22-C36)	880 [3]	9.70	J	6.9	U	9.04	J	6.7	U	15.6		6.0	U
General Chemistry		**%**		**%**		**%**		**%**		**%**		**%**	
Solids, Percent	NV	73.7		70.8		71.9		74.3		71.1		82.1	

Notes:

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µg/kg = micrograms per kilogram
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Bold value indicate analytes above NMED Soil Screening Levels (Rev 4.0, Jun 2006) or combined TPH results above NMED TPH Screening Guidelines for Diesel #2/crankcase oil (Table 2b., Oct 2006)

Table 2
SWMU 123 Excavation Soil Analytical Data (October 2005-January 2006)
Holloman AFB, New Mexico

Client Sample ID:	Soil Screening Levels	SWMU123-SW16		SWMU123-BOTTOM1-11,13		SWMU123-BOTTOM2-11,13		SWMU123-BOTTOM-03		SWMU123-BOTTOM-04	
Lab Sample ID:	NMED	F37783-2		F36173-1		F36173-2		F37741-1		F37741-2	
Date Sampled:	Residential[1]	1/11/2006		10/27/2005		10/27/2005		1/9/2006		1/9/2006	
Analyte		**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**	**Result[2]**	**Q**
Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Acetone	28100	32	U	35	U	28	U	82.6		1600	U
Benzene	10.3	2.6	U	2.8	U	57.5		23.3		130	U
n-Butylbenzene	62.1	2.6	U	2.8	U	2.2	U	32.9		470	
sec-Butylbenzene	60.6	2.6	U	2.8	U	3.9	J	44.9		1380	
Chloroform	4	2.6	U	2.8	U	2.2	U	7.7		130	U
Ethylbenzene	128	2.6	U	22.7		33.0		203	J	2540	
Ethyl methacrylate	52.7	6.4	U	7.0	U	6.1	J	32.4		330	U
Hexane	38	2.6	U	2.8	U	2.2	U	44.6	J	130	U
Isopropylbenzene	271	2.6	U	4.7	J	6.0		75.8		1410	
p-Isopropyltoluene	NV	2.6	U	2.8	U	3.7	J	30.9		408	
Naphthalene	79.5	2.6	U	2.8	U	2.2	U	34.0		952	
n-Propylbenzene	62.1	2.6	U	5.2	J	3.6	J	87.0		2670	
Styrene	100	2.6	U	2.8	U	2.2	U	2.1	U	130	U
1,2,4-Trimethylbenzene	58	2.6	U	14.8		23.0		327		3210	
1,3,5-Trimethylbenzene	24.8	2.6	U	4.3	J	14.5		112		886	
Toluene	252	2.6	U	2.8	U	159		238	J	234	J
m,p-Xylene	82	3.2	U	20.9		58.3		353		829	
o-Xylene	99.5	2.6	U	2.8	U	40.8		155		366	
Semi-Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Benzo(g,h,i)perylene	NV	77	U	90	U	257		79	U	82	U
Diethyl phthalate	48900	96	U	110	U	110	U	99	U	100	U
bis(2-Ethylhexyl)phthalate	347	190	U	220	U	220	U	200	U	210	U
Fluorene	2660	38	U	45	U	44	U	39	U	41	U
2-Methylnaphthalene	NV	38	U	45	U	44	U	876		42.3	J
Naphthalene	79.5	38	U	45	U	44	U	2310		41	U
Total Petroleum Hydrocarbons	**mg/kg**	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
TPH-GRO (C6-C10)	880 [3]	3.4	U	4.4	U	13.3		21.4		203	
TPH (C10-C22)	880 [3]	5.9	U	6.9	U	7.13	J	21.0		10.1	
TPH (>C22-C36)	880 [3]	5.9	U	6.9	U	19.2		18.4		7.57	J
General Chemistry		**%**		**%**		**%**		**%**		**%**	
Solids, Percent	NV	84.7		72.7		74.7		84.6		80.6	

Notes:

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Bold value indicate analytes above NMED Soil Screening Levels (Rev 4.0, Jun 2006) or combined TPH results above NMED TPH Screening Guidelines for Diesel #2/crankcase oil (Table 2b., Oct 2006)

AUG 19 - NOV 30
2005

FT 31
LANDFARM

TRUCK LOG
FROM SWMU 123

Date	Time	Truck number	Driver's name	Volume	Unit	Cell Placement	Over Burden	Desc. of Cont.	Fid	Pid	Cumulative
09/27/05	7:45		R. Jones	5	CY	A-1		PCS (JP4)			5
09/27/05	9:20		R. Jones	5	CY	A-1		PCS (JP4)			10
09/27/05	10:27		R. Jones	5	CY		X	PCS (JP4)			15
09/27/05	10:38		R. Jones	5	CY		X	PCS (JP4)			20
09/27/05	11:15		R. Jones	5	CY		X	PCS (JP4)			25
09/27/05	12:15		R. Jones	5	CY		X	PCS (JP4)			30
09/27/05	12:40		R. Jones	5	CY		X	PCS (JP4)			35
09/27/05	13:00		R. Jones	5	CY		X	PCS (JP4)			40
09/27/05	13:51		R. Jones	5	CY	A-1		PCS (JP4)			45
09/27/05	14:32		S. Chesters	5	CY	A-1		PCS (JP4)			50
09/28/05	8:16		R. Jones	5	CY	A-1		PCS (JP4)			55
09/28/05	8:43		R. Jones	5	CY		X	PCS (JP4)			60
09/28/05	9:55		R. Jones	5	CY	A-1		PCS (JP4)			65
09/28/05	10:22		R. Jones	5	CY	A-1		PCS (JP4)			70
09/28/05	10:56		R. Jones	5	CY	A-1		PCS (JP4)			75
09/28/05	12:28		R. Jones	5	CY	A-1		PCS (JP4)			80
09/28/05	14:52		R. Jones	5	CY	A-1		PCS (JP4)			85
09/30/05	8:14		R. Jones	4	CY	A-1		PCS (JP4)			89
09/30/05	1-:06		R. Jones	5	CY		X	PCS (JP4)			94
09/30/05	10:44		R. Jones	5	CY		X	PCS (JP4)			99
09/30/05	11:12		R. Jones	5	CY		X	PCS (JP4)			104
09/30/05	14:09		R. Jones	5	CY		X	PCS (JP4)			109
09/30/05	14:48		R. Jones	5	CY		X	PCS (JP4)			114
10/03/05	8:06		R. Jones	5	CY	A-1		PCS (JP4)			119
10/03/05	9:24		R. Jones	5	CY	A-1		PCS (JP4)			124
10/03/05	9:57		R. Jones	5	CY		X	PCS (JP4)			129
10/03/05	10:32		R. Jones	5	CY	A-1		PCS (JP4)			134
10/03/05	12:01		R. Jones	5	CY	A-1		PCS (JP4)			139
10/03/05	12:39		R. Jones	5	CY	A-1		PCS (JP4)			144
10/03/05	13:22		R. Jones	5	CY	A-1		PCS (JP4)			149
10/03/05	14:21		R. Jones	5	CY	A-1		PCS (JP4)			154
10/24/05	8:30		R. Jones	6	CY		X	PCS (JP4)			160
10/24/05	8:51		R. Jones	6	CY		X	PCS (JP4)			166
10/24/05	9:15		R. Jones	6	CY		X	PCS (JP4)			172
10/24/05	9:59		R. Jones	6	CY		X	PCS (JP4)			178

TRUCK LOG
FROM SWMU 123

Date	Time	Truck number	Driver's name	Volume	Unit	Cell Placement	Over Burden	Desc. of Cont.	Fid	Pid	Cumulative
10/24/05	10:20		R. Jones	6	CY	A-2		PCS (JP4)			184
10/24/05	10:48		R. Jones	6	CY	A-2		PCS (JP4)			190
10/24/05	11:40		R. Jones	6	CY	A-2		PCS (JP4)			196
10/24/05	12:11		R. Jones	6	CY	A-2		PCS (JP4)			202
10/24/05	12:42		R. Jones	6	CY	A-2		PCS (JP4)			208
10/24/05	13:09		R. Jones	6	CY	A-2		PCS (JP4)			214
10/24/05	13:39		R. Jones	6	CY	A-2		PCS (JP4)			220
10/24/05	14:37		R. Jones	6	CY	A-2		PCS (JP4)			226
10/24/05	15:12		R. Jones	6	CY	A-2		PCS (JP4)	240	30	232
10/25/05	8:06		S. Chesters	2	CY	A-2		PCS (JP4)			234
10/25/05	8:35		S. Chesters	5	CY		X	PCS (JP4)			239
10/25/05	9:10		S. Chesters	5	CY		X	PCS (JP4)			244
10/25/05	9:41		S. Chesters	5	CY		X	PCS (JP4)			249
10/25/05	10:21		S. Chesters	5	CY		X	PCS (JP4)			254
10/25/05	10:49		S. Chesters	5	CY		X	PCS (JP4)			259
10/25/05	11:14		S. Chesters	5	CY	A-2		PCS (JP4)			264
10/25/05	12:08		S. Chesters	5	CY	A-2		PCS (JP4)			269
10/25/05	12:50		S. Chesters	5	CY	A-2		PCS (JP4)			274
10/25/05	13:45		S. Chesters	5	CY	A-2		PCS (JP4)			279
10/25/05	14:18		R. Wood	5	CY	A-2		PCS (JP4)			284
10/26/05	9:04		R. Wood	5	CY	A-2		PCS (JP4)			289
10/26/05	9:38		R. Wood	5	CY	A-2		PCS (JP4)			294
10/26/05	10:14		R. Wood	5	CY	A-2		PCS (JP4)			299
10/26/05	10:48		R. Wood	5	CY	A-2		PCS (JP4)			304
10/26/05	13:56		R. Wood	5	CY	A-2		PCS (JP4)			309
11/17/05	13:09	FORD	R. Jones	5	CY	Reuse Yard		Concrete			314
11/17/05	13:47	FORD	R. Jones	5	CY	Reuse Yard		PCS (JP4)			319
11/17/05	14:28	FORD	R. Jones	5	CY	Reuse Yard		PCS (JP4)			324
11/18/05	8:02	FORD	R. Jones	5	CY	Reuse Yard		PCS (JP4)			329
11/18/05	9:04	4023	R. Jones	10	CY	Reuse Yard		PCS (JP4)			339
11/18/05	9:04	FORD	S. Chesters	5	CY	Reuse Yard		PCS (JP4)			344
11/18/05	10:46	4023	R. Jones	10	CY	Reuse Yard		PCS (JP4)			354
11/18/05	12:53	4023	R. Jones	10	CY	Reuse Yard		PCS (JP4)			364
11/21/05	9:00	4023	R. Jones	10	CY	Reuse Yard		PCS (JP4)			374
11/21/05	11:00	4023	R. Wood	10	CY	Reuse Yard		PCS (JP4)			384

AUG 19 - NOV 30
2005

TRUCK LOG
FROM SWMU 123

FT 31
LANDFARM

Date	Time	Truck number	Driver's name	Volume	Unit	Cell Placement	Over Burden	Desc. of Cont.	Fid	Pid	Cumulative
11/21/05	2:00	FORD	R. Wood	5	CY	Reuse Yard		PCS (JP4)			389
11/22/05	9:00	4023	R. Wood	10	CY	Reuse Yard		PCS (JP4)			399
11/22/05	11:00	4023	R. Wood	10	CY	Reuse Yard		PCS (JP4)			409
11/22/05	2:00	4023	R. Wood	10	CY	Reuse Yard		PCS (JP4)			419
11/23/05	1:13	4023	T. Lucero	16	CY		X	PCS (JP4)			435
11/23/05	1:35	5 Yd	T. Lucero	5	CY		X	PCS (JP4)			440
11/23/05	2:25	4023	T. Lucero	16	CY	A-2		PCS (JP4)			456
11/28/05	8:54	5 YD	R. Wood	5	CY		X	PCS (JP4)			461
11/28/05	9:20	5 YD	R. Wood	5	CY		X	PCS (JP4)			466
11/28/05	9:50	5 YD	R. Wood	5	CY		X	PCS (JP4)			471
11/28/05	10:16	5 YD	R. Wood	5	CY		X	PCS (JP4)			476
11/28/05	11:15	5 YD	R. Wood	5	CY	A-2		PCS (JP4)			481
11/28/05	12:47	5 YD	R. Wood	5	CY		X	PCS (JP4)			486
11/28/05	1:40	5 YD	R. Wood	5	CY		X	PCS (JP4)			491
11/28/05	2:29	5 YD	R. Wood	5	CY	A-2		PCS (JP4)			496
11/28/05	3:09	5 YD	R. Wood	5	CY		X	PCS (JP4)			501
11/28/05	3:30	5 YD	R. Wood	5	CY	B-1		PCS (JP4)			506
11/28/05	8:40	4023	E. Gamboa	15	CY		X	PCS (JP4)			521
11/28/05	9:50	4023	E. Gamboa	10	CY	A-2		PCS (JP4)			531
11/28/05	11:00	4023	E. Gamboa	10	CY		X	PCS (JP4)			541
11/28/05	12:00	4023	E. Gamboa	10	CY		X	PCS (JP4)			551
11/28/05	13:30	4023	E. Gamboa	15	CY		X	PCS (JP4)			566
11/28/05	14:03	4023	E. Gamboa	10	CY	A-2		PCS (JP4)			576
11/28/05	14:43	4023	E. Gamboa	15	CY		X	PCS (JP4)			591
11/28/05	15:20	4023	E. Gamboa	10	CY		X	PCS (JP4)			601

ALL SOIL FROM POL WASH RACK SWMU 123

TRUCK LOGS
QUARTER 10 FT-31 LANDFARM

Date	Time	Truck number	Driver's name	Volume	Unit	Cell Placement	Over Burden	Desc. of Cont.
11/29/05	9:07	FORD	R. Jones	5	CY		X	
11/29/05	9:22	FORD	R. Jones	5	CY		X	
11/29/05	9:35	FORD	R. Jones	5	CY		X	
11/29/05	9:52	FORD	R. Jones	5	CY		X	
11/29/05	10:20	FORD	R. Jones	5	CY		X	
11/29/05	10:40	FORD	R. Jones	5	CY		X	
11/29/05	10:56	FORD	R. Jones	5	CY		X	
11/29/05	11:20	FORD	R. Jones	5	CY		X	
11/29/05	12:33	FORD	R. Jones	5	CY	B-1		PCS (JP4)
11/29/05	13:02	FORD	R. Jones	5	CY	B-1		PCS (JP4)
11/29/05	13:18	FORD	R. Jones	5	CY		X	
11/29/05	13:30	FORD	R. Jones	5	CY		X	
11/29/05	13:41	FORD	R. Jones	5	CY		X	
11/29/05	13:57	FORD	R. Jones	5	CY		X	
11/29/05	14:10	FORD	R. Jones	5	CY		X	
11/29/05	14:29	FORD	R. Jones	5	CY		X	
11/29/05	15:01	FORD	R. Jones	5	CY		X	
11/29/05	8:35	4023	R. Jones	12	CY	Reuse Yard	Concrete	
11/29/05	12:16	4023	R. Jones	10	CY		X	
11/29/05	1:15	4023	R. Jones	5	CY	B-1		PCS (JP4)
11/29/05	1:48	4023	R. Jones	10	CY		X	
11/29/05	2:40	4023	R. Jones	10	CY		X	
11/30/05	8:31	FORD	R. Jones	5	CY		X	
11/30/05	8:49	FORD	R. Jones	5	CY	B-1		PCS (JP4)
11/30/05	9:39	FORD	R. Jones	5	CY	B-1		PCS (JP4)
11/30/05	10:14	FORD	R. Wood	5	CY		X	
11/30/05	10:28	FORD	R. Jones	5	CY		X	
11/30/05	10:45	FORD	R. Wood	5	CY		X	
11/30/05	11:02	FORD	R. Jones	5	CY	B-1		PCS (JP4)
11/30/05	12:25	FORD	R. Wood	5	CY		X	
11/30/05	12:40	FORD	R. Wood	5	CY	B-1		PCS (JP4)
11/30/05	1:00	FORD	R. Wood	5	CY	B-1		PCS (JP4)
11/30/05	1:19	FORD	R. Jones	5	CY	B-1		PCS (JP4)
11/30/05	1:54	FORD	R. Jones	5	CY	B-1		PCS (JP4)
11/30/05	2:52	FORD	R. Jones	6	CY	B-1		PCS (JP4)

TRUCK LOGS
QUARTER 10 FT-31 LANDFARM

ALL SOIL FROM POL WASH RACK SWMU 123

Date	Time	Truck number	Driver's name	Volume	Unit	Cell Placement	Over Burden	Desc. of Cont.
11/30/05	8:22	4023	R. Jones	12	CY		X	
11/30/05	10:10	4023	R. Jones	7	CY	B-1		PCS (JP4)
11/30/05	10:51	4023	R. Jones	7	CY		X	
11/30/05	12:16	4023	R. Jones	10	CY	B-1		PCS (JP4)
11/30/05	13:11	4023	R. Jones	12	CY	B-1		PCS (JP4)
11/30/05	14:31	4023	R. Jones	10	CY	B-1		PCS (JP4)
11/30/05	15:15	4023	R. Jones	10	CY	B-1		PCS (JP4)
12/01/05	8:08	FORD	R. Jones	5	CY	B-1		PCS (JP4)
12/01/05	8:36	FORD	R. Jones	5	CY	B-1		PCS (JP4)
12/01/05	10:22	FORD	R. Jones	5	CY	B-1		PCS (JP4)
12/01/05	8:26	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/01/05	11:46	4023	R. Jones	14	CY	B-1		PCS (JP4)
12/01/05	12:26	4023	R. Jones	15	CY	B-1		PCS (JP4)
12/01/05	12:56	4023	R. Jones	12	CY		X	
12/01/05	13:31	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/01/05	14:27	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/01/05	14:56	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/02/05	8:14	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/02/05	9:33	4023	R. Jones	10	CY	B-1		PCS (JP4)
12/02/05	10:08	4023	R. Jones	12	CY		X	
12/02/05	10:37	4023	R. Jones	12	CY		X	
12/02/05	12:20	4023	R. Jones	12	CY		X	
12/02/05	13:02	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/02/05	13:44	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/02/05	14:31	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/02/05	15:05	4023	R. Jones	12	CY	B-1		PCS (JP4)
12/05/05	9:25	4023	R. Wood	12	CY	B-1		PCS (JP4)
12/05/05	10:17	4023	R. Wood	12	CY	B-1		PCS (JP4)
12/05/05	10:46	4023	R. Wood	12	CY		X	
12/05/05	12:00	4023	R. Wood	12	CY		X	
12/05/05	12:40	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/05/05	13:30	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/05/05	14:40	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/05/05	15:15	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/06/05	8:52	4023	R. Wood	12	CY	B-2		PCS (JP4)

ALL SOIL FROM POL WASH RACK SWMU 123

TRUCK LOGS
QUARTER 10 FT-31 LANDFARM

Date	Time	Truck number	Driver's name	Volume	Unit	Cell Placement	Over Burden	Desc. of Cont.
12/06/05	11:06	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/06/05	12:32	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/06/05	13:19	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/06/05	14:21	4023	R. Wood	12	CY		X	
12/06/05	14:50	4023	R. Wood	10	CY		X	
12/07/05	8:42	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/07/05	9:40	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/07/05	11:08	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/07/05	13:00	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/07/05	14:00	4023	R. Wood	12	CY		X	
12/07/05	14:57	4023	R. Wood	12	CY		X	
12/08/05	10:14	4023	R.Wood	12	CY	B-2		PCS (JP4)
12/08/05	12:53	4023	R.Wood	12	CY	B-2		PCS (JP4)
12/08/05	13:38	4023	R.Wood	12	CY	B-2		PCS (JP4)
12/08/05	14:34	4023	R.Wood	12	CY	B-2		PCS (JP4)
12/09/05	8:22	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/09/05	9:56	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/09/05	10:49	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/09/05	13:27	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/09/05	14:53	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/12/05	9:33	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/12/05	10:32	4023	R. Wood	12	CY	B-2		PCS (JP4)
12/12/05	12:33	4023	R. Wood	12	CY	B-3		PCS (JP4)
12/12/05	14:19	4023	R. Wood	12	CY	B-3		PCS (JP4)
12/13/05	10:50	4023	R. Wood	12	CY	B-3		PCS (JP4)
12/13/05	13:20	4023	R. Wood	12	CY	B-3		PCS (JP4)
01/05/06	2:07	4023	R. Wood	2	CY	Reuse Yard	Concrete	
01/09/06	9:00	4023	R.Wood	2	CY	Reuse Yard	Concrete	
01/09/06	12:30	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/09/06	13:00	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/09/06	15:00	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	7:45	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	8:10	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	8:24	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	8:40	4023	R. Wood	10	CY	B-3		PCS (JP4)

TRUCK LOGS
QUARTER 10 FT-31 LANDFARM

ALL SOIL FROM POL WASH RACK SWMU 123

Date	Time	Truck number	Driver's name	Volume	Unit	Cell Placement	Over Burden	Desc. of Cont.
01/10/06	8:55	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	9:10	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	9:27	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	9:42	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	9:56	4023	R. Wood	10	CY		X	
01/10/06	10:09	4023	R. Wood	10	CY		X	
01/10/06	10:22	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	10:37	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/10/06	12:14	4023	R. Wood	10	CY	B-3		PCS (JP4)
01/11/06	7:39	4023	R. Wood	16	CY		X	
01/11/06	7:55	4023	R. Wood	16	CY		X	
01/11/06	8:18	4023	R. Wood	16	CY		X	
01/11/06	8:29	4023	R. Wood	16	CY		X	
01/20/06	12:44	4023	R. Wood	6	CY	B-3		PCS (JP4)
01/20/06	13:05	4023	R. Wood	6	CY	B-3		PCS (JP4)
01/20/06	13:30	4023	R. Wood	6	CY	B-3		PCS (JP4)
01/20/06	14:33	4023	R. Wood	8	CY	B-3		PCS (JP4)
01/20/06	14:49	4023	R. Wood	10	CY	B-3		PCS (JP4)
02/07/06		853	R.Wood	6	CY	Reuse Yard	Concrete	
02/07/06		853	R.Wood	6	CY	Reuse Yard	Concrete	

APPENDIX C

HISTORICAL NEW MEXICO ENVIRONMENT DEPARTMENT CORRESPONDENCE

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 428-2500
Fax (505) 827-1545
www.nmenv.state.nm.us

rec'd 23AUG00 JG

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

PAUL R. RITZMA
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Post-It® Fax Note 7671	Date 30AUG01 # of pages ▸ 5
To Carol Beniulis	From Jose Gallegos
Co./Dept. FWENC	Co. HAFB
Phone # 505 878 8900	Phone # 505 572 5395
Fax # 505 878 8933	Fax # 505 572 5080

August 17, 2001

Howard E. Moffitt
Deputy Base Engineer
49 CES/CD
550 Tabosa Avenue
Holloman Air Force Base, NM 88330-8458

SUBJECT: NOTICE OF DEFICIENCY: SWMU 123
HOLLOMAN AIR FORCE BASE
EPA ID NUMBER: NM6572124422
TASK #: HWB-HAFB-01-007

Dear Mr. Moffitt:

Pursuant to its authority under the New Mexico Hazardous Waste Act, N.M.S.A. 74-4-1 et seq., and regulations promulgated pursuant thereto, the Hazardous Waste Bureau (HWB) of the New Mexico Environment Department (NMED) has reviewed the letter report submitted by Holloman Air Force Base (HAFB) requesting a risk-based no further action (NFA) for the petroleum-oil-lubricant (POL)-contaminated soil at solid waste management unit (SWMU) 123.

Following review of the letter report, HWB has made a determination that additional information is required prior to making a final determination for NFA. The enclosed attachment lists the comments that HAFB must address and submit to NMED for review and NFA determination.

Please submit the requested information to HWB within sixty (60) calendar days from the date you receive this letter and the attached notice of deficiency (NOD). NMED HWB may consider a petition for a deadline extension, provided that a written justification and the expected submittal time are given.

Please present the required information in two hard copies and on a 3.5" diskette compatible with MS Word.

If you have any questions regarding this NOD please contact Cornelius Amindyas of my staff at (505) 841-9488, or at the above address.

Sincerely,

Acting Dobby Brinkerhoff

James P. Bearzi
Chief
Hazardous Waste Bureau

JPB:ca

cc: John E. Keiling, NMED HWB
Will Moats, NMED HWB
Cornelius Amindyas
Kirby Olson, NMED HWB
David Neleigh, EPA Region VI (6PD-N)
John Poland, HAFB
Jose Gallegos, HAFB
File: Red HAFB 01 and Reading

ATTACHMENT
NOTICE OF DEFICIENCY ON SWMU 123, [BUILDING 704, WASTE OIL TANK]
HOLLOMAN AIR FORCE BASE
August 17, 2001

The following is a list of comments that the New Mexico Environment Department (NMED) Hazardous Waste Bureau compiled following review of Holloman Air Force Base (HAFB) letter report titled "*Results of additional soil sampling for remediation of the POL-Contaminated SWMU 123, at Holloman Air Force Base*."

HAFB must address these comments and submit the required information to NMED to enable HWB make a final determination for NFA on the subject SWMU.

COMMENT #:

1. The sampling results for BTEX given in Table 6-1 exceed the NMED soil screening levels (SSLs) for protection of groundwater (DAF=20) for ethylbenzene, toluene, and xylene in sample SWMU123-SB-C-9. The migration to groundwater SSLs are relevant at this site because the groundwater table is only 15-30 ft below ground surface. Also, the sampling results showed elevation of these three constituents at all of the deep samples and the text refers to excavation of contaminated soil near the washrack to the groundwater table. **Most importantly, the above sample contains ethylbenzene at a concentration almost double the saturation-based direct exposure NMED SSL. This means that there is substantial chance that free product may be present in the soil under the washrack.** The potential for groundwater contamination and for free product in the soil are not addressed in this document, so potential risk pathways have not been adequately addressed in the document.

2. It is not possible to assess whether there may be risks from other RCRA constituents at the site, because sampling results are submitted only for BTEX and TRPH. The TRPH levels are quite high, particularly at 8-9 ft, so there is no assurance that individual constituents don't exceed the risk-based guidelines issued by NMED. Since the site collected waste oil, there may also be concerns about risks from metals; no sampling results are submitted for metals in the letter report. The sampling results given in this NFA proposal are inadequate for determining if there is residual risk from contaminants remaining at the site; the sampling analysis should have been for RCRA constituents to allow for comparison to risk-based cleanup levels.

3. This document does not present a valid risk assessment to support the requested risk-based NFA due to the deficiencies mentioned above. HAFB should therefore conduct further investigation to delineate the nature, horizontal and vertical extent of the contaminant plume by sampling for RCRA constituents, pH, and metals at SWMU 123.

4. HAFB should address free product during the investigations, since elevated concentration of ethylbenzene and TRPH with depth in the soil samples strongly suggests the possibility that free product exists below.

5. Provide a site plan (with a scale and north arrow) that shows the locations of the concrete pad, the waste oil tank, the boring locations, the limits of the remedial excavation, all soil sample locations, surrounding site structures (including the office building 704), any subsurface structures such as USTs, utility lines, storm drains, manholes, and any surrounding monitoring wells.

6. Provide information on the containment of wash water on the pad, and explain whether it drains off the sides of the pad, is there a drain or sump and associated drain lines, are there sewer lines or tanks? And, if present, has HAFB investigated these structures previously? Earlier studies conducted in 1994 did not cover/discuss these.

7. Provide the analytical methods and detection limits for each chemical analysis performed for all past and future sample analyses. NMED recommends that sample analysis values be reported as less than instrument detection limits, versus a non-detect (ND) reporting.

8. Drill one boring at the downgradient end of the concrete pad, since the letter report indicates that HAFB's deepest soil boring only reached a maximum depth of 9 feet below ground surface. The new boring should be drilled to a minimum depth of 5 feet below the seasonal low water table elevation and also to apparent clean soil based on field screening. Soil samples should be collected at 2.5-foot intervals or continuously from the boring. HAFB should submit the soil sample collected from immediately above the water table, from the base of the boring and also the most contaminated sample (based on field screening) to a laboratory for analysis of gasoline range organics (GRO), diesel range organics (DRO) and oil range organics (ORO) by EPA Method 8015M, VOCs by EPA Method 8260, SVOCs by EPA Method 8270 and RCRA metals (i.e., **Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, and Silver**).

9. HAFB should install a monitoring well in the boring with a screened interval that extends above the water table. HAFB should test for phase-separated hydrocarbons. If there is no free product then HAFB must collect groundwater samples for analyses of GRO, DRO, ORO, VOCs, SVOCs and RCRA metals.

10. If the waste oil UST was in a different location, HAFB must install a well there also as described above and add PCBs to the soil sample analytical suite.

11. If HAFB doesn't have information on the direction of groundwater flow, it must install a minimum of 3 wells so that it can determine and indicate the groundwater flow direction at the site.

12. NMED is suggesting analysis of VOCs by EPA Method 8260 because solvents may have been used at the wash rack and would have been discharged to the waste oil UST. Therefore HAFB should check for HVOCs. If HAFB already has some of this information, then just test for BETX (EPA Method 8021B or the latest version will do).

13. Submit a work plan to complete this work within 60 calendar days from the date HAFB receives this Attachment and the cover letter. Based on the results of the investigation, NMED may require further investigation and possibly corrective action. Further, should the POL contamination be limited to soil, HAFB could consider excavating and disposing of the contaminated soil appropriately to protect the health of the office workers in the building(s) located near SWMU123.

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 428-2500
Fax (505) 428-2567
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

DERRITH WATCHMAN-MOORE
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

February 10, 2004

Ms. Debbie Hartell
Chief Environmental
49 CES/CEV
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

RE: APPROVAL OF THE ADDITIONAL SOIL BORING AND MONITORING WELL INSTALLATION WORKPLAN FOR SWMU 123, HOLLOMAN AIR FORCE BASE
EPA ID# NM6572124422
HWB-HAFB-03-006

Dear Ms. Hartell:

The New Mexico Environment Department (NMED) has reviewed Holloman Air Force Base's *Soil Boring And Monitoring Well Installation Workplan for SWMU 123* dated November 2003.

NMED approves the workplan for implementation. However, the following considerations should be addressed during implementation of the proposed work.

1. Regardless of the findings at the DPT-2 location, at least one of the optional DPT soil borings should be installed in the area of or east of soil boring 123-B02, (Phase 1 Investigation Remedial Investigation Report, September 1997) which was drilled approximately 25 feet east of the abandoned waste oil tank. Soil boring 123-B02 showed elevated levels of Total Recoverable Petroleum Hydrocarbons (TRPH) and volatile organic carbons (VOCs) constituents and therefore must be investigated in order to define the lateral extent of contamination in this direction.

2. The ground water flow direction does not appear to be well established in this area based on the south/southwest flow directions at SWMUs LF-01 and SD-08, and the easterly ground water flow direction at Spill Site 02/05. Therefore, HAFB should consider installing an additional ground water monitoring well to the east of the release location.

If you have any questions, please contact me at (505) 841-9488.

Sincerely,

Steve Jetter
HWB Permits Management Program

cc: Sandra Martin, NMED HWB
John Kieling, NMED HWB
Cornelius Amindyas, NMED HWB
James Harris, EPA-Region 6
David Scruggs, HAFB
Dan Holmquist, HAFB
File: Reading and HAFB-HSWA

MEMORANDUM FOR NEW MEXICO ENVIRONMENT DEPARTMENT
Attn: Mr. James P. Bearzi
Hazardous Waste Bureau
2905 Rodeo Park Dr., East, Bldg. 1
Santa Fe, NM 87505-6303

FROM: 49 CES/CEV
550 Tabosa Ave
Holloman AFB NM 88330-8458

SUBJECT: Notification of Free Phase Liquid at Solid Waste Management Unit (SWMU) 123 – Bldg. 704 Waste Oil Tank Site

1. This letter is to inform you of the presence of free phase liquid in monitoring well MW-1. This changed condition was identified during investigation activities at the site. We have initiated the following activities to both assess and mitigate this condition:

a. A sample of the liquid has been submitted for laboratory analysis to determine if it is characteristically hazardous.
b. The four adjacent monitoring wells have been resampled to assess the extent of any changes.
c. Removal (bailing) of free phase liquid has been initiated.

2. Well MW-1 is located along the northern edge of the wash rack where a waste oil tank (SWMU 21) and an oil water separator (OWS, SWMU 22) were removed in the past. Considering the historical nature of the waste oil tanks and the OWS in conjunction with the weathered appearance (dark brown) of the free phase liquid, this is not a newly discovered release. As a result of these findings, the Investigation Report for the site is being delayed until the new data is available for evaluation. A draft of the report will be available by 1 November 2004. The environmental restoration of the SWMU-123 site is scheduled to take place in 2005.

3. If you have any questions, please contact Mr. Dan Holmquist at (505) 572-5395.

DAVID BUDAK
Deputy Base Civil Engineer

cc

Mr. Cornelius Amindyas	Mr. Steve Jetter	Mr. James Harris
Hazardous Waste Bureau	NMED DOE OB	USEPA, Region 6 PD-N, Cube
4131 Montgomery NE	H & Pennsylvania Street	1445 Ross Ave., Ste 12
Albuquerque, NM 87109	Albuquerque, NM 87116	Dallas, TX 75202-2733

Telephone Record

To: Frank Gardner, John Hymer, Dave Rizzuto, Dan Holmquist, Dave Strasser & Cornelius Amindyas

Prepared By: Chuck Schick

Date: 8/30/2005 - Approximately 9:50am

Call Between: Chuck Schick and Mr. Dave Strasser (NMED) regarding the VCM Work Plan for SWMU 123 dated August 2005

Major Items Discussed:

The above referenced work plan is verbally approved with the following modifications:

1. The approximate size of the excavation area is 80 feet (North and South walls) by 50 feet (East and West walls).
2. A minimum of four (4) confirmation (stress on minimum) soil samples from each of the North and South wall (samples for offsite lab analysis) will be collected (total of 8). Minimum implies that more than four samples can be collected from each wall if required to delineate any remaining contaminants.
3. Change the location of soil sample collection from the mid-point of each wall to a staggered configuration with alternating locations of 1-foot above the water table and the next sample at the mid-point of the wall. This will promote vertical delineation along each wall.
4. A minimum of two (2) confirmation (we can take more than two if needed) soil samples from each of the **East and West walls** of the excavation. The same staggered vertical pattern used on the longer side walls will be continued with one sample from the mid-point followed by the next from 1-foot above the water table.

Other Items Discussed:

1. The work plan does not address groundwater impact. It is anticipated that additional monitoring wells to the south and southeast will be necessary to delineate impacts observed in well MW-2. It is possible that a remedial strategy will be necessary for the groundwater contaminants.
2. A report will be generated from the soil removal addressed in this VCM work plan. That report will include a work plan (a work plan inside a source removal or contaminant reduction report) to address the additional groundwater characterization.

APPENDIX D

SITE-SPECIFIC ADDENDUM TO THE BASEWIDE HEALTH AND SAFETY PLAN

SITE-SPECIFIC ADDENDUM
TO THE BASEWIDE HEALTH AND SAFETY PLAN

RCRA FACILITY INVESTIGATION
SWMUs 122 AND 123
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49 CES/CEV
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers-
Albuquerque District
HTRW Branch
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435
USACE Albuquerque District Project No. KWRD076046

Prepared By:

NationView, LLC
1608 13th Avenue South, Suite 160
Birmingham, Alabama 35205

NationView Project No. 8080014.02.01

~~November 2008~~June 2009

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SITE-SPECIFIC ADDENDUM TO THE BASEWIDE HEALTH AND SAFETY PLAN

RCRA FACILITY INVESTIGATION

SWMUs 122 AND 123

HOLLOMAN AIR FORCE BASE, NEW MEXICO

TABLE OF CONTENTS

Tables

Figures

Attachments

ACRONYMS AND ABBREVIATIONS

AF Fm	Air Force Form
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
Bhate	Bhate Environmental Associates, Inc.
CES/CEV	Civil Engineering Squadron/Combat Engineer Vehicle
CFR	Code of Federal Regulations
CHMM	Certified Hazardous Materials Manager
CIH	Certified Industrial Hygienist
CPR	Cardiopulmonary Resuscitation
CRZ	Contamination Reduction Zone
CSP	Certified Safety Professional
dBA	Decibels A-weighted
DOT	Department of Transportation
DPT	Direct push technology
DQO	Data Quality Objective
EM	Engineering Manual
EZ	Exclusion Zone
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
HEPA	High Efficiency Particulate Air
HSM	Health and Safety Manager
LEL	Lower Explosive Limit
mg/m^3	Milligrams per cubic meter
mL	Milliliters
MSDS	Material Safety Data Sheet
MUTCD	Manual on Uniform Traffic Control Devices
NIOSH	National Institute for Occupational Safety and Health
NMED	New Mexico Environment Department
NRR	Noise Reduction Rating
PAPR	Powered Air Purifying Respirator
PEL	Permissible exposure limit
P.G.	Professional Geologist
PID	Photoionization Detector
PM	Project Manager
POL	Petroleum Oil Lubricants
PPE	Personal protective equipment
ppm	Parts per million
OSHA	Occupation Safety and Health Administration
OV	Organic Vapor
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation

SCBA	Self Contained Breathing Apparatus
SPF	Sun protection factor
SSA	Site-Specific Addendum
SSHO	Site Safety and Health Officer
SWMU	Solid Waste Management Unit
SZ	Support Zone
TWA	Time-weighted average
USACE	U.S. Army Corps of Engineers
VOC	Volatile organic compound

1 PROJECT SAFETY COORDINATION

The NationView personnel who are responsible for safety and health issues at the Solid Waste Management Unit (SWMU) 122 and 123 project site are identified in Table 1-1. The respective personnel shall have reviewed and approved this Site-Specific Addendum to the Basewide Health and Safety Plan (HASP) submitted by NationView, LLC for implementation on this scope of work prior to the start of field operations. The requirements of this site-specific addendum are applicable to NationView employees, their subcontractors, and site visitors.

Table 1-1. Project Team Members with Project Health and Safety Responsibilities

Title	Name	Telephone
Corporate Sponsor	Mr. David Martin	(205) 908-0731
Project Manager	Mr. Frank Gardner, P.G.	(303) 386-6454
Field Team Leader/ Senior Geologist	Mr. Jim Moore, P.G.	(303) 929-4840
Project Geologist/ Site Safety and Health Officer	Mr. Dustin McNeil, P.G.	(303) 895-1963
Health and Safety Manager	Mr. Brian Muller, CIH, CSP, CHMM	(205) 918-4032
Notes: P.G. = Professional Geologist CIH = Certified Industrial Hygienist CSP = Certified Safety Professional CHMM = Certified Hazardous Materials Manager		

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2 PROJECT BACKGROUND AND SCOPE

Over a period of years, wash water, waste oil, and fuels have been released from the previously removed Building 704 Waste Oil Tank (SWMU 123) through deteriorating fuel lines or spills and migrated, contaminating the soils and groundwater. Prior excavations have removed SWMU 123 source area soil contamination, but the horizontal extent of groundwater contamination is currently unknown. The primary objectives of this Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) are to:

1. Identify potential releases to the subsurface soil and groundwater from the previously removed Building 702 Waste Oil Tank (SWMU 122).

2. Delineate the downgradient horizontal extent of Volatile Organic Compound (VOC) (benzene, toluene, ethylbenzene, and xylene) groundwater contamination from the previously removed Building 704 Waste Oil Tank (SWMU 123) that has been identified under the petroleum, oil, and lubricants (POL) Washrack.

3. Collect sufficient analytical data to complete a site-specific risk assessment of the groundwater exposure pathways.

4. Collect the proper data to meet the data quality objectives (DQOs) to support closure of the site based on guidance from the New Mexico Environment Department (NMED).

A detailed summary of the site history is included in the RFI Work Plan. The anticipated activities for this project include:

- Mobilization and demobilization of equipment;
- Direct Push Technology (DPT) soil boring, monitoring well installation,
- Subsurface soil sampling, groundwater sampling

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3 HAZARD ASSESSMENT AND CONTROLS

3.1 Task Hazard(s) Summary

The potential health and safety hazards of this task are summarized below in Table 3-1. The potential for encountering these hazards is ranked (high, moderate, or low) based on the work to be performed and the hazard control measures to be used.

Table 3-1. Task Hazards Summary

Summary	Hazard potential [High, Moderate, or Low]	Description of potential hazards
_√_Safety (i.e. Walking and working surfaces, heavy equipment, traffic, falls, excavations, power and hand tools, materials handling, confined spaces, electrical safety, etc.)	• Moderate All tasks and their control measures are addressed in Task Specific Activity Hazard Analyses (AHAs) in Attachment A	• Walking and surfaces • Heavy equipment and vehicular traffic • Materials handling • Slips, trips, and falls
_√_Utilities	• Moderate	• Buried • Overhead • Building Although these hazards should not be associated with this particular scope of work, it is necessary to verify that the hazards can be controlled.
_√_Chemical	• Moderate	• Volatile Organic Compounds: Benzene, Toluene, Ethylbenzene and Xylenes (see Attachment B) • Sample preservatives (acids)
_√_Physical	• Moderate	• Thermal stressors • Equipment noise
_√_Biological (i.e. Plants, animals, insects, spiders, infectious waste)	• Low	• Insect stings and bites • Poisonous snakes/reptiles (Potential for contact should be minimal)

3.2 Hazard Control Measures

General safe work practices and control measures are identified and summarized in the *Basewide HASP* (Bhate, December 2003). Additional task-specific hazards and control measures are identified for non-routine tasks as part of the Activity Hazard Analysis (AHA) process.

AHAs have been developed for each of the following activities and are included in Attachment A:

- General site activities/mobilization and demobilization
- Soil boring, monitoring well installation, soil and groundwater sampling, and IDW Handling

3.3 Written Safety Procedures and Programs

Table 3-2 provides a summary of the existing safety procedures and programs that will be used for this task. Copies of applicable procedures and programs are included in the *Basewide HASP*, as indicated.

Table 3-2. Written Safety Procedures and Programs

Reference Procedure or Program	Applicable Section(s)
Hazard Communication Program	All (Refer to Basewide HASP)
Respiratory Protection Program	All (Refer to Basewide HASP)
Hearing Conservation Program	All (Refer to Basewide HASP)
Incident Reporting and Investigation Program	All (Refer to Basewide HASP)
General Work and Safety Rules	All (Refer to Basewide HASP)
Site Health and Safety Inspections	All (Refer to Basewide HASP)
Environmental Monitoring	All (Refer to Basewide HASP)
Personal Protective Equipment Program	All (Refer to Basewide HASP)
Thermal Stressors Program	All (Refer to Basewide HASP)
Materials Handling Program	All (Refer to Basewide HASP)
Housekeeping Program	All (Refer to Basewide HASP)
Fire Prevention/Protection/Response Plans Program	All (Refer to Basewide HASP)
Utilities Program	All (Refer to Basewide HASP)
Electrical Safety Program	All (Refer to Basewide HASP)
Emergency Procedures Program	All (Refer to Basewide HASP)
Hand and Power Tools Program	All (Refer to Basewide HASP)

3.4 Permits

Before site activities can begin, there are several pre-construction documents and approval requirements to be met, including Air Force Form (AF Fm) 332 approval, Base dig permit with utility clearances, site security measures, and facility manager notification of the intended operations. NationView will coordinate project requests for Base installation support services through the 49th Civil Engineering Squadron/Combat Engineer Vehicle (CES/CEV). Pertinent to the start of activities, a pre-construction meeting and site walk-through will be conducted with the U.S. Army Corps of Engineers (USACE) Resident Engineer, Holloman Air Force Base (HAFB) personnel, and NationView Site Manager, to inspect site conditions for site/equipment access, equipment staging, and decontamination area(s), potential site hazards and emergency evacuation routes. Also reviewed at this time will be project procedures in accordance with the schedule and planned activities.

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4 PERSONAL PROTECTIVE EQUIPMENT

4.1 Purpose

The purpose of this program is to ensure that personal protective equipment (PPE) is selected in accordance with 29 Code of Federal Regulations (CFR) §1910.132, properly used and maintained, and that NationView personnel are properly trained in the inspection, use, and maintenance of PPE.

4.2 Scope

This program applies to all NationView operations including the sub-contractors on NationView managed projects. The following PPE as presented in Table 4-1 will be used for the identified activities based on the best available information about the work requirements and anticipated hazards.

Table 4-1. Personal Protective Equipment by Activity

Activity	Head/Face	Foot	Hands	Respiratory	Clothing
Mobilization / Demobilization	Hard Hat (for overhead hazards), Safety Glasses[1] with rigid side shields	Steel toed boots	Leather gloves as needed	None[3, 4]	Minimum of long pants and shirts with a minimum 4-inch sleeve
General Site Labor	Hard Hat (for overhead hazards), Safety Glasses[1] with rigid side shields Goggles if windy or dusty conditions exist	Steel toed boots	Leather gloves as needed	None[3, 4]	Minimum of long pants and shirts with a minimum 4-inch sleeve High visibility vests around equipment operation or traffic Hearing protection in areas > 85 dBA
Equipment Operation (Drilling)	Hard Hat[2] (for overhead hazards), Safety Glasses[1] with rigid side shields Goggles if windy or dusty conditions exist	Steel toed boots	Leather gloves as needed Chemical resistant gloves (nitrile) if contact with contaminants is possible	None[3, 4] Full face Air Purifying Respirator with Organic vapor (OV) and P100 combination cartridges or Powered Air Purifying Respirator (PAPR) with P100/OV cartridges based on monitoring results	Minimum of long pants and shirts with a minimum 4-inch sleeve High visibility vests around equipment operation or traffic Hearing protection in areas > 85 dBA

Activity	Head/Face	Foot	Hands	Respiratory	Clothing
Equipment Decontamination	Hard Hat[2] (for overhead hazards), Safety Glasses[1] with rigid side shields Goggles if windy or dusty conditions exist	Steel toed boots Boot covers	Chemical resistant gloves (nitrile inner and outer)	None[3, 4] Full face Air Purifying Respirator with OV and P100 combination cartridges or PAPR with P100/OV cartridges based on monitoring results	Minimum of long pants and shirts with a minimum 4-inch sleeve Tyvek coveralls may be worn where splashing is possible and as recommended by the Site Safety and Health Officer (SSHO) High visibility vests around equipment operation or traffic Hearing protection in areas > 85 dBA
Soil and Groundwater, Sampling/ Screening Handling Investigation Derived Waste (IDW)	Hard Hat[2] (for overhead hazards), Safety Glasses[1] with rigid side shields Goggles if windy or dusty conditions exist	Steel toed boots Boot covers as needed	Chemical resistant gloves (nitrile inner and outer)	None[3, 4] Full Face Air Purifying Respirator with OV and P100 combination cartridges or PAPR with P100/OV cartridges based on monitoring results	Minimum of long pants and shirts with a minimum 4-inch sleeve Tyvek coveralls may be worn where splashing is possible and as recommended by the SSHO High visibility vests around equipment operation or traffic Hearing protection in areas > 85 dBA
Supervision of work	Hard Hat (for overhead hazards), Safety Glasses[1] with rigid side shields Goggles if windy or dusty conditions exist	Steel toed boots Boot covers as needed	Leather gloves as needed Chemical resistant gloves (nitrile) if contact with contaminants is possible	None[3, 4] Full Face Air Purifying Respirator with OV and P100 combination cartridges or PAPR with P100/OV cartridges based on monitoring results	Minimum of long pants and shirts with a minimum 4-inch sleeve Tyvek coveralls may be worn where splashing is possible and as recommended by the SSHO High visibility vests around equipment operation or traffic Hearing protection in areas > 85 dBA

Notes:

[1] Safety Glasses with rigid side shields approved by American National Standards Institute (ANSI) Z-87 required at all times.

[2] Hard hats are not required inside fully enclosed equipment cabs.

[3] Voluntary use of respirators is authorized for comfort from nuisance dusts and odors, provided they are issued and used in accordance with established respiratory protection program procedures.

[4] Cartridge change out will occur at the following conditions:

- Damage to cartridge
- Cartridge is wet, restriction in breathing, unusual odors
- Cartridge is visibly clogged with dust, restriction in breathing
- After each day of use with no continuous exposures over the established Permissible Exposure Limits (PELs) per 29 CFR §1910.1028(g)(3)(i) (benzene standard) and the cartridge manufacturer’s change out calculations based on anticipated concentrations.
- Changes that may be otherwise identified in 29 CFR §1910.120.

The following qualified person certifies that the selection of PPE is based on best available information about the work requirements and anticipated hazards.

Printed name:	Signature:	Date:
Brian Muller, CIH, CSP, CHMM **Health and Safety Manager**		**5-15-09**

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5 SITE MONITORING

Site monitoring will be conducted using direct-reading instruments primarily in the workers' breathing zone. To the extent feasible, site operations will be conducted and modified as needed to ensure that personnel are situated upwind of the well installation activities. Initial upwind background and work-zone readings will be obtained before the initiation of activities. Readings of breathing zones (unless location is otherwise specified) will be taken periodically during all activities. The Site Safety and Health Officer (SSHO) has the authority to modify the level of protection required for work at this site as well as halt operations as deemed necessary to control personal exposures. Monitoring results will be recorded on an Atmospheric Monitoring Log Field Health and Safety form maintained by the SSHO. Monitoring, calibrating, and maintaining instruments are the responsibility of the SSHO. Table 5-1 summarizes the site monitoring parameters and action levels applicable for direct reading exposure monitoring.

Table 5-1. Direct Reading Exposure Monitoring

Activity(s)	Compound / Instrument	Action Level(s) and Frequency	Actions
Soil boring and Monitoring Well installation (All intrusive soil activities) Handling IDW	Total VOCs / Photoionization Detector (PID)	0 - 5 parts per million (ppm) Every 15 minutes during intrusive activities	Continue work in required PPE and continue monitoring.
		> 5 ppm to < 10 ppm (Sustained for more than 5 minutes)	Ensure personnel are upwind, notify the Project Manager (PM). SSHO will upgrade PPE to Level C respiratory protection with OV and High Efficiency Particulate Air (HEPA) cartridge, as necessary. Implement appropriate controls such as ventilation. Monitor for benzene and implement actions listed below.
		> 10 ppm (Sustained for more than 5 minutes)	Stop work, ensure employees are upwind. Notify PM and Health and Safety Manager (HSM) for additional control measures.
	Benzene / By colorimetric tube or similar (where indicted by PID readings)	No detection up to 0.2 ppm	Continue work activities in required protective equipment. Perform integrated personal exposure monitoring using OV badge or charcoal tubes with calibrated pump per National Institute for Occupational Safety and Health (NIOSH) or Occupational Safety and Health (OSHA) method (consult HSM as needed).
		> 0.2 ppm	Cease work, exit the area to upwind location and notify the Site Manager.

Activity(s)	Compound / Instrument	Action Level(s) and Frequency	Actions
Intrusive Soil Activities	Visible Dust Particulates / Personal DataRam or SKC HAZ Dust IV Real Time Particulate Air Monitor	0 – 1.5 milligrams per cubic meter (mg/m^3) (respirable) 1-5 mg/m^3 (inhalable/total) Every 15 minutes during intrusive activities	Continue work in required PPE and continue monitoring.
		>1.5 mg/m^3 - < 3 mg/m^3 (respirable) >5 mg/m^3 - < 10 mg/m^3 (inhalable/total) (Sustained for more than 5 minutes)	Cease work and ensure personnel are upwind, notify the Site Manager. SSHO shall upgrade PPE to air purifying respiratory protection with HEPA cartridges. Perform personnel exposure monitoring using integrated time weighted average (TWA) monitoring.
		>3 - < 30 mg/m^3 (respirable) >10 - <100 mg/m^3 (total inhalable) (Sustained for more than 5 minutes)	Cease work and ensure personnel are upwind, notify the Site Manager. SSHO shall upgrade PPE to powered air purifying respiratory protection with HEPA cartridges. Perform personnel exposure monitoring using integrated TWA monitoring.
Intrusive Soil Activities Handling IDW	Lower Explosive Limit (LEL)	<10% LEL	Continue work in required PPE and continue monitoring.
		>10% LEL	Cease work and ensure personnel are upwind, notify the Site Manager. Ensure all sources of ignition are kept >50 feet away.
All site activities	Noise	< 85 decibels A-weighted (dBA)	Continue work in required PPE and continue monitoring.
		> 85 dBA to < 110 dBA	Ear plugs or ear muffs must be worn with a Noise Reduction Rating (NRR) of at least 26 dBA.
		> 110 dBA to < 130 dBA	Ear plugs and ear muffs must be worn together each with a NRR of at least 26 dBA each
		> 130 dBA	Cease work and ensure personnel leave work area. Notify the PM.

6 SITE CONTROL

6.1 Site Activities

Site-specific site control measures will be used to control access to the work area. Tables 6-1 and 6-2 summarize the site control requirements applicable for both general work areas and work areas with potentially contaminated soils, respectively.

Table 6-1. Site Control for General Work Area(s)

Location	Site Control Procedure (discuss important elements such as signs, barricades, fencing, briefings, sign-in/out logs, etc.)
General Work Area	Due to the location of the project site, access will be coordinated with the Site Manager and HAFB Operations. Access will be made via a specified route. The SSHO will be responsible for the accountability for all onsite personnel using appropriate sign in / sign out procedures as needed. The SSHO shall be responsible for maintaining adequate site control in order to limit hazards to site workers and site visitors. To the extent feasible, immediate work areas shall be cordoned off through the use of devices such as traffic cones, caution tape, or construction fencing along with appropriate signage such as "Danger – Construction Area, Authorized Personnel Only" and "Hard Hat, Safety Glasses, and Safety Boots Required in this Area". All site workers shall be aware of surroundings and prevent unauthorized personnel as well as vehicle traffic from entering the work area. In areas where traffic control is required, all traffic control devices and methodologies will comply with the U.S. Department of Transportation (DOT) Manual on Uniform Traffic Control Devices (MUTCD, http://mutcd.fhwa.dot.gov) including the use of appropriate roadway markings, highly visible safety vests, and flagmen as needed.

Table 6-2. Site Control for Potentially Contaminated Area(s)

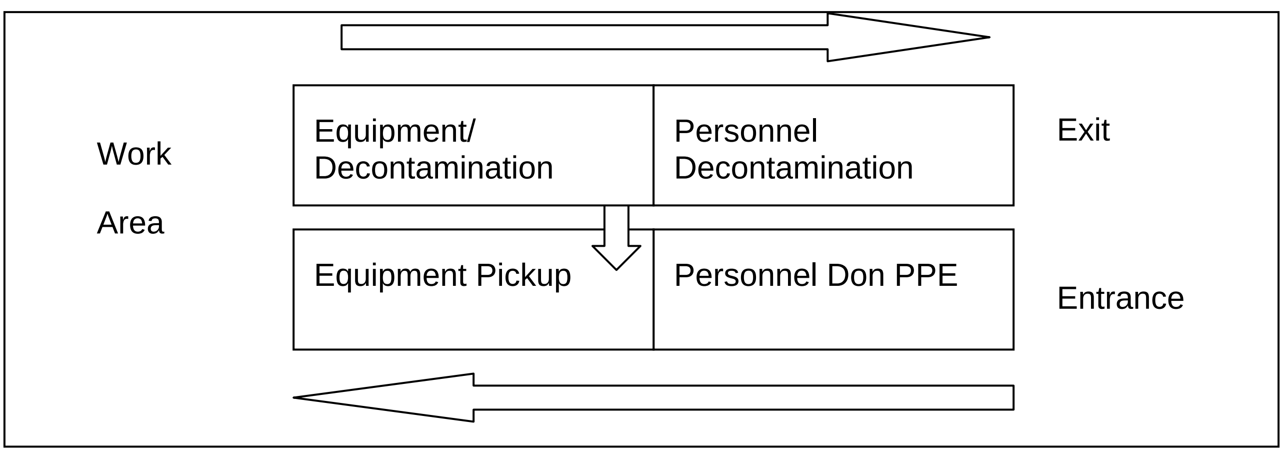
Location	Site Control Procedure (discuss important elements such as signs, barricades, briefings, qualifications, required supplies and equipment, sign-in/out logs, etc.)
Support Zone (SZ)	Located outside of contaminated areas, access will be from clean areas or from the Exclusion Zone through the Contamination Reduction Zone.
Contamination Reduction Zone (CRZ)	The Contamination Reduction Zone will be demarcated with caution tape or temporary construction fencing. Decontamination stations will be located here.
Exclusion Zone (EZ)	Exclusion Zone work areas will be clearly demarcated with caution tape or temporary construction fencing. All access to this area will require the use of a sign-in/out log.

6.2 Decontamination

Required decontamination procedures are described below in Table 6-3.

Table 6-3. Decontamination Procedures by Location

Type of Decontamination	Decontamination Methods
Personnel decontamination	Personal hygiene will be the responsibility of each individual worker. Eating, drinking, chewing tobacco or gum, smoking, and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the work area. Personnel will be required to thoroughly wash hands and face prior to eating, drinking, or smoking. Any disposable PPE used will be collected following use in the work area for proper disposal. All disposable PPE will be removed and disposed of in a labeled, pre-designated receptacle prior to leaving the work area to prevent the spread of contaminants. Upon return, new and/or cleaned PPE will be provided for use. In the case of excessive soiling or splattering, the PPE shall be changed out more frequently to reduce the spread of contamination and reduce the potential for contaminant breakthrough. Reusable PPE shall be cleaned with soap and water after each use. Respirator filter cartridges (if used) shall be changed out on a daily basis. The decontamination area will be divided into two general areas (equipment area and personnel decontamination area). When exiting the work area, workers will leave all equipment in the equipment area. Workers will then remove PPE. Gloves will be turned inside out so as to not come into contact with potentially contaminated material. Respirators if used will then be removed and set aside for cleaning. Workers will then proceed to the personnel decontamination area and don clean gloves for use with soap and water to wash respirators, any other reusable PPE and tools. A small wash area will be provided so workers can then wash their face and hands. Clean paper towels and/or rags will be used to dry hands and face. Spent PPE and towels/rags will then be placed in a 55-gallon drum for proper disposal at the end of the project. The drawing below this table depicts a typical decontamination sequence.
Equipment decontamination	Work efforts will be made to minimize equipment contact with contaminated materials. Prior to leaving the work area and land-farm following placement of contaminated soils, equipment (tires, excavator/loader buckets, hand tools) will be dry decontaminated. Soils from the dry decontamination process will be disposed with the excavated materials. Decontamination tools may include brooms and shovels.



7 COMMUNICATIONS

Cellular telephones will be available to summon emergency services as required. Refer to Sections 10, 11, and 12 of this Site-Specific Addendum (SSA) to the HASP for site specific guidance on emergency situations and appropriate actions. Site communication amongst workers shall be a combination of verbal and line of sight hand communications. Visual signals include:

1. Hand gripping throat = Can't breathe,
2. Grip partner's wrist or both hands at waist = Leave area immediately,
3. Hands on top of head = Need assistance,
4. Thumbs up = OK, I'm all right, I understand,
5. Thumbs down = No, Negative

Cellular telephone use is not permitted while operating equipment. However, in the event of an emergency, the support zone may contact operators of heavy equipment with hand held radios or cellular phones.

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8 MEDICAL SURVEILLANCE AND TRAINING

The medical surveillance and training requirements for NationView's on-site personnel working on the soil boring, soil sampling, well installation, and groundwater sampling activities will follow the requirements outlined in the Basewide HASP Sections 7.4 and 5, respectively.

All personnel performing on-site work activities, wherein they may be exposed to hazards resulting from field activities, will have completed applicable training in compliance with 29 CFR Part 1910/29 CFR Part 1926 and Engineering Manual (EM) 385-1-1. Table 8-1 provides a summary of the minimum training requirements for site project personnel.

Table 8-1. Required Worker Training and Site-Specific Training

Required worker training	Site-specific training requirements
√ 40-hour General Site Worker √ 8-hour Supervisor (as applicable) √ 8-hour Refresher (as applicable) No retraining requirements are anticipated during the project	All personnel working on site shall attend site-specific orientation/training prior to starting onsite project work. This training will be facilitated by the SSHO.

Additionally, at a minimum the SSHO or the designated representative and one other person will be certified in First Aid and Cardiopulmonary Resuscitation (CPR), and will be continuously present during site operations.

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9 HAZARDOUS CHEMICALS

Hazardous chemicals (as defined in 29 CFR §1910.1200) to be brought or used on-site are identified below. This chemical inventory and associated Material Safety Data Sheet (MSDSs) will be maintained by the SSHO.

Table 9-1. Hazardous Chemicals Brought On-Site

Chemical Name	Amount	Location	Purpose
Assorted fuels, lubricants, coolants, etc. necessary for equipment operation	No storage planned. Quantities limited to immediate use requirements of on-site equipment.	No storage planned. Materials to be brought on-site by vendor's maintenance vehicle.	Equipment Servicing and Operation
Calibration gases for air monitoring equipment, if required for instruments in use	One small aluminum cylinder of each required gas. (Each contains approximately 35 L of gas mixture).	Storage with monitoring equipment in the onsite field office	Calibration of monitoring equipment
Groundwater sample preservative (hydrochloric acid)	2 milliliter (mL)/vial	Minimal quantities will be required for groundwater sampling	Groundwater Sampling

Hazardous materials anticipated to be brought on site include preservatives for groundwater samples, calibration gases for air monitoring equipment, and possible fuel, lubricants, or coolants for equipment. No other hazardous materials are anticipated to be brought on site by NationView or their subcontractor for use on site under this scope of work.

A copy of the NationView Hazard Communication Program is included in the Basewide HASP. A MSDS must be maintained on site for any hazardous materials stored or used. A MSDS must be submitted to the HSM and approvals obtained prior to bringing any hazardous materials on the job site. The MSDSs for all hazardous materials will be reviewed with all onsite personnel by the SSHO as a part of chemical specific hazard communication training.

Additionally, all personnel onsite will have appropriate general hazard communication training per 29 CFR §1910.1200 and 29 CFR §1910.120. All containers used to store hazardous materials or Investigation Derived Waste (IDW) will be properly labeled with the identity and hazards associated with the contents. All IDW water will be contained in 55-gallon U.S. Department of Transportation (DOT) approved drums. An inventory of the number of drums will be maintained by the SSHO. The labeling will be weatherproof and fade proof for a minimum of 1 year. An IDW holding area will be designated at or near the subject site. Groundwater sampling results will be used to characterize the IDW.

10 EMERGENCY ACTION AND RESPONSE

Personnel responsible for coordinating emergency response actions during the SWMU 122 and 123 DPT soil boring, well installation, and soil and groundwater sampling activities are identified below in Table 10-1. A map showing directions to the authorized medical facility is included in Section 12.

Table 10-1. Emergency Coordinator and Alternate

Responsibility	Name	Phone Number(s)
Task Emergency Coordinator	Mr. Dustin McNeil	Office (303) 597-2450 Cell (303) 895-1963
Alternate Emergency Coordinator	Mr. Dave Rizzuto	Office (505) 679-2100 Cell (505) 430-3965

If an emergency situation develops which requires evacuation of the work area, the evacuation procedures in Table 10-2 shall be followed.

Table 10-2. Evacuation Procedures

Evacuation Step	Methods and comments:
Notify affected workers	Use of site communication methods as applicable
Evacuate to safe location	Assemble at the primary evacuation site (support area outside of the exclusion zone)
Assemble and account for workers	Emergency Coordinator shall account for personnel using site Sign in/Sign out sheet
Notify Fire and Emergency Services	Notification as needed
Complete incident report	Follow the Incident Reporting and Investigation Procedure

Table 10-3 summarizes potential emergency situations and response actions that are applicable for the SWMU 122 and 123 work site.

Table 10-3. Potential Emergency Situations

In case of	Response actions
Injury or illness	Treat injury with applicable First Aid. All work related injuries beyond first aid will result in notification of Emergency Services and notification of the employee supervisor. Any employee requiring advanced medical treatment will be accompanied by a knowledgeable company employee that can answer potential questions on job duties and hazards. Make notifications in accordance with the Incident Reporting and Investigation Procedure (found in Section 10.2.2 of the *Basewide Health and Safety Plan*, Bhate, December, 2003).
Chemical exposure	First Aid shall be provided such as but not limited to: move victim to fresh air, remove contaminated clothing, flush affected skin with water, and seek medical attention.
Fire or explosion	Notify emergency services immediately. All personnel shall evacuate the immediate area of the fire and move to an upwind location. Personnel shall not engage in fire fighting activities use of fire extinguisher) unless trained to do so and only in the incipient stages of fire.
Adverse weather	Tornados, lightning, or other threatening weather conditions will result in an immediate shut down of operations and evacuation of personnel. Lightning proximity will be determined by measuring the time interval between the visually observed lightning flash and the subsequent sound of thunder. An interval less than 30 seconds will prompt the shut down. Operations will be shut down for the period of the storm passing plus an additional 20 minutes.
Material spill or release	Vehicles and equipment will be maintained and inspected so as to prevent fluid leaks. Should any vehicle fluid leaks occur, the equipment will be taken out of service to make necessary repairs and any contaminated material will be cleaned-up and disposed of properly. Spill kits will be available to facilitate prompt containment and clean-up of spills. Notification will be made in accordance with the Incident Reporting and Investigation Procedure. Storage areas will be designed to have secondary containment as required, and work plans will be executed to accommodate stormwater runoff and minimize the potential for contamination spread.

11 EMERGENCY CONTACTS

In the event of an emergency, the following contacts should be made, as appropriate:

HAFB Emergency Number (using HAFB phone system) 9-911
Operators will assist with Medical, Fire, and Police emergencies
HAFB Security Force...(505) 572-5037
HAFB Fire Protection ....(505) 572-1117
HAFB Hospital – 49th Medical Group (Main switchboard) ....(505) 572-2778
Civilian Hospital (Alamogordo)
Gerald Champion Regional Medical Center ....(505) 439-6100

After initial contacts have been made and the situation has stabilized, notify the Site Manager SSHO, Senior Project Manager, and/or HSM, as appropriate.

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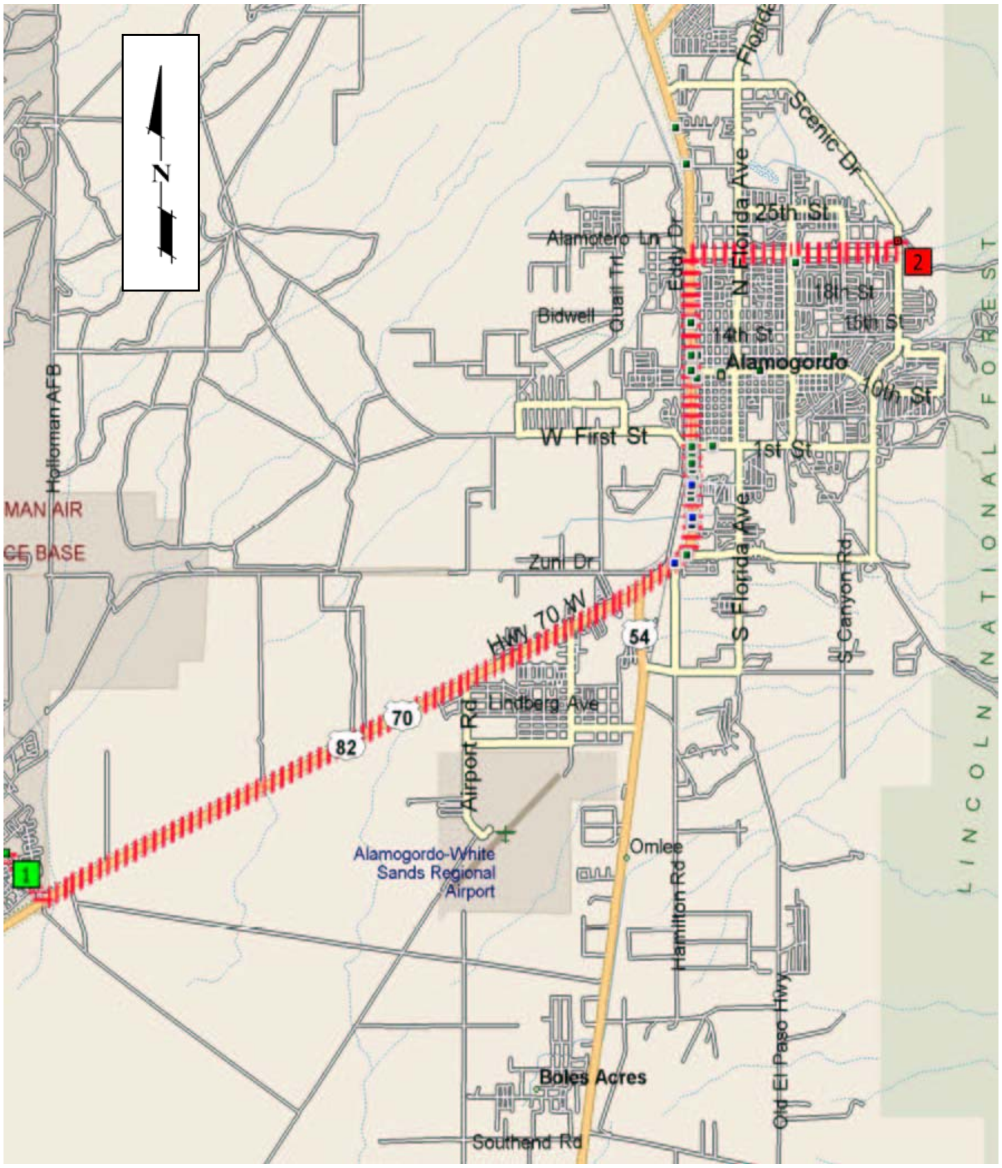
12 HOSPITAL DIRECTIONS

In the event of a true medical emergency (“life or limb”), HAFB Emergency Services should be used. Notification of any injury must be made to HAFB Emergency Services. NationView personnel and subcontractors should not transport injured personnel to the HAFB Hospital without prior authorization from HAFB Emergency Services.

Other injuries should be treated as necessary at Gerald Champion Regional Medical Center at 2669 Scenic Drive, Alamogordo, NM 88330. From HAFB, exit the Main Gate and proceed east on US-70 onto US-54, continue north on US-54 to Indian Wells Road, turn right heading east to Scenic Drive, and turn left on Scenic proceed to the medical center. A map to this hospital is presented as Figure 12-1.



NATIONVIEW	HOSPITAL ROUTE MAP Holloman Air Force Base to Gerald Champion Regional Hospital Source: Microsoft Expedia Street Maps		SWMU 122 and 123 Holloman Air Force Base SSA to the HASP Figure 12-1
	Not to Scale	Date ~~October 2008~~June 2009	

Figure 12-1. Hospital Route Map

ATTACHMENT A

ACTIVITY HAZARD ANALYSES (AHAS)

Activity Hazard Analysis (AHA) – 01

Task: SWMU 122 and 123 RCRA Facility Investigation	NationView Project Number: 8080014	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)	Location: Holloman Air Force Base, New Mexico	
	Analysis Approved by: Brian Muller, CIH, CSP, CHMM	Date: ~~November 2008~~June 2009

Activity	Potential Hazards	Recommended Controls
General Site Activities including Mobilization / Demobilization and Site Preparation Note: Each workday shall begin with a mandatory daily safety meeting for all on-site workers	Slips, trips, or falls on walking and working surfaces	• Determine the best access route prior to transporting equipment and tools • Continuously inspect the work area for slip, trip, and fall hazards • Pay attention; ensure safe and secure footing • Maintain clean work areas by following good housekeeping procedures • Be alert for uneven and variable terrain • Wear slip resistant footwear when walking/working on slippery surfaces or slopes
	Site Traffic	• Be aware of potential vehicle traffic while on site • Follow posted warnings and rules for travel around site • All personnel to wear highly visible safety vests
	Eye injury	• Use approved safety glasses with rigid side shields • Use safety goggles if dusty conditions exist
	Overhead hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1 in all areas with overhead hazards
	Cuts, punctures, and abrasions	• Wear leather work gloves when handling materials or using tools
	Dropped objects	• Steel toe boots meeting ANSI Standard Z41 will be worn
	Thermal Stressors (i.e. heat stress, cold stress)	• Employees will have appropriate clothing for variable weather • Use of long sleeves or application of sunscreen with a high sun protection factor (SPF) on exposed skin encouraged • Employees will take breaks and drink plenty of fluids to prevent heat stress • Warming breaks will be permitted as necessary to prevent cold stress
	Back Injury from Materials Handling	• Use proper lifting techniques • Loads greater than 50 pounds require assistance or mechanical equipment • Prior to lifting, check the load for jagged or sharp edges • Avoid torso twisting motions while handling or moving loads

AHA – 01 (Continued)

Activity	Potential Hazards	Recommended Controls
Mobilization/Demobilization and Site Preparation (continued)	Inclement weather (Thunderstorms and tornadoes)	• Halt activities immediately and take cover during thunderstorm or tornado warnings, shelter in a building if possible, stay away from windows • If outdoors, stay close to the ground • Listen to radio or television announcements for pending weather information • Do not try to outrun a tornado on foot or in a vehicle
	Biological hazards (spiders, snakes, etc.)	• Workers will inspect the work area carefully and avoid placing hands and feet into concealed areas • Look in direction of travel for biological hazards to avoid
	Chemicals (i.e. fuels, lubricants, coolants, sample preservatives, etc)	• Always practice good personal hygiene by washing hands and face frequently during the day and especially before eating, drinking, smoking, applying cosmetics, or any other activity that would increase the chances for hand to mouth exposure. • Wear appropriate PPE while handling any chemicals; refer to the MSDS for specific requirements; minimum PPE must include safety glasses, safety boots, hard hats (for overhead hazards), and chemical resistant gloves.
Safety Equipment Used	**Inspection Requirements**	**Training Requirements**
Level D PPE First Aid Kit Fire Extinguisher Eyewash	Weekly inspections will be performed on fire extinguishers. Weekly inspections will be performed on first aid kits. Portable eye wash will be inspected weekly. Informal daily work area inspections to be conducted by the SSHO. Formal weekly inspections to be conducted by the SSHO using the Site Safety and Health Inspection Form.	Site personnel have read and understand the SSA Site personnel possess all of the required training as specified in the SSA Site personnel received site specific safety indoctrination Site personnel have reviewed all applicable MSDSs At least two individuals on-site will have current CPR and First Aid training

Activity Hazard Analysis (AHA) – 02

<table>
<tr><td colspan="2">Task: SWMU 122 and 123 RCRA Facility Investigation</td><td colspan="2">NationView Project Number: 8080014.02</td></tr>
<tr><td colspan="2" rowspan="2">Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, chemical gloves (nitrile inner and neoprene outer), and hearing protection, as required)</td><td colspan="2">Location: Holloman Air Force Base, New Mexico</td></tr>
<tr><td>Analysis Approved by: Brian Muller, CIH, CSP, CHMM</td><td>Date: ~~November 2008~~June 2009</td></tr>
<tr><th>Activity</th><th>Potential Hazards</th><th colspan="2">Recommended Controls</th></tr>
<tr><td rowspan="3">Soil Boring, Soil and Groundwater Sampling,
Handling IDW

Hazards and recommended controls from AHA – 01 apply</td><td>Drill Rig Hazards
Including but not limited to:
Flying debris, falling objects, noise, hydraulic failures, unguarded machinery, equipment rollover, movement of large, heavy drilling tools, etc.</td><td colspan="2">• Drill rig is to be operated and maintained by qualified operators
• A Drill Rig Inspection Checklist should be completed daily to ensure that the rig is operating properly
• The inspection will include fittings, cables, pins, connections, lubrication points, controls, emergency stops, etc.
• To the extent possible, the terrain should be level and the condition of the ground such that unexpected movement of the rig is unlikely
• Stabilize the rig prior to boring
• Wear required PPE (hard hat, safety glasses, work gloves, ear muffs or plugs, steel toe work boots), ensure loose clothing, jewelry, and/or hair is secured
• Maintain good housekeeping on and around drill rig</td></tr>
<tr><td>Overhead/buried utilities</td><td colspan="2">• Conduct a utility locate to identify the location of underground utilities in boring locations and complete any required dig permits
• Overhead utilities should be considered live until determined otherwise
• Maintain a minimum distance of 15 feet from overhead utilities
• All underground utilities must be clearly marked before beginning work
• No borings shall be made within a 4 foot "Buffer Zone" of any utility marking</td></tr>
<tr><td>Exposure to soil contaminants</td><td colspan="2">• To the extent feasible, limit contact with subsurface materials
• Wear required PPE when conducting intrusive activities
• SSHO shall conduct breathing zone monitoring for VOCs with a PID and particulates in accordance with requirements for site monitoring
• SSHO may require an upgrade in PPE or modification to work based on monitoring results
• Wear appropriate PPE including chemical resistant gloves (nitrile inner and outer) and Tyvek coveralls to minimize potential contact with soil, as appropriate
• Use appropriate decontamination methods
• All IDW will be containerized in 55 gallon drums and properly labeled and stored</td></tr>
</table>

AHA – 02 (Continued)

Activity	Potential Hazards	Recommended Controls
Monitoring Well Installation	Pinch points	• Utilize appropriate PPE (leather gloves) when handling well casings and tools
	Dust	• Use care when installing well materials (sand, bentonite, Portland cement) into monitoring well to prevent dust generation • Position body in an upwind location • Suppress dust generation using wet methods and careful handling
Well Development / Groundwater depth measurement / Groundwater sampling	Exposure to groundwater contaminants	• Position body upwind from monitoring well prior to opening cap • Wear appropriate PPE including chemical resistant gloves (nitrile inner and neoprene outer) and Tyvek coveralls to minimize potential contact with groundwater, as appropriate • Conduct work activities in a manner that minimizes potential contact with groundwater • Collect all PPE and disposable sampling equipment and dispose of properly • Wash hands and face prior to eating, drinking, or smoking
Safety Equipment Used	**Inspection Requirements**	**Training Requirements**
Level D PPE First Aid Kit Fire Extinguisher Eyewash	Weekly inspections will be performed on fire extinguishers. Weekly inspections will be performed on first aid kits. Portable eye wash will be inspected weekly. Informal daily work area inspections to be conducted by the SSHO. Formal weekly inspections to be conducted by the SSHO using the Site Safety and Health Inspection Form.	Site personnel have read and understand the SSA Site personnel possess all of the required training as specified in the SSA Site personnel received site specific safety indoctrination Site personnel have reviewed all applicable MSDSs At least two individuals on-site will have current CPR and First Aid training

ATTACHMENT B

PRIMARY CONTAMINANTS OF CONCERN

Properties of the Primary Contaminants of Concern

Contaminant	PEL	TLV	Route(s) of Exposure	Signs and Symptoms of Exposure		Target Organs	IP (eV)	Specific Gravity	VP (mm Hg)	Flash Point (°F)	LEL %	UEL %
				Acute	Chronic							
Benzene	1 ppm 5 ppm = STEL	0.5 ppm	Inhalation Ingestion Contact Absorption	Irritation of eyes, skin, nose, and throat, headache, dizziness, nausea, staggered gait, fatigue	Cancer (leukemia), adverse reproductive effects (female fertility, birth defects)	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	9.24	0.88	75	12	1.2	7.8
Toluene	200 ppm (750 mg/m^3) Ceiling 300 ppm	50 ppm (188 mg/m^3)	Inhalation Ingestion Contact Absorption	Irritation of eyes, skin, nose, drowsiness, fatigue, weakness, confusion, headache, nausea, dilated pupils	Liver and kidney damage	Eyes, skin, respiratory system, CNS, liver, kidneys	8.82	0.87	21	40	1.1	7.1
Ethylbenzene	100 ppm (435 mg/m^3)	100 ppm (434 mg/m^3)	Inhalation Ingestion Contact Absorption	Irritation of eyes, and skin, may also cause conjunctivitis (eyes)	CNS depression, pulmonary aspiration	CNS, eyes, skin, respiratory system	8.76	0.87	7	55	0.8	6.7
Xylenes (o-, m-, p-isomers)	100 ppm	100 ppm	Inhalation Ingestion Contact Absorption	Irritation of eyes, skin, nose	CNS permanent brain and nervous system damage	CNS, liver, and urinary system/kidneys	21	0.864	8	76	1.0	7.0

Notes:

PEL = Permissible Exposure Limit
TLV = Threshold Limit Value
IP = Ionization Potential
eV = Electron volt
VP = Vapor Pressure
mm Hg = Millimeters of mercury
°F = Degrees Fahrenheit
LEL = Lower Explosive Limit
UEL = Upper Explosive Limit
% = Percent
ppm = Parts per million
mg/m^3 = Milligrams per cubic meter of air
CNS = Central Nervous System
STEL = Short term exposure limit

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