BHATE ENVIRONMENTAL, INC.

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ENTERED

LETTER OF TRANSMITTAL

DATE	JOB NO
8-12-05	9050197

ATTENTION: Mr. Tom Zink

RE: Solid Waste Management Unit (SWMU) 13
Holloman Air Force Base, NM

TO: U.S. Army Corps of Engineers
106 South 15th Street
Omaha, NE 68102-1618

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via ______ the following items:

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2	8-2005	--	Voluntary Corrective Measures Work Plan

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Federal Express

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Mr. Chuch Schick - (1 copy)
Mr. John Hymer - Bhate Holloman (2 copies)
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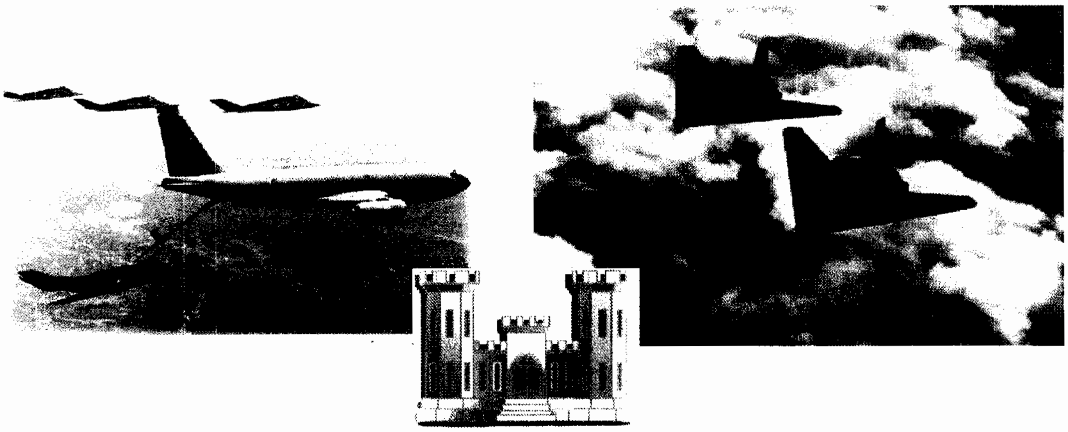
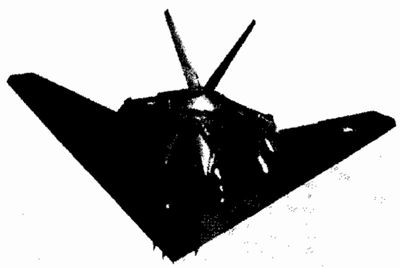
VOLUNTARY CORRECTIVE MEASURES WORK PLAN SWMU 123





Holloman Air Force Base
New Mexico

August 2005

Contract No.: DACA45-03-D-0023
Delivery/Task Order No.: 0013
Bhate Project No.: 9050197

Headquarters, Air Combat Command
Langley Air Force Base, Virginia

49 CES/CEV
Holloman Air Force Base, New Mexico

VOLUNTARY CORRECTIVE MEASURES WORK PLAN

SOLID WASTE MANAGEMENT UNIT (SWMU) 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
Omaha District
Omaha, Nebraska

Contract No.
DACA45-03-D0023
Delivery/Task Order No. 0013

August 2005

Prepared by:

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Bhate Project No. 9050197

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VOLUNTARY CORRECTIVE MEASURES WORK PLAN

SOLID WASTE MANAGEMENT UNIT (SWMU) 123

HOLLOMAN AIR FORCE BASE, NEW MEXICO

REVIEW SHEET

This Work Plan has been reviewed and approved by:

John Hymer Site Manager	Signature	Date: August 8, 2005
Karen J. Niebuhr, P.E. Senior Project Manager	Signature	Date: August 12, 2005
Frank Gardner, P.G. Program Manager	Signature	Date: August 8, 2005

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VOLUNTARY CORRECTIVE MEASURES WORK PLAN

SOLID WASTE MANAGEMENT UNIT (SWMU) 123

HOLLOMAN AIR FORCE BASE, NEW MEXICO

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ACRONYMS AND ABBREVIATIONS

AAF	Army Air Field
ACI	American Concrete Institute
AFCESA	Air Force Civil Engineer Support Agency
AF Fm	Air Force Form
amsl	Above mean sea level
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
bgs	Below ground surface
Bhate	Bhate Environmental Associates, Inc.
BMP	Best management practices
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CDW	Construction-derived waste
CES/CEV	Civil Engineering Squadron/Combat Engineer Vehicle
CLSM	Controlled low-strength material
COC	Chain-of-custody
CRZ	Contamination reduction zone
cu yds	Cubic yards
DPT	Direct push technology
DRO	Diesel range organics
DQO	Data quality objective
ERPIMS	Environmental Restoration Program Information Management System
EZ	Exclusion zone

°F	Degrees Fahrenheit
FID	Flame-ionization detector
GC	Gas chromatogram
GRO	Gasoline range organics
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
ln ft	Linear feet
mg/kg	Milligrams per kilogram
MS/MSD	Matrix spike/matrix spike duplicate
NAVFAC	Naval Facilities Engineering Command
NFA	No Further Action
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Commission Criteria
NOD	Notice of Deficiency
ORO	Oil range organics
OSHA	Occupational Safety and Health Administration
OVA	Organic vapor analyzer
OWS	Oil/water separator
PAH	Polynuclear aromatic hydrocarbon
PCS	Petroleum-contaminated soils
PID	Photo-ionization detector
POL	Petroleum, oil, and lubricant
PPE	Personal protective equipment

QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
SVOC	Semi-volatile organic compound
SZ	Support zone
TPH	Total petroleum hydrocarbons
TRPH	Total recoverable petroleum hydrocarbons
UFGS	Unified Facilities Guide Specifications
USACE	United States Corps of Engineers
USEPA	United States Environmental Protection Agency
UVF	Ultraviolet Fluorometer
VCMs	Voluntary Corrective Measures
VOC	Volatile organic compound
WRCC	Western Regional Climate Center
WSMR	White Sands Missile Range
WWTP	Wastewater treatment plant

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1 INTRODUCTION

Bhate Environmental Associates, Inc., (Bhate) has been retained by the U.S. Army Corps of Engineers (USACE), under contract DACA45-03-D0023, Delivery/Task Order No. 0013, to conduct Voluntary Corrective Measures (VCMs) at Solid Waste Management Unit (SWMU) 123 at Holloman Air Force Base (HAFB), New Mexico. The VCMs include multiple tasks as outlined in the USACE Scope of Services dated May 5, 2005. This document is to provide a work plan that will serve as the primary working document for the excavation activities at SWMU 123.

This plan provides the relevant site specific information and requirements as outlined in the Scope of Work for remedial activities at SWMU 123. The primary objective of this VCM is to remove, through excavation, and properly dispose of petroleum-contaminated soils (PCS). 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.

This document has been written to provide relevant information on the geologic, hydrologic, and other environmental conditions for HAFB and SWMU 123 as well as the procedures by which the VCM will be completed. Information is provided for the entire Base and its surrounding environment as well as SWMU 123. This VCM calls for the removal of PCS at the site through excavation, with verification of complete PCS removal via confirmation sampling from the excavation.

1.1 HAFB Site Description

HAFB is located in southeastern New Mexico in Otero County, New Mexico, approximately 100 miles north-northeast of El Paso, Texas and six miles west of Alamogordo, New Mexico (Figure 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 training center for the German Air Force's Tactical Training Center.

1.2 SWMU 123 Site Description

SWMU 123 is identified as a former waste oil tank area and is located in the main petroleum, oil, and lubricant (POL) facility which is located on the eastern perimeter of the southeast corner of the Base off Delaware Road (Figure 2). The size, construction material, and exact location of the waste oil tank at SWMU 123 is unknown as the tank was previously removed and detailed documentation is not available. The waste oil tank is assumed to have received wash water, waste oil, and fuels from the oil/water separator (OWS) located west of the former waste oil tank (Radian, October 1994). The PCS at SWMU 123 that are scheduled for excavation are located beneath the footprint of an existing wash rack and associated canopy.

1.3 Physiography

HAFB is located within the Sacramento Mountains Physiographic Province on the western edge of the Sacramento Mountains. 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 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. HAFB is approximately 59,600 acres in area, and is located at a mean elevation of 4,093 feet above sea level. The Base is located in the Tularosa Sub-basin which is part of the Central Closed Basins. 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, the basin is about 60 miles east to west and stretches approximately 150 miles north to south.

The ground surface at SWMU 123 is relatively flat and covered with native vegetation, asphalt parking lots, and concrete walkways and driveways.

1.4 Surface Water

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.

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 the Base's, is supplied from Lake Bonito (which is in the Pecos River Basin).

Within the boundaries of SWMU 123, surface water runoff is controlled by the minimal topographic relief as per the existing grade and landscaping with surface drainage towards the adjacent parking area. Appurtenances can be found placed along the perimeter of the parking area to the north and southwest for collection into the Base storm water drainage system. Within the walled area of the site, open non-concrete areas will allow for precipitation to percolate downward and/or evaporate.

1.5 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 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, 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.

Groundwater in the area of SMWU 123 flows in a southeast direction with a relatively flat hydraulic gradient (~0.01 feet/feet). The approximate depth to the water table at SWMU 123 is 11 feet.

1.6 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 are in the 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, usually less than 10 inches (Foster Wheeler/Radian, 1995). 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% of the annual total rainfall.

1.7 Geology

The sedimentary rocks which make up the adjacent mountain ranges are between 500 and 250 million years old (White Sands Missile Range (WSMR), 2003). 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, gravel, and other matter continues to flow into the basin.

As the Tularosa 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 the Base. At the site, soils are predominantly silty sands and interbedded clays.

Lacustrine deposits are observed throughout HAFB. There has been the identification of stiff caliche layers, varying in thickness at HAFB. At SWMU 123, soils are predominantly silty sands and interbedded clays.

In general, subsurface soils at SWMU 123 consist of slightly moist clayey silts with varying amounts of medium to fine sand and caliche to depths ranging from 4 to 5 feet below ground surface (bgs). These soils display low to no plasticity and weak cementation of the caliche fraction. Generally, soils beneath 5 feet are characterized as silty medium to fine sands and sandy silts with occasional layers demonstrating higher percentages of clay content. Soils tend to be moist to saturated below the water table.

2 HISTORICAL DATA REVIEW

2.1 Initial Site Investigations

Previous excavation activities at SWMU 123 have occurred over two phases. The initial phase (Phase I) was conducted to remove PCSs which existed outside of the footprint of the wash rack foundation (and associated canopy) as, based on agreement with NMED and HAFB, soils with total recoverable petroleum hydrocarbons (TRPH) concentrations exceeding 1,000 milligrams per kilogram (mg/kg) that extended under large structures would not require remediation if the soil posed no potential health risk. The second phase of excavation activities (Phase II) was conducted to remove additional PCSs that were not addressed during the Phase I excavation activities.

2.1.1 Phase I Excavation

The initial site reclamation activities at SWMU 123 began in August 1995, and 50 cubic yards of PCS were removed during these activities (Foster Wheeler, April 1999). No tank was identified during the excavation activities and it was then held that the tank had already been removed. There is no known available data regarding confirmation samples collected after or during the removal of the contaminated soil.

2.1.2 Phase II Excavation

In March 1997, an additional 132.5 cubic yards of PCS were removed at SWMU 123. Following the completion of the field excavation, a total of 5 confirmation soil samples were collected and the results are presented in the *Final Closure Report Addendum for Phase II Remediation of POL-Contaminated Site* (Foster Wheeler, 1997). Four of the confirmation samples, laboratory analysis indicated concentrations of TRPH to be less than 1,000 mg/kg. The 5th sample, collected adjacent to the wash rack (and associated canopy), indicated TRPH concentration at 4,100 mg/kg and a benzene concentration of 33 mg/kg, above the HAFB allowable action limit for benzene of 25 mg/kg. Although the sidewall confirmation sample indicated that contaminated soils still existed, they were under the wash rack and thus unavailable for remediation. HAFB requested No Further Action (NFA) from NMED for the site.

2.1.3 Follow-up Investigation

Based on results of Phases I and II, NMED issued a Notice of Deficiency (NOD) requiring an additional investigation of the potentially contaminated soils beneath the wash rack (and associated canopy). Subsequent soil sampling was performed during January and February 1999 by Foster Wheeler (April 1999), and a total of 9 soil borings were completed beneath the wash rack (and associated canopy) floor/concrete pad. Three of the locations were not sampled as they were located over concrete footers for the surface pad. A total of 13 soil samples were collected from 4 to 9 feet bgs. Of the 13 samples analyzed, 6 had TRPH concentrations above the allowable NMED soil screening level (SSL) for jet fuel of 940 mg/kg. Analytical results for

TRPH ranged from a high of 7,400 mg/kg at 9 feet bgs to a low of less than 10 mg/kg or non-detect at 4 feet bgs. Individual petroleum-related constituents benzene, toluene, ethylbenzene, and xylene (BTEX) were also analyzed at that time. Benzene had a range of non-detect for four of the locations to 1.1 mg/kg and 0.7 mg/kg. None of the 13 soil samples collected exceeded the HAFB allowable benzene concentration of 25 mg/kg.

2.2 Subsequent Site Investigation

In April 2004, Bhate performed an additional site investigation to complete the delineation of the subsurface hydrocarbon contamination at SWMU 123. A total of five soil borings and nine direct push technology (DPT) locations were advanced during this investigation. The five soil borings were subsequently completed as 2-inch flush mount monitoring wells.

A total of 31 soil samples from 14 soil borings, including three duplicate samples, were submitted to the laboratory for analysis. One sample location (SB01), from 10 to 11 feet bgs, exhibited concentrations that exceeded applicable NMED residential SSLs for volatile organic compounds (VOCs). At this location, 1,2,4-trimethylbenzene was detected at 53.7 mg/kg and total xylenes were detected at 170 mg/kg. Their SSLs are 52.2 mg/kg and 132 mg/kg, respectively. Three semi-volatile organic compounds (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 total petroleum hydrocarbons (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 locations to have the total TPH concentrations that exceed the NMED SSL for jet fuel of 940 mg/kg.

Based on the findings of the investigation, the following conclusions and recommendations were developed (Bhate, November 2004):

- Groundwater hydrocarbon contamination in excess of New Mexico Water Quality Commission Criteria (NMWQCC) standards exists at the site in the proximity of monitoring wells MW-1, MW-2, and MW-3. The plume has a southeasterly trajectory and is predicted to be relatively narrow due the non-detect results for the adjacent monitoring well MW-5 and only trace amount in MW-3 groundwater samples. The farthest southerly extent of the contamination is unknown as there is no definitive end-point or non-detect determined for the southern projection of the plume. An additional downgradient well installation would fill the data gap.

- Free product was found in MW-1 with an initial measured thickness of 1.41 feet. This product thickness has been reduced to 0.11 feet and will require continued removal using conventional pumping/skimming methods.

- Soil contamination in the form of TPH concentrations greater that the NMED SSL of 880 mg/kg (for diesel-crankcase oil) is confined to a relatively small area centered at DP04 and

SB01. The contamination is estimated to occur just above the water table (12 feet bgs) to approximately 9 feet bgs with an estimated volume of impacted soil of less than 250 cubic yards.

The NMED allowable limit for benzene is 27 mg/kg (NMED, February 2004). The results of the April 2004 (from the November 2004 Bhate report) investigation are summarized in the tables attached as Appendix A.

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3 EXCAVATION PROCEDURES

The objective of the soil excavation at SWMU 123 is to excavate, transport, and dispose of impacted subsurface soils that either have TPH levels exceeding 880 mg/kg (the NMED SSL for diesel-crankcase oil) or soils posing a risk due to exposure to VOCs and/or SVOCs as established by the NMED soil screening guidance. Contaminated soils will be removed to approximately 15 feet below the site's existing concrete slab grade. This depth will ensure complete removal of PCS and account for any potential smear zone. Horizontally, the excavation will be completed based upon TPH levels greater than 880 mg/kg as determined by confirmation soil samples collected from the excavation and analyzed by Accutest Laboratories. The estimated extent of soils to be removed is shown in Figure 3.

At this time, excavation is proposed to extend 12 feet beyond the north and east building line and will not extend beyond the building line on the west and south sides. Except where noted below, the excavation activities will prescribe to the procedures outlined in Unified Facilities Guide Specifications (UFGS) Section 02111 *Excavation and Handling of Contaminated Material,* September 2003 (Appendix B). The UFGS are a joint effort of the USACE, the Naval Facilities Engineering Command (NAVFAC), and the Air Force Civil Engineer Support Agency (AFCESA). The UFGS are for use in providing construction specifications and guidelines for the military services.

3.1 Pre-Excavation Activities

The construction general permit requires a project *Storm Water Pollution Prevention Plan* (SWPPP) to be submitted for excavation sites which will disturb greater than one acre of surface soils. For the planned activities, inclusive of the temporary clean soil stockpiles, the total area of disturbance and/or excavation is less than one acre. Therefore, a project SWPPP will not be prepared and submitted.

Before excavation and other site activities can begin, there are several pre-construction documents and approval requirements to be met, including: Air Force Form (AF Fm) 332 approval, dig permit with utility clearances, site security measures, and facility manager notification of the intended operations. Bhate will coordinate project requests for Base installation support services through the 49^{th} 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 the Bhate Site Manager to inspect site conditions for site/equipment access, equipment staging area(s), 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.

3.1.1 AF Form 332

The completed and approved AF Fm 332 for this site, included as Appendix C, 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. Also, the AF Fm 332 is the mechanism by which the utility clearance/dig permit is authorized. Both the AF Fm 332 and dig permit were reviewed by the appropriate Base utility group for approval to begin work at the excavation site. Prior to the submittal of AF Fm 332, the area of excavation was clearly delineated with marker flags, stakes, or paint, as appropriate to the surface material.

3.1.2 Dig Permit/Utility Clearances

As noted above, utility clearance approvals will be completed by the appropriate HAFB utility office. Upon receipt of the approved dig permit with the utility clearances, the Bhate Site Manager or other authorized project personnel will complete a site walk-through confirming the dig permit authorizations and make any required changes.

Any utilities adjacent to the planned excavation boundary noted during the site reconnaissance will be properly identified and located. All necessary measures to secure the utility from potential damage and/or service interruption will be implemented prior to excavation.

3.1.3 Excavation Area Site Safety

As an Occupational Safety and Health Administration (OSHA) Class II excavation, site safety is concerned with the excavation and the areas around the excavation. Concerns include: the proper designation and demarcation of construction boundaries (i.e. exclusion zone [EZ], contamination reduction zone [CRZ], and support zone [SZ]), compliance with excavation requirements, posting of potential hazards, and control of un-authorized site personnel. This is discussed in the 2003 *Basewide Health and Safety Plan* (HASP) (Bhate, December 2003). Notification of the excavation activities will be provided to the appropriate personnel with the POL Yard prior to the initiation of any field activities.

At a minimum, the site will be secured with caution tape surrounding the perimeter of the site delineating the outer boundary of the SZ. This is essential in the utility clearance process and it serves as the demarcation of the site for both project and non-project persons. A CRZ and/or EZ will be established as guided by the HASP and prevailing site conditions. The depth to the bottom of the excavation will extend to the water table and is expected to reach 15 feet below grade. At the immediate edge of the excavation, a temporary construction fence will be erected completely around the excavation site. Postings will indicate the excavation hazard as well.

3.2 Decontamination Procedures

Small equipment, such as sampling tools, will be decontaminated in accordance with the *Basewide Quality Assurance Project Plan* (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.

3.3 Excavation Activities

3.3.1 Excavation Boundary

The approximate limit of the area to be excavated during activities outlined under this VCM Work Plan is shown on the Shoring Plan on Figure 4. Based upon the estimated horizontal extent of contamination, an estimated 2,700 cubic yards (cu yds) of overburden will be required to be removed. This material will be directly loaded into a dump truck for immediate delivery to FT-31 Landfarm for treatment or stockpiling.

Prior to the excavation of overburden, the concrete drive-up pad, three concrete utility pads, and approximately 8 feet of asphalt paving will be removed. All construction debris will be disposed of at the Base re-use area for processing.

3.3.2 Canopy Shoring

Prior to any excavation activities, the existing pre-fabricated metal building under which the excavation activities will be performed will require the installation of a modular frame shoring system. The modular shoring system will be erected in accordance to the shoring specifications of Patent Construction Systems (see Figures 5, 6, and 7). The shoring system consists of 4-foot wide shoring frames, 24-inch adjustable screw jacks, base plates, cross braces, stringer beams, soldier beams, and the required hardware to clamp the shoring system to the existing building. The Shoring Plan is shown on Figure 4. Three of the four girder beams on the north side of the canopy will require the installation of the shoring system to support the weight of the wash rack (and associated canopy) (Figure 5). To properly support the canopy during the excavation activities, which requires the removal of soils beneath the north side building foundation, there will be a separate shoring unit placed at each building girder with each unit able to support a maximum allowable load of 41,000 pounds as shown in Figures 6 and 7.

Once all canopy shoring has been installed, an elevation survey of the top of each canopy support column foundation will be performed to establish existing top elevations. As excavation commences and soils are removed from beneath the building foundation, elevation surveys will be performed a minimum of twice per shift to assure that the existing foundation does not settle (see Appendix D for foundation plan drawings that were prepared by the CES). Major settling is not anticipated. If elevation surveys determine that the shoring system does not properly support the building despite attempts to adjust the shoring system, immediate measures will be taken to replace removed soils from beneath the building foundation and alternate shoring or stabilization methods will be evaluated and implemented including but not limited to additional shoring.

3.3.3 Excavation Shoring

During excavation activities, the excavation will be benched to provide access for hand work and density testing. Excavation activities associated with previous investigations at different locations on HAFB indicate native soils demonstrate significant stability, achieving near vertical walls, during excavations. The soils surrounding SWMU 123 are considered native soils to within 4 feet of the building limits. Inside 4 feet from the building limits and under the building concrete foundations and pad the soils are considered structural fill to a depth of 4 feet and native soil from 4 feet below grade to the excavation depth limit. At this time, stabilization of the excavation sidewalls is not intended; however, monitoring of the excavation sidewalls will be performed as the excavation progresses. If any slumping or sidewall failure is evident, then alternate stabilization methods will be evaluated and implemented including but not limited to sloping, benching, or shoring.

3.3.4 Soil Excavation

Excavation activities will utilize the appropriate excavation equipment and a wheel loader to assist with soil management and will be performed in accordance with UFGS Section 02315 *Excavation, Filling and Backfilling for Buildings* (see Appendix E). All overburden soils will be directly loaded into a dump truck and hauled to the FT-31 overburden stockpile. All overburden soils will be directly loaded into a dump truck and hauled to the FT-31 overburden stockpile. Soil (backfill) stockpiles will be managed as to not allow for any material to be removed or transported off-site via wind or precipitation (see Section 6 of this Work Plan, *Waste Management*).

The contaminated subsurface smear zone is estimated to begin directly below the bottom of concrete. All contaminated soils will be directly loaded and transported to FT-31 Landfarm for management. Applicable procedures and safety measures for completing the excavation are located in the *Basewide Health and Safety Plan* (Bhate, December 2003) will be followed. Applicable HAFB Standard Operating Procedures (SOPs) for completing the sampling associated with this excavation are located in Appendix A of the *Basewide Quality Assurance Project Plan* (Bhate, November 2003).

3.3.4.1 Soil Screening

Throughout the excavation, observation of discoloration and unusual odors will be documented. Potential PCS will be field screened for petroleum hydrocarbon contamination using the SiteLAB® Analytical Test Kit Ultraviolet Fluorometer (UVF) 3100A in accordance with the U.S. Environmental Protection Agency (USEPA) *Field Measurement Technologies for Total Petroleum Hydrocarbons in Soil* guideline (see Appendix F of this Work Plan). Excavated soil will be segregated in the field based on visual observation, headspace readings, and onsite analysis of TPH with laboratory confirmation. Soils that demonstrate a field screened TPH concentration above 880 mg/kg exceed the action limit for PCS and will be managed in accordance with Section 6 of this Work Plan. Soils demonstrating a concentration below 880 mg/kg will be stockpiled for backfill once the excavation is complete. The excavation sampling quantities and analyses are summarized in Table 3-1.

The field screening incorporates the initial screening for the segregation of the excavated soils between contaminated and un-contaminated and the corresponding Quality Assurance/Quality

Control (QA/QC) confirmation and validation analyses. The soil screening is comprised of three phases: 1) initial field screening, 2) field confirmatory, and 3) laboratory validation. These steps are detailed in Section 4, *Soil Sampling and Analysis,* of this Work Plan.

3.3.4.2 Soil Segregation

The 880 mg/kg action level for PCS is found listed in Table 2 of the residential direct exposure limit for diesel fuel in the *NMED TPH Screening Guidelines*, June 24, 2003 (Appendix G). This cleanup level is part of a previous agreement between HAFB and NMED. The concentrations for the TPH carbon fractions will be summed for the total TPH value as the comparison to the NMED TPH allowable limit of 880 mg/kg for diesel contaminated PCS.

The un-impacted soils are the overburden soils which have historically demonstrated no contamination and the source of the contamination is not from a surface release. These soils are from the surface to an approximate depth of 4 feet bgs, approximately 400 cu yds. Suspected contaminated soils are those primarily within the smear zone. These are typically contained in a 1 to 2 foot zone above the contaminated soils. They will be found in the depth range from 3 to 5 feet bgs with an approximate volume of 200 cu yds. The contaminated soils are those that are definitively contaminated as validated by laboratory analytical data. These soils are typically the lower 3 feet just above the water table, in a depth range from 5 to 8 feet bgs, approximately 300 cu yds. Due to the small size of this site, suspected contaminated soils will be handled as though they are contaminated, directly loaded and transported to the FT-31 Landfarm for treatment or stockpiling.

3.3.4.3 Confirmation Soil Sampling

After the excavation is complete and all suspected petroleum contaminated soils have been removed, sidewall confirmation samples will be collected. Samples will be collected using the bucket of the back-hoe. A soil sample will be obtained from the interior of the bucket to minimize the potential for outside source contamination. Samples will be collected at a frequency of 1 per 20 linear feet (ln ft) per side wall at mid-depth of the contamination zone. At a minimum, 1 sample per side wall will be collected.

3.3.5 Excavation Backfilling and Compaction

Clean soils will be obtained for backfill as needed from a local sand/gravel provider. In areas not directly under an existing foundation, below 6 feet bgs, the backfill will be placed in 24-inch lifts and compacted using a remote controlled hydraulic plate compactor lowered into the excavation by heavy equipment (see Appendix H of this Work Plan) to at least 18 inches. For depths from 6 feet bgs to 1 feet bgs, the excavation will be backfilled in 9-inch lifts with compaction to at least 6 inches.

For areas directly under foundations, below 6 feet bgs, the backfill will be placed in 24-inch lifts and compacted to at least 18 inches using a remote controlled hydraulic plate compactor lowered into the excavation by heavy equipment. For depths from 6 feet bgs to approximately 3 feet bgs depending on the height of the remote controlled compactor, the excavation will be backfilled in 9-inch lifts with compaction to at least 6 inches. The remaining fill required to reach the bottom of the existing foundation will be controlled low-strength material (CLSM) more commonly referred to as flowable fill.

The compaction of the two base soils lifts in all areas will be confirmed by determination of the soil density via an in-place nuclear densitometer, or similar test per American Society for Testing and Materials (ASTM) Method D 2922 (see Appendix I of this Work Plan).

The final 12-inches of backfill in areas not directly beneath foundations will adhere to the specifications of subgrade preparation found in UFGS Section 03307 *Concrete for Minor Structures* (see Appendix J of this Work Plan) and as discussed in Section 3.3.7.1 of this Work Plan, *Minor Concrete Reconstruction.*

In areas directly beneath foundations, the final backfill, CLSM, will be designed in accordance with the flowable fill specifications in Appendix K of this Work Plan and placed according to American Concrete Institute (ACI) publication, ACI 229R-99 (see Appendix L of this Work Plan).

While major settling is not anticipated, the loss of approximately 1/4-inch in elevation during the curing of the CLSM is expected to occur, as the CLSM will shrink approximately 1/8-inch per foot of depth.

3.3.6 Soil Disposal

Contaminated soils will be transported to the permitted FT-31 Landfarm for treatment/processing or stockpiling. Soils will be handled, transported, and managed in accordance with the NMED guidelines and the facility's requirements.

3.3.7 Site Restoration

Upon completion of site excavation and backfill activities, the site will be restored to its original appearance. Construction equipment and debris will be removed. The site will be canvassed for trash, debris, etc. Final grade for areas of the site which will not have a surface improvement upon them will allow for positive drainage in accordance with the surrounding area.

3.3.7.1 Minor Concrete Reconstruction

The section(s) of minor concrete which have been removed or damaged during the excavation will be replaced in similar construction and match in appearance to that which was removed. The design and construction, inclusive of materials, will be completed in accordance with the UFGS specifications for minor structures, Section 03307 *Concrete for Minor Structures,* August 2004 (see Appendix J of this Work Plan). Matching of the new minor concrete structures to the existing structures has primacy over the UFGS guideline. The guideline should be adhered to utilizing best management practices and holding to the intent of the guideline.

3.3.7.2 Structural Concrete Restoration

The section(s) of structural concrete which have been removed or damaged during the excavation will be replaced in similar construction and match in appearance to that which was removed. The design and construction, inclusive of materials, will be completed in accordance with the UFGS specifications for cast-in-place structural concrete, Section 03300 *Cast-in-Place Structural Concrete*, January 2005, and the UFGS specification Section 01610 *Aggregate for Portland Cement Concrete* (see Appendix M of this Work Plan). Matching of the new structural concrete to the existing concrete has primacy over the UFGS guideline. The guideline should be adhered to utilizing best management practices and holding to the intent of the guideline.

3.3.7.3 Landscaped Areas

The areas of landscape material which are removed or damaged during the excavation will be replaced with similar design and match in appearance to that which was removed.

3.3.7.4 Asphalt Parking Area

The area of vehicle parking or traffic which is removed or damaged during the excavation will be replaced in similar construction and match in appearance to that which was removed. The design and construction, inclusive of materials, will be completed in accordance with the UFGS guideline for asphalt paved areas, Section 02741N *Bituminous Concrete Pavement*, September 1999 (see Appendix N of this Work Plan). Matching of the new paved area to the existing paved area has primacy over the UFGS guideline. The guideline should be adhered to utilizing best management practices and holding to the intent of the guideline. The UFGS guideline allows for references to the specific State of which construction is to be completed for the design specifications. The New Mexico Highway Department State Highway Specifications, specifically Division 416 *Minor Paving*, provides the applicable guidelines for completion of re-paving a vehicle parking area (see Appendix O of this Work Plan). This UFGS shall be implemented in its entirety except for the following parts and/or subparts:

Sections 1.1 and 1.2
Sections 2.0 through 2.10
Sections 3.0 through 3.2

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4 SOIL SAMPLING AND ANALYSIS

The project soil sampling requirements, detailed in Table 3-1, include field screening samples, stockpile samples, and confirmation samples. Table 4-1 provides the sample collection information inclusive of the container type, quantity, and holding times.

4.1 Field Screening Sampling

Soils will be periodically field screened using soil-headspace screening techniques via a field organic vapor analyzer (OVA). Confirmatory field TPH analysis of the OVA headspace samples will be performed with the field fluorometer in accordance with the USEPA *Innovative Technology Verification Report: Field Measurement Technologies for Total Petroleum Hydrocarbons in Soil*, September 2001 guideline (see Appendix F of this Work Plan). From these samples, final QA confirmation analysis in accordance with the NMED specified gas chromatogram (GC) methods will be accomplished via a fixed-base laboratory.

4.1.1 Initial Field Screening

HAFB excavation guidelines for PCS require initial field screening via headspace analysis every 100 cubic yards. This sampling scheme would allow for only 3 field screening samples and a single field confirmatory sample. To improve the accuracy of the screening of the excavated soils, field screening frequency will increase to one sample per 50 cubic yards removed for a total of 6 samples to be screened via the OVA.

4.1.2 Field Confirmatory Sampling

A field confirmatory frequency of 50% with the SiteLAB® Analytical Test Kit UVF-3100A will be implemented instead of the normal 10% per the USACE and USEPA (SW846) guidelines for QA/QC requirements of site investigations for contamination. The adjusted resulting quantity is a total of 3 of the 6 samples to be field checked with the SiteLAB®. This test uses a 10-gram sample of soil where petroleum compounds are extracted with methanol. The extract is decanted into a quartz cuvette and placed in the chamber of the UVF and the TPH concentration is displayed. Although the NMED clean-up level is 880 mg/kg, soils resulting in a headspace reading with the UVF above 790 mg/kg will be designated TPH contaminated, allowing for a 10% instrument error and variability between the screening method and the USEPA Method analyses.

4.1.3 Laboratory Validation

Laboratory validation frequency of the UVF screening samples will be at 10%, or 1 sample per site minimum. Laboratory validation will be completed using USEPA Method 8015M for TPH-gasoline range organics (TPH-GRO) [C_6-C_{10}], TPH-diesel range organics (TPH-DRO) [C_{10}-C_{22}], and TPH-oil range organics (TPH-ORO) [C_{22}-C_{36}]. Laboratory analyses will be completed at an expedited turn-around-time of 24 hours.

4.2 Excavation Confirmation Sampling

Excavation confirmation samples will be collected at the frequency of one per 20 linear feet of each sidewall within the contamination zone at mid-depth. Analytical confirmation sampling from the bottom of the excavation is not required because excavation will be terminated at one foot below the water table. Samples will be analyzed by a fixed-base laboratory for TPH, TPH-DRO, and TPH-GRO, using USEPA Method 8015M, VOCs (USEPA Method 8260B), and SVOCs (USEPA Method 8270C). If any single sample demonstrates a TPH level above the NMED soil value for TPH of 880 mg/kg, excavation will continue along that face until field screening deems termination with re-evaluation via laboratory confirmation analysis. Data will adhere to project data quality objectives (DQO) requirements, method reporting limits, duplicate field samples, and QC samples as established within the *Basewide Quality Assurance Project Plan* (Bhate, November 2003). Sample quantities, containers, methods of preservation, and holding times will be consistent with the requirements of associated method protocols. Laboratory analyses will be completed at a rush turn-around-time, 24-hours.

4.2.1 Stockpile Sampling

Stockpiled overburden soils will be sampled every 500 cu yds. Laboratory analyses will be completed at an expedited turn-around-time, 24 hours with analysis for TPH, -DRO and –GRO, using USEPA Method 8015M, VOCs (USEPA Method 8260B), and SVOCs (USEPA Method 8270C).

4.2.2 Analytical Methods

Each laboratory soil sample (including the field duplicates) will be analyzed for their respective analytes in accordance with Table 4-2. Samples will be analyzed for BTEX, as VOCs, by Method 8260B, polynuclear aromatic hydrocarbons (PAHs), as SVOCs, by Method 8270C, TPHs and carbon fractions (Table 4-3) by Method 8015M.

Laboratory analyzed samples will be completed by Accutest Laboratories in Orlando, Florida. A copy of their USACE validation is included in Appendix P of this Work Plan.

5 RISK BASED CLEAN-UP APPROACH

The objective of the excavation activities presented is to remove contaminated soil from the site to support closure of the site. Data collected as a result of field screening will be evaluated based on the DQOs of the project. The results from the off-site laboratory confirmation samples from the sidewalls of the excavation 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 given possible exposure at the site. 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.

5.1 Evaluation of TPH

Based on the direction provided by NMED pertaining to the remediation of petroleum-impacted sites at HAFB, a TPH screening level of 880 mg/kg will be used to evaluate the data provided by the off-site analytical laboratory. As discussed in Section 4 of this Work Plan, *Soil Sampling and Analysis*, the 880 mg/kg action level for PCSs is the Residential Direct Exposure Limit for diesel fuel, listed in Table 2 of the *NMED TPH Screening Guidelines*, June 24, 2003 (see Appendix G of this Work Plan).

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 Appendix A of the revised NMED guidance document *Technical Background Document for Development of Soil Screening Levels, Revision 2.0*, February 2004 (NMED, 2004). Tables containing the SSLs from this guidance document are provided in Appendix Q of this Work Plan. The laboratory data for each collected soil sample will be compared to these SSLs.

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6 WASTE MANAGEMENT

Construction-derived waste (CDW) generated by the activities of this excavation may include excavated soil, decontamination residuals, and personal protective equipment (PPE) (see Table 6-1). Each of these waste streams will be managed and characterized according to the guidelines discussed below. Waste containers and the decontamination pad will be managed in a secure area.

6.1 Excavated Soil

6.1.1 Clean Soils – Stock Piles

The clean soil stockpiles will be constructed in accordance with best management practices (BMPs) to mitigate soil loss due to erosion, wind, and run-off. These BMPs may include the use of a plastic liner, straw bales for berming or silt fencing, and a cover. Soils will be placed on thick plastic sheeting within a constructed berm for protection from off-site transportation by wind and rain until characterization is complete. If laboratory analysis indicates concentrations are below the SSL for TPH of 880 mg/kg, and the SSL for each individual VOC and SVOC constituent, the stockpiled soil will be used as backfill once the excavation activities are complete.

6.1.2 Contaminated Soils – Base Landfarm

Excavated contaminated soils will be handled in accordance with Sections 3 and 4 of this Work Plan. Contaminated soils will be directly loaded and transported to the selected location for treatment and/or disposal at either the FT-31 Landfarm or an off-site subcontractor location.

6.2 Decontamination Water

Decontamination water is anticipated to be non-hazardous and as such, can be disposed of through the HAFB wastewater treatment plant (WWTP). When feasible, decontamination water will be allowed to evaporate from the decontamination pad area. Sediment remaining in the decontamination pad area after the water has either evaporated or has been discharged to the WWTP will be combined with the excavated contaminated soil for disposal.

6.3 Personal Protective and Disposable Sampling Equipment

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

6.4 Construction Debris

Unless visibly stained, all construction debris will be assumed to be uncontaminated and non-hazardous and will be disposed of accordingly at the Base re-use facility. Stained construction debris will be disposed of in accordance with HAFB procedures.

7 PROJECT QUALITY ASSURANCE

The laboratory performing the chemical sample analysis will follow the Site Specific Addendum to the Basewide QAPP (Bhate, August 2005) provided as Appendix R to this Work Plan.

7.1 Standard Operating Procedures

Applicable SOPs for completing the sampling associated with excavation at SWMU 123 are located in Appendix A of the Basewide QAPP (Bhate, November 2003).

7.2 Sample Identification

Each sample will be identified on the sample label and chain-of-custody (COC) records for each sample collected, regardless of type. Field duplicates will be paired with another sample and will be classified as blind samples. The duplicate samples will appear in sequence with the regular samples. Sample nomenclature will adhere to the procedures and guidelines established in the Basewide QAPP. Sample labeling will adhere to the format provided in the Basewide QAPP and/or QAPP project addendum.

7.3 Project Documentation

The field operations documentation will provide consistent procedures and formats for documentation and management of field records and collected samples.

7.3.1 Sample Documentation

Sample documentation, identification, and tracking will adhere to the prescribed methods found in the Basewide QAPP and/or its respective project-specific addendum. All sampling activities will include documentation of significant activities, potential environmental influences during sampling, field variances, and sample identification information. At a minimum, field logbooks will be utilized to record dates and times, sampling protocols, project numbers, and sampler's name. Daily Quality Assurance Reports will be completed and submitted weekly to the HAFB Project Manager. Other pertinent information will include COC numbers and air bill tracking numbers. COC forms will be completed and included with each sample shipment; one COC per cooler.

At a minimum, the following sample collection information will be logged in the field book:

- Date and time
- Sample identification number
- Project number
- Sampler name
- Preservative (if any)

- Analysis
- Map or schematic of sampling location

If no map of sampling locations is available prior to sampling, a drawing of the site will be sketched on the left page of the field logbook to provide an illustration of all sampling points. Measured distances from sampling points to a fixed reference point will be recorded.

7.3.2 Field Logbook

Personnel will use only bound field logbooks for field records. The Project Manager will ensure that all field notes can be efficiently traced, filed, and retrieved. All entries will be recorded in indelible, waterproof ink. If errors are made, corrections will be made by crossing a single line through the error, correcting the information, and initialing and dating the correction. Entries will be made as described below.

Documentation and reporting of events and activities will be made in chronological order on the right page of the logbook. All entries will be dated and time of entry recorded. At the beginning of each day, the first two entries will be "personnel/contractors on site" and "weather". At the end of each day's entry, the personnel will draw a diagonal line originating from the bottom left corner of the page to the conclusion of the entry and sign along the line indicating the conclusion of the entry or the day's activity. Once completed, the field logbooks become documents that can be used to account for project activities and will be maintained as part of the project files.

The following general requirements apply to field logbooks:

- The left page of the logbook will be used for auxiliary reporting such as sketches, tables, etc.

- The date will be recorded in the top, left-hand corner of each right page.

The time of entry recordings will be in columnar form down the left-hand side of the right page.

7.3.3 Field Analytical Data

The field analytical data collected at the site will include the field screening readings for selection of PPE, as well as field screening for headspace analysis. The breathing zone of the site will be screened for VOCs in the field at the time of sample collection utilizing an OVA. If a high humidity condition exists at the time of sample collecting, a flame-ionization detector (FID) is recommended since a photo-ionization detector (PID) is not a completely reliable screening instrument under these conditions. The field screening data will be recorded in the field logbook.

7.3.4 Data Reporting

Data obtained during the excavation, through confirmation or field screening samples, will be reported according to the Basewide QAPP (Bhate, November 2003). In accordance with USACE EM200-1-6, 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 matrix spike/matrix spike duplicate (MS/MSD) samples are to be collected concurrently. The data 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 VCM report for the site. An Environmental Restoration Program Information Management System (ERPIMS) submittal is not required for this project.

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8 HEALTH AND SAFETY REQUIREMENTS

Project health and safety practices during the excavation activities will adhere to the *Basewide Health and Safety Plan* (HASP) (Bhate, December 2003) and the Site Specific Addendum to the *Basewide HASP*, included in Appendix S of this Work Plan. It is anticipated that no greater than modified level D PPE will be required to complete the site inspection and sampling activities. This includes: OSHA-approved safety shoes, American National Standards Institute (ANSI) approved safety glasses (Z87.1) and hard hat (Z89.1-1997: Type I), long-sleeved shirt and long pants, and as required, hearing protection, leather work gloves, and/or nitrile gloves.

The site must also be secured to further ensure safety at the site. Of concern is the proper designation and demarcation of the excavation boundaries (i.e., SZ, CRZ, and EZ), as appropriate. Likewise, compliance with any intrusive work requirements, posting of potential hazards, and control of unauthorized site personnel will be completed as directed in the *Basewide HASP*. At a minimum, the site will be secured with caution tape surrounding the perimeter of the site and delineating the outer boundary of the SZ. This is essential in the utility clearance process and it serves as the demarcation of the site for both project and non-project-related individuals. A CRZ and/or EZ will be established as guided by the *HASP* and site prevailing conditions.

Excavation depths are expected to exceed 15 feet. Sidewall benching will not be completed.

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9 ORGANIZATION AND SCHEDULE

During the corrective measures activities at the site, Mr. John Hymer will serve as the Bhate Site Manager overseeing and directing all investigation sampling activities. Mr. Hymer will also provide on-site management of any subcontractors for the project. Mr. Frank Gardner is the Bhate Program Manager and will ensure required project documents, permits, contractual agreements, and other program tasks are completed. Key project personnel are listed in Table 9-1. Activities associated with this Work Plan are anticipated to begin at the end of August and last approximately 2 weeks.

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FIGURES