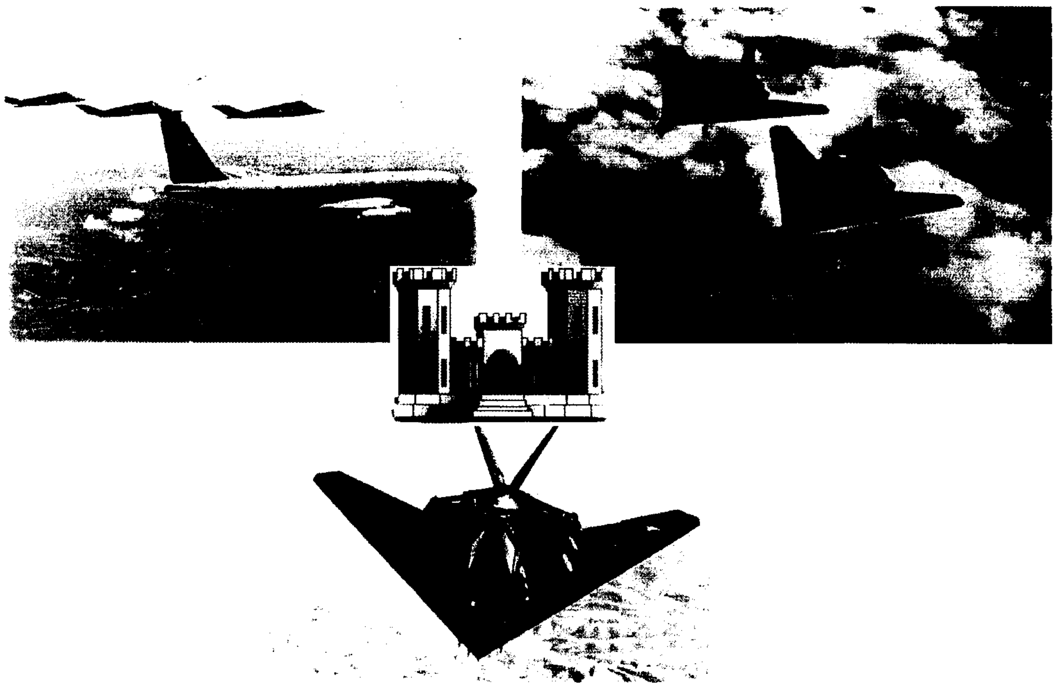
HAFB05 2/1/05

REVISED
WORK PLAN

VOLUNTARY CORRECTIVE MEASURES
T-38 TEST CELL FUEL SPILL SITE
HOLLOMAN AFB, NEW MEXICO



Prepared For:

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

February 2005

Contract No.: DACA45-03-D-0023
Task Order No.: 4
Bhate Project No.: 9040089

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<u>REVISED</u>

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HOLLOMAN AFB, NEW MEXICO

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T-38 TEST CELL FUEL SPILL SITE

HOLLOMAN AFB, NEW MEXICO
REVIEW SHEET

COMMITMENT TO IMPLEMENT THIS WORK PLAN

Frank Gardner	[signature]	2/28/05
Program Manager	Signature	Date
John Hymer	[signature]	2/28/05
Site Manager	Signature	Date

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REVISED

WORK PLAN

VOLUNTARY CORRECTIVE MEASURES T-38 TEST CELL FUEL SPILL SITE

HOLLOMAN AFB, NEW MEXICO

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ACRONYMS AND ABBREVIATIONS

%	Percent
AAF	Army Air Field
AOC	Area of Concern
AFB	Air Force Base
AF Fm	Air Force Form
amsl	Above mean sea level
ANSI	American National Standards Institute
AST	Aboveground storage tank
ASTM	American Society for Testing and Materials
Bhate	Bhate Environmental Associates, Inc.
CDW	Construction-Derived Waste
CES/CEV	Civil Engineering Squadron/Combat Engineer Vehicle
CFM	Cubic feet per minute
CFR	Code of Federal Regulations
CMS	Corrective Measure Study
COC	Chain-of-custody
CRZ	Contamination reduction zone
DI	Deionized water
DQO	Data Quality Objective
DRMO	Defense Reutilization and Marketing Office
DPE	Dual-phase extraction
DRO	Diesel-Range Organics
ERP	Environmental Restoration Program
ERPIMS	Environmental Restoration Program Information Management System
eV	Electron volt
EZ	Exclusion zone
°F	Degrees Fahrenheit
FD	Field duplicate
FID	Flame ionization detector
GAC	Granular activated carbon
gpm	Gallons per minute
GPS	Global positioning system
GRO	Gasoline-Range Organics
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
HVDPE	High vacuum dual-phase extraction
IRA	Interim Remedial Action
LNAPL	Light non-aqueous phase liquid
mg/L	Milligrams per liter
mg/kg	Milligrams per kilogram
MS	Matrix spike

ACRONYMS AND ABBREVIATIONS-CONTINUED

MSD	Matrix spike duplicate
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
ORO	Oil-Range Organics
OSHA	Occupational Safety and Health Administration
OWS	Oil/water separator
OVA	Organic vapor analyzer
PCS	Petroleum-contaminated soils
PID	Photoionization detector
PPE	Personal Protective Equipment
ppm	Parts per million
PSH	Phase separate hydrocarbons
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RCRA	Resource Conservation and Recovery Act
SOP	Standard Operating Procedure
SSL	Soil Screening Level
SVE	Soil Vapor Extraction
SVOC	Semi-volatile organic compounds
SWPPP	Storm Water Pollution Prevention Plan
SWMU	Solid Waste Management Unit
SZ	Support zone
T-38	T-38 Test Cell Fuel Spill Site
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbons
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UST	Underground storage tank
UVF	Ultra Violet Fluorometer
VOC	Volatile organic compounds
VCM	Voluntary Corrective Measures
VE	Vacuum-enhanced
WWTP	Wastewater treatment plant

1 INTRODUCTION

Bhate Environmental Associates, Inc., (Bhate) has been retained by the U.S. Army Corps of Engineers (USACE), under contract DACA45-03-D-0023, Task Order No. 4, to conduct Voluntary Corrective Measures (VCMs) at several of the Areas of Concern (AOC) at Holloman Air Force Base (HAFB), New Mexico. The VCMs include multiple tasks as outlined in the USACE Scope of Services dated February 25, 2004. This document is to provide a work plan that will serve as the primary working document for the excavation activities at the T-38 Test Cell Fuel Spill Site (T-38) formally known as Environmental Restoration Program (ERP) Site SS-59. This plan provides the relevant site information and requirements to implement a VCM at the T-38 Site. The primary objective of this VCM is to remediate petroleum-contaminated soils (PCS) at the site through excavation and removal. During this process, required data will be collected to support the closure of the site based on guidance from the New Mexico Environment Department (NMED). The ultimate objective is to achieve approval for site closure from NMED.

1.1 Purpose

This revised Work Plan has been constructed to provide sufficient information as requested by NMED in the January 21, 2005, letter to HAFB requesting specific supplemental information regarding the current conditions at the site and the rationale for performing remediation by PCS excavation. Additionally, this work plan contains relevant information on the geologic, hydrologic, and other environmental conditions for HAFB and the T-38 site. Information is provided for the entire Base and its surrounding environ as well as T-38, specifically. Further, the work plan identifies the methods, and procedures for site excavation, soil sampling, laboratory analysis, soil segregation, and disposal of PCS and any residual phase separate hydrocarbons (PSH) that may be encountered.

Solid Waste Management Units (SMWUs) 19, 20, and 229 are collectively known as the T-38 Site. A detailed description of the physical features of the site and its use are presented in Section 1.3 of this report. A summary of the current known extent of PCS and PSH, justification of the current remedial approach, and the estimated excavation extents are discussed in Section 2 of this report.

1.2 Description of Holloman AFB

HAFB is located in southeastern New Mexico in Otero County, approximately 100 miles north-northeast of El Paso, Texas, and six miles west of Alamogordo, New Mexico (Figure 1-1). HAFB was first established in 1942 as Alamogordo Army Air Field (AAF). From 1942 through 1945, Alamogordo AAF served as the training grounds 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. Today, HAFB also serves as the German Air Force's Tactical Training Center.

1.3 Project Background

Reportedly, the T-38 Test Cell was used as an F4 trim pad from 1966 through 1977 (Foster Wheeler, April 2002). During this time, an underground storage tank (UST) and the power check pad were installed in the area. In 1977, the test cell was upgraded for T-38 aircraft. A temporary test cell was used in conjunction with the existing 1,000-gallon UST for approximately 3 years. DynaCorp assumed operation of the T-38 Test Cell in 1988. The new operation was upgraded with the addition of a 5,000 gallon UST in 1991. After one week of nonuse, the level was checked and it was discovered that the 5,000-gallon JP-4 jet fuel UST had been leaking. It was estimated that approximately 2,000 gallons had leaked from the underground line system leading to the test cell. Subsequently, the underground lines were replaced with aboveground lines.

Various investigations by U.S. Environmental Protection Agency (USEPA) and U.S. Air Force (USAF) contractors have been conducted since 1992. During these studies, monitoring wells were installed and soil and groundwater samples were collected to assist in the delineation of the jet fuel free product and characterization of the site parameters that would influence product recovery. It was soon apparent that more than 2,000 gallons of JP-4 had been released at the site. The site was studied and interim remediation activities such as PSH skimming and vapor extraction were initiated during the extensive investigation. The remedial systems at the site were expanded and upgraded in 1993 and 1996 as the extent of the release was better defined. A description of each remediation system and its operation is presented in the sections below.

1.3.1 Physical Description of the T-38 Site

T-38 is located along the northwest edge of Taxiway A (Figure 1-2). Presently, the remediation system at the 11.5-acre site consists of a Soil Vapor Extraction (SVE) system, located north of Building 638, connected to 133 extraction wells. Prior to 1998, the system was a dual-phase extraction system (DPE). Extracted free product, groundwater, and soil vapors were treated aboveground. Soil vapors were treated in an onsite thermal oxidizing unit and treated groundwater was discharged through an infiltration gallery located northeast of the treatment system. Free product was stored in an aboveground storage tank (AST) for subsequent use as fuel for the onsite thermal oxidizing unit.

Adjacent to the site to the northeast is a concrete area that contains the outdoor power check pad where T-38 planes are tested. Currently, Building 638 is used for general support and maintenance activities. The oil/water separators (OWSs), UST, and other associated equipment have been removed.

To the northwest is the radar building. Transmission lines and emergency lines are located underground west of the site. There is an electrical underground utility line traversing the center of the site. The remaining area contains sparse vegetation.

1.3.2 Dual-Phase Extraction System Operation

In 1994, groundwater and SVE models were performed to analyze a 19-hour DPE pilot test to support a full-scale design. The Interim Remedial Action (IRA) recovery system was installed in mid-1994. The high-vacuum (HV) DPE system pulled liquids and soil vapors from a series of 11 extraction wells. The liquids were separated from the vapors and treated through an OWS with the product going to an 8,000-gallon AST, the groundwater treated through a 60 gallons per minute (gpm) air stripping tower followed by polishing through a granular activated carbon (GAC) system prior to re-injection via the infiltration gallery. Vapors from the HVDPE system and the air stripping tower were treated through a 5,000-cubic feet per minute (CFM) thermal oxidizer.

A *Corrective Measure Study* (CMS), conducted after the IRA system was installed, concluded that a light non-aqueous phase liquid (LNAPL) plume was detected across the site, 150 feet upgradient and 500 feet downgradient of the test cell tank system. In the CMS, the volume of free product was estimated to be 450,000 to 480,000 gallons (Foster Wheeler, 1995).

From November 1995 through May 1996, an expansion of the HVDPE system was completed. Two HVDPE package systems and a bioventing package system, in addition to 122 extraction wells, were installed and combined with the existing system to enhance free product recovery. Additional pilot test studies were conducted in 1997 and 1999 to optimize the operation of the system.

1.3.3 Soil Vapor Extraction System Operation

In 1998, the extraction of groundwater was terminated and efforts for product recovery were switched to vacuum-enhanced (VE) skimming. SVE was performed on all of the 133 extraction wells while oil-skimmers operated on 20 sealed wells. The system was reconfigured so the thermal oxidizer could include a dual-phase option to burn either natural gas or jet fuel. A natural gas pipeline was routed from the base natural gas main to T-38. Also, a temporary discharge line was run from the groundwater treatment system to the HAFB wastewater treatment plant (WWTP). However, since 2001, the system has been shut down.

In 2002, a study was conducted to model the multi-phase extraction system, make recommendations to optimize the extraction of free product, update the estimate of remediation time, and to revise the estimate of the volume of jet fuel released. The modeling indicated a revised estimate of 1,013,009 gallons released, an estimate of 851,897 gallons of product remaining in the ground (214,005 gallons of free product and 637,892 residual product), and an estimated time period for closure of 77 years.

1.4 Physiography

HAFB is located within the Sacramento Mountains Physiographic Province on the western edge of the Sacramento Mountains (Figure 1-3). The region is characterized by high tablelands with rolling summit plains, cuesta-formed mountains dipping eastward, and west-facing escarpments with the wide bracketed basin forming the basin and range complex. HAFB is approximately 59,600 acres in area, and is located at a mean elevation of 4,093 feet above mean sea level (amsl). The Base is located in the Tularosa Sub-basin which is part of the Central Closed Basins. The San Andreas Mountains bound the basin to the west (about 30 miles) with the Sacramento Mountains approximately 10 miles to the east. At its widest, the basin is about 60 miles east to west and stretches approximately 150 miles north to south.

1.5 Surface Water

The Tularosa Sub-basin contains all of the surface flow in its boundaries. The nearest inflow of surface waters to HAFB comes from 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 is located in the far north. Malone and Rita's Draw, which drain into the Lost River, and Dillard's Draw 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.

Ancient lakes and streams deposited water bearing deposits over the older bedrock basement material. Fractures, cracks and fissures, in the Permian and Pennsylvanian bedrock, yield small quantities of relatively good quality water in the deeper peripheral. Potable water is only found from a handful of wells near the edges of the basin with more saline water towards the center. Two of the principal sources of potable water are a long narrow area on the upslope sides of Tularosa and Alamogordo with the other in the far southwestern part of the basin. Alamogordo's water, as well as water for HAFB, is supplied from Lake Bonito (which is in the Pecos River Basin).

1.6 Groundwater

The predominance 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 then moves downgradient through progressively finer-grained sediments towards the central basin. Because the Tularosa Sub-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, groundwater ranges from 5 to 50 feet. Flow for the Base is generally towards the southwest with localized influences from the variations in the topography of the Base. Near the arroyos, groundwater flows directly toward the surface drainage feature.

Previous analyses indicate total dissolved solids (TDS) of greater than 10,000 milligrams per liter (mg/L) in groundwater beneath HAFB. This exceeds the New Mexico Water Quality Control Commission (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.

1.7 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. The climate of the Central Closed Basins varies with elevation. HAFB 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 °F 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, usually less than 10 inches (Foster Wheeler and Radian, 1997). 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 to 30 – 40 percent (%) of the annual total rainfall.

1.8 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 Andreas mountain ranges). In the millions of years following, rainfall, snowmelt, and wind eroded the mountain sediments depositing them in the valley (i.e. Tularosa Sub-basin). Water carrying eroded gypsum, gravel, and other matter continues to flow into the basin.

As the Tularosa Sub-basin is a bolson, which is a basin with no surface drainage outlet, sediments carried by surface water into a closed basin are bolson deposits. The overlying alluvium generally consists of unconsolidated gravels, sands, and clays. Soils in the basin are derived from the adjacent ranges as erosional deposits of limestone, dolomite, and gypsum. A fining sequence from the 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 clay containing gypsum and are contiguous with the alluvial fan and eolian deposits throughout HAFB. There has been the identification of stiff caliche layers, varying in thickness, at different areas of HAFB. At the site, soils are predominantly silty sands and interbedded clays.

2 CURRENT KNOWN EXTENT OF PCS AND GROUNDWATER IMPACT AT T-38

Remediation systems that extracted water and vapor or just vapor from across the approximately 11 acre site had operated from 1996 to 2001. In 2002, a comprehensive evaluation of the remediation systems that operated at T-38 was presented to the HAFB. The study was called the *Multiphase Modeling and Recommendations Report for ERP Site SS-59, SWMU 229, (T-38 Test Cell Fuel Spill Site)* and was prepared by Foster Wheeler Environmental Corporation (Foster Wheeler) in 2002. The purpose of the evaluation was to understand the known site conditions and actual system performance. This information was then used to model several scenarios for the continued operation of the remediation system. The modeling included the length of time to completion under these configurations.

The conclusions of the evaluation can be summarized as follows:

- The exact amount of jet fuel released at the site could be more than originally estimated. The exact volume varies for each modeling scenario. Likewise, the volume of jet fuel remaining varies widely based upon model boundary conditions, the apparent thicknesses of PSH measured in the observation wells, and the varied ranges of absorption capacity in soil types.

- Under varied operating conditions (including the addition of more equipment to enhance operation), the estimated duration of activities at the site would range from 52 to 77 years with an estimated cost of approximately $28.6 million.

- Under even the most optimistic modeling, there would still be 0.01 foot of PSH on the water table and PCS would still be present due to adsorption of hydrocarbons on fine grained soil particles.

- All scenarios would require a variance from the NMED Soil Screening Levels (SSLs) for petroleum hydrocarbons to obtain closure even after the operations for an estimated 52 to 77 years.

2.1 Justification for the Remedial Approach

The Foster Wheeler *Multiphase Modeling and Recommendations Report* (2002) concluded that operations would require a longer than originally anticipated time to complete remediation (52 to 77 years). Additionally, all the operating scenarios modeled would still require NMED to waive or modify the risk based SSLs for petroleum hydrocarbons in soil. Several modeled scenarios would require a variance for the complete removal of PSH from the water table by the NMWQCC to facilitate closure.

These conclusions led HAFB to seek alternatives to the remedial approach at T-38. The most cost effective and conclusive alternative was to simply excavate the nearly 11 acres of PCS and treat the soil in an adjacent landfarm. Also, this approach would permit easy removal of PSH encountered during the excavation using the existing treatment equipment, pumps, separators, holding tanks, and oxidizer. Using an excavation, soil treatment, and PSH removal approach would be a more cost effective approach and provides a definite conclusion to the remediation (5 to 7 years at costs equal to system operation). Therefore, the excavation, treatment of PCS, and removal of PSH described in this work plan is believed to be the simplest, cost effective, and thorough strategy for closure at this site.

2.2 Estimate of PCS Requiring Excavation Soil Screening

The following sources of data were used to determine the volume of soil requiring excavation and treatment at T-38:

- Photoionization detector (PID) screening of borehole cuttings during well installation at T-38
- Laboratory analytical results from test pit excavations installed at the site in October 2003
- Well gauging data collected in October 2003 (and historical fluid level measurements)

These data were used to prepare five cross sections through the site in order to illustrate the spatial location of PCS, potential areas containing PSH, and areas with potentially clean soil (i.e. soil that exceeds the NMED SSLs). A more detailed description of the data and its relative value is detailed below.

Approximately 133 soil borings which were converted into either groundwater monitoring wells or system extraction wells were installed during the construction of the remediation system at the site. Cuttings from each borehole were field screened for volatile organic vapors using a PID. While no soil samples were submitted for laboratory analysis, the PID screening results are a qualitative tool for delineating contaminated soil at the site. In addition to the screening results, the description of soil encountered in each boring was plotted on cross sections to highlight the relationship between soil types, groundwater elevations, PSH, and PCS and a clay-silt layer.

Fluid levels (groundwater elevations and PSH thickness) from operating monitoring wells at the site were measured in October 2003. These data were used to construct a groundwater contour map, an apparent PSH thickness contour map, and the cross sections.

Approximately 16 test pits were excavated around the site in order to collect soil samples for laboratory analysis (Figure 2-1). The soil samples were collected from the most contaminated areas of each pit. The samples were analyzed for petroleum hydrocarbons and select volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The primary purpose of this sampling and analysis was to model bioremediation activity and potential air emissions from land farming the PCS from T-38. However, the data is suitable for use for this effort as well.

Data from these three sources was compiled on six approximately north to south cross sections through the site. These sections incorporate data from all three sources described above in order to provide an illustration of the location and approximate volume of PCS. These cross sections are presented as Figures 2-2, 2-3, 2-4, 2-5, and 2-6.

The cross sections illustrate the discrepancy between the PSH levels measured in monitoring wells with those observed in adjacent test pits. While several probable explanations can be offered for the difference between the presence of PSH in monitoring wells but not in immediately adjacent test pits, the important conclusion is that most test pits which are actual excavations did not identify PSH (except for Test Pit 10). Further when PSH was present in a test pit, it was nearly 10 percent of the thickness identified in the adjacent wells. Therefore, the important conclusion is to recognize that regardless of the reason, the actual thickness of PSH is most likely less than that measured in monitoring wells. Since the equipment is at the site that can readily remove (skim and pump) PSH, if PSH is encountered, it can be easily removed. Based upon the data compiled in the cross sections, it appears that:

- PCS is closely associated and limited to an approximately 4-foot thick layer dominated by clay-silt (red clay-silt) located between approximately 4,059 feet and 4,063 feet amsl.
- PSH and the water table rest on top of this red clay-silt which appears to provide a confining layer for PSH across the site.
- Removal of the finer particle red clay-silt material should eliminate nearly all of the PCS.
- Base upon an aerial distribution of 10 acres, the estimated volume of PCS at the site is approximately 65,000 cubic yards.
- A substantial volume of clean soil is present at the site (estimated at approximately 135,520 cubic yards).

Based on the headspace screening in soil boring logs, clean soil can be present to a depth of approximately 12 feet (near the water table). In order to access PCS, a substantial volume of clean soil (as observed in the soil borings and test pits) that has not been involved in the release from the UST must be moved aside to access the PCS. The soil boring logs and direct observations indicate this soil is free of petroleum hydrocarbons. Therefore, soil screening and sampling will focus on determining that "clean" soil contains constituents at concentrations below NMED SSLs.

2.3 Present Extent of PSH on the Water Table

Figures 2-7 and 2-8 are groundwater contour and apparent PSH thickness contour maps for the T-38 site based upon the measurements collected in October 2003. The water level elevations collected in October 2003 indicate the direction of groundwater flow at the site is southwest with a gradient of approximately 0.025. When the dual phase system was operational, water levels fluctuated an average of 1.5 feet in each well and the groundwater flow direction was still southwesterly (Foster Wheeler, 2002).

Figure 2-8 is a contour map of the PSH measured in each monitoring well. This data is not corrected for specific gravity or any of the other algorithms used to approximate PSH thickness in the formation. The map indicates a maximum product thickness of 4.5 feet as measured in monitoring wells. Specifically, in monitoring wells MW-4, MW-19, MW-20, and MW-32 located near the center of the site. However, test pits TP-10, TP-12, and TP-16 excavated to the water table in the heart of the thickest PSH contours contained a maximum of 0.5 feet of PSH (TP-10) and test pits TP-12 and TP-16 contained no PSH. Additionally, TP-10 with 0.5 feet of PSH was the only test pit where PSH was identified at the site. The locations of the test pits are presented in Figure 2-1. As mentioned previously, there is a discrepancy between the observed thickness of PSH in monitoring wells and the test pits. There are several possible explanations for this difference. The most probable, however, is that PSH accumulated in the monitoring wells over time due to frequent depressions and recovery of the water table by the treatment system pumping. This fluctuation combined with the well construction and occlusion due to the build up of natural organic material ("slime"), could result in the monitoring wells acting somewhat like "sumps" collecting and trapping a thicker layer of PSH than actually present in the subsurface.

Data collected in soil borings, the monitoring wells, and at least one test pit indicates that PSH is present on the water table. However, direct observations from test pit data does not indicate the thickness of PSH indicated by contouring the results for observation wells. Further, since the remedial solution for this site is to excavate contaminated soil and remove PSH, this difference is an academic issue. The exact reason for the difference will not impede the primary objective of clean-up at the T-38 site.

3 EXCAVATION PROCEDURES

Because an estimated 65,000 cubic yards of PCS will be removed, treated, and returned to the excavation, VCM activities at T-38 will be conducted incrementally based on yearly funding allocations. The remediation for site closure will be accomplished over a period of approximately 5 to 7 years. The objective of the soil excavation is to remove contaminated subsurface soil, down to the groundwater table, that contains more than 940 milligrams per kilogram (mg/kg) of total petroleum hydrocarbons (TPH) and where there is a risk due to an exposure to VOCs and/or SVOCs. The level of 940 mg/kg is the Residential Direct Exposure Limit for kerosene and jet fuel as listed in Table 2 of the *New Mexico Environment Department TPH Screening Guidelines,* June 24, 2003 (included in Appendix A of this report). Further, PSH discovered during excavation will be skimmed from the water surface, bulked in the treatment system, and disposed of either by operating the onsite thermal treatment unit or by disposal off site to an oil/fuel recycler whichever is most cost effective. However, the final disposal method will be documented and included in the closure report for the site.

Excavation will extend approximately one foot below the water table at the site with the lateral extent based upon previous investigations (such as the data presented in Section 2), fluid level measurements, and the direct observation of the excavation sidewalls. Excavation will continue in all directions in order to pursue the PCS.

The excavation of PCS at T-38 presents unique challenges due to the location of the site. As stated in Section 1.3.1 of this report, T-38 is located northwest of Taxiway A. The only access to T-38 is to cross the tarmac and taxiway which results in very restricted access to the site. The restricted access is a positive asset, especially with the large area requiring excavation. The following sections detail how excavation, soil segregation, soil sampling and analysis, landfarm treatment, and site restoration will be accomplished at the T-38 site.

3.1 Pre-Excavation Activities

Before excavation and other site activities can begin, there are several pre-construction documents and approval requirements to be met including Air Force Form 332 (located in Appendix B of this report) approval, Base dig permit with utility clearances, site security, and erosion control mechanisms. Remediation activities at T-38 will be conducted in accordance with the *Draft Storm Water Pollution Prevention Plan T-38 Test Cell Fuel Spill Site* (SWPPP) (Bhate, December 2003), so that petroleum-impacted soils will not result in a discharge of contaminated storm water.

Bhate will coordinate project requests for HAFB installation support services through the 49 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 USACE Resident Engineer, HAFB personnel, and Bhate Site Manager, to inspect site conditions for site/equipment access, equipment staging area, soil stockpile areas, potential site hazards, and emergency evacuation routes. Also, reviewed at this time will be project procedures in accordance with the schedule and planned activities.

3.2 Site Security and Access

The T-38 Site is located inside of the taxiways of the Base airfield. Security for the airfield is high due to the nature of military air operations. Therefore, access to the perimeter of the airfield and across any taxiway is limited to air crews, maintenance crews, and air traffic control personnel. The taxiways are guarded by military police and observed 24 hours a day by the control tower. Anyone attempting to enter the area without proper clearance will be met by security forces. Therefore, security fencing at the site only requires limiting accidental excursion of personnel into the excavation area. Temporary plastic construction fencing capable of warning personnel they are near a construction zone will be sufficient. Fencing will be opened and closed as needed during daily activities and signage will warn personnel that the area is an environmental clean-up site.

In addition to the temporary fence, select areas will be designated as the exclusion zone (EZ), the contamination reduction zone (CRZ), and the support zone (SZ). Further, site personnel will be comply with excavation requirements, posting of potential hazards, and control of un-authorized site personnel, as discussed in the *Basewide Health and Safety Plan* (HASP) (Bhate, November 2003). Based upon the Occupational Safety and Health Administration (OSHA) classifications of the various excavations, this site will be a Class II excavation.

3.3 Grid System for Soil Excavation and Sampling

The T-38 test site excavation is several acres in size and will require several years to complete. A grid system will be imposed across the site to better track the excavated soil through the segregation, stockpile, and landfarm processes. Further, the soil screening, soil sampling, and laboratory analysis will be tied to the grid system in order to demonstrate that sufficient sampling was performed for clean stockpiled soil and soil treated in the landfarm. Also, the grid will address the vertical component by elevation starting with the 4,080 foot elevation. Each grid block will be assigned a number that will follow the fate of the soil and be used as an identifier for all analytical results related to the soil in the block. Each grid will be 80 feet square as shown in Figure 3-1. The grid will be installed at the site using global positioning system (GPS) survey grade equipment with a horizontal and vertical accuracy greater than 0.1 feet. By tracking the fate of soil from each grid, personnel will be able to accurately document the remediation at the site (and plan for future work in an efficient manner). Likewise, samples collected at the site (including flame ionization detector [FID]/PID screening samples) will be assigned a unique alpha numeric sample number that will refer to the grid site of the soil (see section 4.5 of this report).

3.4 Monitoring Well and Treatment System Demolition

As the excavation progresses across the site, several groundwater monitoring wells, extraction wells, and associated piping will be decommissioned and removed. In some instances, residual hydrocarbons may be present in these materials. The following sections describe the procedures for proper decontamination and confirmatory sampling of these materials.

3.4.1 Monitoring and Extraction Wells Demolition

During excavation activities, monitoring wells located within the excavation area will be properly abandoned. At most locations, the entire well can be pulled from the excavation with heavy equipment. However, at locations where the entire well can or does not require removal, the surface fittings, well box, well casing, and other materials shall be removed to a depth of 3 feet below grade. Each monitoring well will then be grouted in-place to the surface in accordance with American Society for Testing and Materials (ASTM) Guidance D 5299-92. They will be pressure grouted with a 6% to 8% bentonite powder/grout mixture. For wells with a depth less than 50 feet, grout shall be placed via tremmie pipe.

Piping and screen materials will be taken to the decontamination pad located in the equipment compound onsite. These materials will be pressure washed until residual materials have been eliminated to the extent practical. The materials will then be stockpiled in the equipment compound for confirmation rinseate sampling (Section 3.4.3 of this report). Water from the decontamination pad will be disposed of in the base sewer system, permitted to evaporate (if conditions permit), or taken to the landfarm for use in dust control or moisture regulation for PCS undergoing treatment.

3.4.2 Treatment System Demolition

Piping and other materials associated with the treatment system that have been in contact with hydrocarbons at the site will be removed as they are encountered during excavation. The piping will be examined for residual product and drained (if necessary) to prevent spillage across the site. When necessary, the piping will be capped or blanked to prevent any materials still present in the remaining system from migrating offsite.

During the VCM activities conducted under this Excavation Work Plan, parts of the existing SVE system will be abandoned; however, the majority of the system will remain in use. Groundwater and associated free product will be removed by the existing SVE system. The water will be routed through the existing water treatment system to remove free product and ultimately discharged to the HAFB WWTP.

Piping and screen materials will be taken to the decontamination pad located in the equipment compound onsite. These materials will be pressure washed until residual materials have been eliminated to the extent practical. The materials will then be stockpiled in the equipment compound for confirmation rinseate sampling (Section 3.4.3 of this report). Water from the decontamination pad will be disposed of in the base sewer system, permitted to evaporate (if conditions permit), or taken to the landfarm for use in dust control or moisture regulation for soil undergoing treatment.

3.4.3 Decontamination Sampling of Treatment System and Monitoring Well Equipment

For every 1,000 linear feet of piping or well material that has undergone decontamination, one section of piping will be randomly selected for rinseate sampling to demonstrate that no hazardous constituents are present on the piping. The selected section will be rinsed with deionized water (DI). A sample of the DI water will be collected directly from the piping into the appropriate laboratory sample containers and shipped under strict chain-of-custody to the laboratory for analysis. These water samples will be analyzed for VOCs by Method 8260B and SVOCs by Method 8270C. The results will be compared to Resource Conservation and Recovery Act (RCRA) standards to determine if any hazardous constituents remain on the materials.

If the system and well materials are non hazardous, they will be relinquished to the HAFB Defense Reutilization and Marketing Office (DRMO). Characterization sampling also applies to any equipment at the treatment pad that will not be relinquished to the Base DRMO but designated for disposal. If the materials still contain characteristically hazardous constituents, they will again undergo the decontamination procedure and testing until they are characteristically non hazardous.

3.5 Soil Screening and Segregation

During the excavation process, soil will be screened for contamination. Soil will be periodically screened by soil-headspace screening techniques utilizing an organic vapor analyzer (OVA). The OVA will be equipped with either a FID or PID using a 10.2 electron volt (eV) lamp or equivalent. The goal of screening is to segregate clean soil that has not been impacted by the jet fuel release. Section 4.1 of this report describes the headspace soil screening technique and frequency during excavation and segregation of soil.

3.6 Soil Excavation

Prior to excavation of overburden or contaminated soils, the site will be prepared according to the Draft SWPPP (Bhate, December 2003). Excavation activities will utilize an excavator or track hoe for the primary soil removal with either a front loader or rubber tired backhoe to assist with soil management. Overburden soil shall be removed, with appropriate screening, and stockpiled onsite and sampled in the manner and frequency identified in Section 4. Stockpiles will be managed in accordance with the Draft SWPPP (Bhate, December 2003). Contaminated soil or soil believed to be contaminated (suspect) will be transported to the onsite landfarm. Field screening and laboratory sampling of soil will be performed in accordance with the procedures and with the frequency described in Sections 3.5 and 4 of this report.

Based upon the cross sections produced using data available from the soil boring logs, the test pits, and fluid level measurements, the majority of PCS is located approximately 4 feet above the water table (approximately 4,063 feet elevation) to 1-foot below the water table (approximately 4,059 feet elevation). It is anticipated that PSH on the water table will be encountered over some portion of the site. During the excavation process, periodic trenching may be required to promote the amassing of liquid phase petroleum that may be present on the water table. Accumulated free product will be removed by the existing treatment system and will accumulate in the treatment systems AST for treatment or disposal.

Free product and groundwater will be removed from the excavation using the existing HVDPE system. Any recovered groundwater will be treated and discharged to the HAFB WWTP.

3.7 Excavation Backfilling and Compaction

Clean overburden soil removed from the site and treated soil from the landfarm will be emplaced into the excavation with periodic compaction using the loader and a compactor. It is not anticipated that the site is to be reused for any future construction activities (buildings, structures, etc.) due to its location inside the airfield complex.

3.8 Soil Disposal

Contaminated soil shall be transported directly from the excavation to the onsite landfarm operating adjacent to the T-38 site. Soils treated onsite will be used as backfill material when testing indicates TPH concentrations are below 940 mg/kg and no other constituents exceed the NMED Residential SSLs for PCS. The landfarm operates with a discharge permit issued by the NMED Groundwater Quality Bureau.

3.9 Site Restoration

Upon completion of site excavation and backfill activities, the site will be restored with grading to the surrounding grade with a thin to moderate layer of crushed stone. Construction equipment and debris will be removed. The site will be canvassed for trash, debris, etc. Final grade for the site will allow for positive drainage in accordance with the surrounding area.

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4 SOIL SAMPLING AND ANALYSIS

Three separate analytical procedures with unique purposes will be employed to segregate PCS from "clean soil". To verify the completeness of PCS removal, confirmation soil samples will be collected from the excavation sidewalls and submitted for laboratory analysis. Each sampling and analytical procedure is described in the sections below. Any soil that is suspected of being contaminated by petroleum hydrocarbons above the NMED SSLs will be immediately transported to the T-38 Landfarm located adjacent to the site. Soil entering and leaving the landfarm is sampled at a frequency of every 720 cubic yards for all PCS constituents in accordance with the operating NMED Groundwater Bureau Discharge Permit. Therefore, no further sampling of the soil is needed once the soil is sent to the landfarm for treatment. The sampling frequency and analytical procedures are summarized in Table 4-1.

All stockpile and landfarm soil samples will be tracked and tied to their grid of origin in the excavation. Each sample will receive a unique alpha-numeric identification that will permit easy identification of the sample type and location.

The field headspace screening technique will be performed on all soil excavated from T-38 at a minimum of every 700 cubic yards using an OVA. Section 4.1 of this report describes the procedure for OVA headspace screening.

To support and validate the OVA headspace screening, one soil sample will be collected from every 3,500 cubic yards of "clean" soil and analyzed for Diesel Range Organics-Gasoline Range Organics (DRO-GRO) TPH using the siteLAB®. The siteLAB® analyzer will be calibrated with a standard prepared by the manufacturer specifically for the jet fuel at T-38. One soil sample will be collected from the "clean soil" stockpile for every 3,500 cubic yards of soil (or one for every five OVA headspace analysis). The siteLAB® sampling and analysis is described in Section 4.2 of this report.

To provide more assurance that "clean soil" is below the NMED SSLs, one sample from every 7,000 cubic yards of "clean" soil (that had undergone both OVA headspace screening and siteLAB® analysis) will be collected and shipped to an offsite analytical laboratory certified for SW-846 analytical methodology. The laboratory sampling and analytical procedures for "clean soil" stockpile samples are described in Section 4.3 of this report.

Once the excavation has been completed, soil samples will be collected from the excavations sidewalls to demonstrate that PCS is no longer present and the excavation is complete. These samples termed "confirmation samples" will be collected and submitted under strict chain-of-custody to the offsite laboratory (Associated Laboratories of Orange California) for analysis. A detailed summary of the sampling procedures and analytical methods are described in Section 4.4 of this report.

Table 4-1. Sampling Schedule for Soil Excavated from T-38

Soil Type	Number of Samples	Sample Frequency	Analytical Method(s)	Sample Identification Prefix
Excavated Soil If the soil is "clean", then move across the table (Screening analysis)	1	700 cubic yards of stockpiled soil	OVA/FID/PID Headspace Analysis	SS-59-SS-OVA-xxx
	1	3,500 cubic yards of stockpiled soil	Site Lab® TPH Analysis to analytical lab GRO/DRO standards.	SS-59-SS-SL-xxx
If the soil is PCS or "suspect" Move to column below (landfarm)	1	7,000 cubic yards of stockpiled soil	TPH by Method 8015M VOCs by Method 8260B SVOCs by Method 8270C	SS-59-SS-LAB-xx
Landfarm Soil (soil >800 ppm) OVA Headspace Screening	12	1 round of 12 samples is collected when the lift is placed in the landfarm	TPH by EPA Method 8015M VOCs by Method 8260B SVOCs by Method 8270C	LF-59-Lx-Ax-P/R-xx
or Soil Suspected of Exceeding NMED SSLs	12	1 round of 12 samples is collected when the lift has undergone treatment in the landfarm	TPH by EPA Method 8015M VOCs by Method 8260B SVOCs by Method 8270C	LF-59-Lx-Ax-P/R-xx
Confirmation Soil Samples Collected from the completed Excavation Sidewalls	Total number of samples depends on the circumference of the excavation	1 sample for every 100 linear feet of excavation sidewalls	TPH by Method 8015M VOCs by Method 8260B SVOCs by Method 8270C	SS-59-CS-xx (location)-xxxx (elevation)

4.1 Headspace Field Screening Evaluation of Soil

During the excavation process, all soil will be screened for potential and real contamination. Initial screening will be visual observance of discoloration. The goal of screening is to segregate clean soil that has not been impacted by the jet fuel release from PCS.

Soil will be screened via headspace analysis at least every 700 cubic yards (1 per grid section). Screening will be more frequent if noticeable contamination is present. Although the NMED clean-up level is 940 mg/kg, soils resulting in a headspace reading with the PID above 800 parts per million (ppm) will be designated TPH contaminated, allowing for a 10% measurement error and variability between the screening method and the NMED approved laboratory analysis.

The soil will be screened using headspace screening techniques with an OVA equipped with either an FID or PID using a 10.2 eV lamp or equivalent. All soil will be screened using this headspace procedure at a minimum frequency of 700 cubic yards. Additional soil sampling using an onsite laboratory procedure and offsite analysis by EPA methodology laboratories will be performed using techniques and sampling intervals described in Section 4.2 of this report.

Personnel shall perform the headspace field screening in accordance with the following procedures:

1. Immediately upon retrieving the sample place the soil into a 1-gallon Zip-Lock™ bag. Fill the bag ½ full and close the bag.

2. Vigorously agitate the sample bag for at least 15 seconds and then allow a minimum of 15 minutes (or as the environmental conditions dictate) for the sample to adequately volatilize and equilibrate to ambient temperatures.

3. During cold weather, the samples shall be warmed to near room temperature (approximately 60 to 70°F) prior to taking the headspace measurement.

4. Following the 15-minute period, re-shake the bag. Pierce the bag or unzip the corner of the seal and insert the tip of the OVA into the headspace. These data will be recorded in the dedicated field log book. No background value corrections are made for these headspace readings.

4.2 SiteLAB® Onsite Analysis of Soil Samples

For every 3,500 cubic yards of "clean" soil stockpiled, one representative soil sample will be collected and analyzed for TPH GRO and DRO using the siteLAB® bench top analyzer. This frequency of sampling and analysis represents 1 siteLAB® analysis for every 5 headspace screening analysis. To increase the accuracy of the unit, the siteLAB® has a calibration standard prepared by the manufacturer that was created using PCS from the T-38 site. More specific details concerning the siteLAB® operation are presented in Appendix C of this report.

4.3 Soil Sample Laboratory Analysis

For every 7,000 cubic yards of "clean" soil stockpiled, one representative soil sample will be collected and analyzed for TPH by Method 8015M, VOCs by Method 8260B, and SVOCs by Method 8270C. This frequency of laboratory sampling and analysis represents 1 laboratory sample for every 2 siteLAB® analyses and 1 for every 20 OVA headspace screening analyses. These samples will be collected and submitted under strict chain-of-custody (COC) to the offsite laboratory (Associated Laboratories of Orange California) for analysis.

The laboratory data will adhere to data quality objective (DQO) requirements, method reporting limits, duplicate field samples, and quality control (QC) samples as established in the *Basewide Quality Assurance Project Plan* (QAPP) (Bhate, November 2003). Sample quantities, containers, methods of preservation, and holding times will be consistent with the requirements of associated method protocols.

4.4 Confirmation Soil Sampling and Analysis

To demonstrate that excavation of PCS is complete, confirmation samples will be collected. One confirmation sample will be collected from each sidewall of the excavation every 100 linear feet and will be analyzed by a fixed base laboratory, Associated Laboratories of Orange, California.

Confirmation soil samples will be collected at a minimum of 100 foot intervals from the excavation sidewalls along the perimeter of the excavation. The soil samples will be collected from the area of maximum contamination which is most likely present between 0 and 3 feet above the water table in the red clay-silt (refer to Figures 2-2 through 2-6).

Soil samples will be analyzed for TPH using EPA Method 8015M, VOCs by EPA Method 8260B, and SVOCs by EPA Method 8270C. Analytical confirmation sampling from the bottom of the excavation is not required because excavation will terminate one foot below the water table. Data will adhere to DQO requirements, method reporting limits, duplicate field samples and QC samples as established within the T-38 addendum to the *Basewide Quality Assurance Project Plan* (QAPP) (Bhate, November 2003). Sample quantities, containers, methods of preservation, and holding times will be consistent with the requirements of associated method protocols.

4.5 Sample Identification System

Each environmental sample collected (OVA headspace screening samples, siteLAB® samples, and fixed based laboratory samples) will receive a unique alpha-numeric sample number that corresponds to the site location, sample type, grid location, and approximate elevation. This sample number will be identified on the sample label and COC records, regardless of type. The duplicate samples will appear in sequence with the regular samples. Two sample identification systems, one for stockpiled soil samples and the other for confirmation samples will be used for this VCM. Each is explained in the sections below. PCS taken to the landfarm is labeled in accordance with the soil sampling and analysis procedures described in the application for operating discharge permit for the T-38 Landfarm (Bhate 2004).

4.5.1 Stockpile Sample Identification System

Three types of soil samples (OVA headspace screening, siteLAB® soil samples, and fixed based laboratory analytical samples) are collected from the "clean" soil stockpiles. The identifier nomenclature for stockpiled soil samples will be as follows:

SS-59-SS - xxx- grid# (nn) - eeee - CC

Where:

SS-59	SS-59 is for the T-38 Site
SS	Indicates the sample is from the clean soil stockpile
xxx	Denotes the analysis type where: OVA - OVA headspace screening analysis SIT - siteLAB® DRO-GRO TPH analysis FIX - Sample was sent to an off site fixed based laboratory for analysis
grid#	Indicates the grid number of origin for the stockpiled soil. In the case of SIT and FIX samples which can span several grids, this number becomes a range of grid numbers such as (5-7) for grids 5 through 7
nn	Is an extra sample number for duplicates or multiple samples taken from the same stockpile
eeee	Indicates the approximate elevation of the grid #
CC	Reserved for quality assurance (QA) sample identifiers including: FD = field duplicate MS = matrix spike MSD = matrix spike duplicate

The collection of samples will be recorded in a bound dedicated field notebook.

4.5.2 Excavation Sidewall Sample Identification System

The identifier nomenclature for confirmation soil samples will be as follows:

SS-59-CS-xx-eeee

Where:

SS-59	SS-59 is for the T-38 Site
CS	Indicates the sample is a confirmation sample from the excavation sidewall
xx	Denotes the sample number
eeee	Indicates the approximate elevation of the sample on the sidewall

These sample locations will be surveyed individually and are not associated with the grid system.

4.5.3 Landfarm Sample Identification System

The identifier nomenclature for landfarm soil samples will be as follows:

LF-59-Lx-Ax-P/R-xx

Where:

LF-59	LF-59 is for the T-38 Site specific Landfarm
Lx	Lx is the lift number (e.g., L1, L2, L3, etc)
Ax	Ax is the cell location within the lanfarm (e.g., A1, B2, D5, etc)
P/R	P = lift placement sample, R = lift removal sample
xx	Indicates depth of sample collection below surface

4.6 Sampling and Analysis of Landfarm Treated Soil

Applicable Basewide Standard Operating Procedures (SOPs) for sample collection are located in the Basewide QAPP (Bhate, November 2003).

5 RISK-BASED CLEANUP APPROACH

The objective of the VCM activities presented is to remove PCS and free product from T-38 to support closure of the site. Data collected as a result of field screening will be evaluated based upon the DQOs of the project. The results from the offsite laboratory confirmation samples will be evaluated to determine whether excavation activities at the site have removed the contaminated soil to the point where there is an acceptable risk due to exposure at the site.

5.1 Evaluation of TPH

Based on the direction provided by NMED, pertaining to the remediation of petroleum-impacted sites, a residential exposure TPH screening level of 940 mg/kg will be used to evaluate the data provided by the offsite analytical laboratory. Samples will be analyzed for GRO, DRO, and Oil Range Organics (ORO). Concentrations detected will be totaled and that result will be compared to the screening level of 940 mg/kg.

5.2 Evaluation of VOCs and SVOCs

For any VOCs or SVOCs that are detected in soil, the concentration will be evaluated against the screening levels provided in the NMED guidance document *Technical Background Document for Development of Soil Screening Levels* (NMED, February 2004). Table A-1 containing the SSLs from this guidance document is provided in Appendix D of this report. The laboratory data for each soil sample collected will be compared to these SSLs. If the completed evaluation indicates an acceptable risk, then no further excavation will be required and the site can be considered for closure with no further action.

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6 HEALTH AND SAFETY REQUIREMENTS

Project Health and Safety practices will adhere to the Basewide HASP (Bhate, November 2003) and the Activity Hazards Analysis included as an attachment to the *Site-Specific Addendum to the Basewide Health and Safety Plan, T-38 Test Cell Fuel Spill Site* (Bhate, November 2003) included as Appendix E of this report. It is anticipated that no greater than modified Level D personal protective equipment (PPE) will be required to complete the excavation and sampling activities at T-38. This includes: 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 nitrile gloves during sampling. A copy of the Basewide HASP (Bhate, November 2003) will be maintained onsite.

Excavation depths are expected to exceed 4 feet yet be less than 20 feet. Sidewall benching shall be conducted in accordance with OSHA regulation 29 Code of Federal Regulations (CFR) 1926 Subpart P.

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7 CONSTRUCTION-DERIVED WASTE MANAGEMENT

Construction-Derived Waste (CDW) will be managed and characterized according to the approach presented in Table 7-1. Whenever possible, waste minimization techniques will be used to reduce the amount of CDW. Wastes generated during this field program will be characterized using the analytical results available from samples collected. The management of CDW generated in the field will be specified for each waste stream category indicated in Table 7-1. A summary of CDW management for each waste stream is presented in the following sections.

Table 7-1. Proposed Waste Streams for the VCM

ACTIVITY/ITEM	WASTE STREAM			
	Excavated Soil	Recycled Material	PPE	Decontamination Water
Excavation	X		X	X
Soil Sampling	X		X	X
SVE Piping		X	X	X
Equipment Decontamination			X	X

7.1 Excavated Soil

Excavated soil will be segregated in the field based on visual observation, OVA headspace readings, onsite analysis of TPH using the siteLAB® and laboratory analysis. Soil that is suspected of contamination will be treated in the landfarm and will then be returned to the completed excavation as backfill.

7.2 Decontamination Water

Small equipment, such as sampling tools, will be decontaminated in accordance with the Basewide QAPP (Bhate, November 2003). Heavy equipment, such as the backhoe, trackhoe, etc., will be decontaminated at a temporary decontamination pad set up at the site. The containers and decontamination pad will be managed in a secure area and the decontamination water will be either allowed to evaporate or discharged to the HAFB WWTP. Decontamination water is anticipated to be non-hazardous and as such, can be disposed of through the WWTP. Sediment remaining in the decontamination pad will be combined with the soil to be remediated in the onsite landfarm. If a substantial volume of water is generated by decontamination procedures it can be used as dust and moisture control (sprayed from a tanker truck) at the landfarm in accordance with the operating permit.

7.3 Personal Protective Equipment, Disposable Sampling Equipment, and Decontamination Pad Materials

PPE and other site non-hazardous debris/waste shall be placed in plastic trash bags and disposed in a standard solid waste dumpster or receptacle as directed by HAFB personnel.

7.4 SVE Piping

Decommissioned piping from the SVE system will be handled in accordance with Section 3.4.3 of this report.

8 SAMPLE DOCUMENTATION

Sample documentation, identification, and tracking will adhere to the prescribed methods found in the Basewide QAPP (Bhate, November 2003) and this work plan. Sampling activities will include documentation of significant activities, significant occurrences, and sample identification information. At a minimum, field log books will be utilized to record dates and times, sampling protocols, project numbers, and the sampler's name. Other pertinent information will include COC numbers and air-bill tracking number. COC forms will be completed and included with each sample shipment.

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9 DATA REPORTING

Due to the phased approach for this VCM and the timeframe required for the treatment of the soils, weekly maps using the GPS collected data will be generated during the active excavations and transmitted to the Bhate Program Manager. The maps will show the GPS generated locations of samples collected and the progress of the excavation. This will also assist in the generation of the final report by documenting activities as they occur.

Data obtained during the excavation, confirmation or field screening samples, will be reported according to the Basewide QAPP (Bhate, November 2003). Risk evaluation and sampling results will be tabulated and summarized in the closure report for the site. An Environmental Restoration Program Information Management System (ERPIMS) submittal is not required for this project.

A comprehensive closure report will be prepared at the completion of the VCM activities. The report will include a summary of previous investigations and remediation activities that have been performed at the site.

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10 ORGANIZATION AND SCHEDULE

During the excavation operations at T-38, Mr. John Hymer, will serve as the Bhate Site Manager overseeing and directing the excavation, and also providing onsite management of sub-contractors for the project. Mr. Jerry Pelfrey will serve as the Field Quality Assurance Manager coordinating and overseeing sampling activities. Mr. Pelfrey will also ensure that all samples collected have the proper documentation and recorded locations. Mr. Frank Gardner is the Bhate Program Manager and will ensure required project documents, permits, contractual agreements, and other program tasks are completed.

Bhate personnel, or its sub-contractors, will complete tasks in regards to the dismantling of the SVE piping system, as needed. A geologist will oversee the abandonment of the monitoring/extraction wells. Likewise, qualified, licensed operators will provide excavation and transportation service

Excavation is anticipated to begin around March 2005. The actual start schedule is highly dependant upon the completion of existing and scheduled remedial actions at HAFB (i.e. SS-17 and SS-02/05). Turn around time at the T-38 landfarm is expected at 5 weeks with one week for transitioning soils. The landfarm is rated at 16,000 cubic yards of soil per treatment cycle.

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11 REFERENCES

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FIGURES