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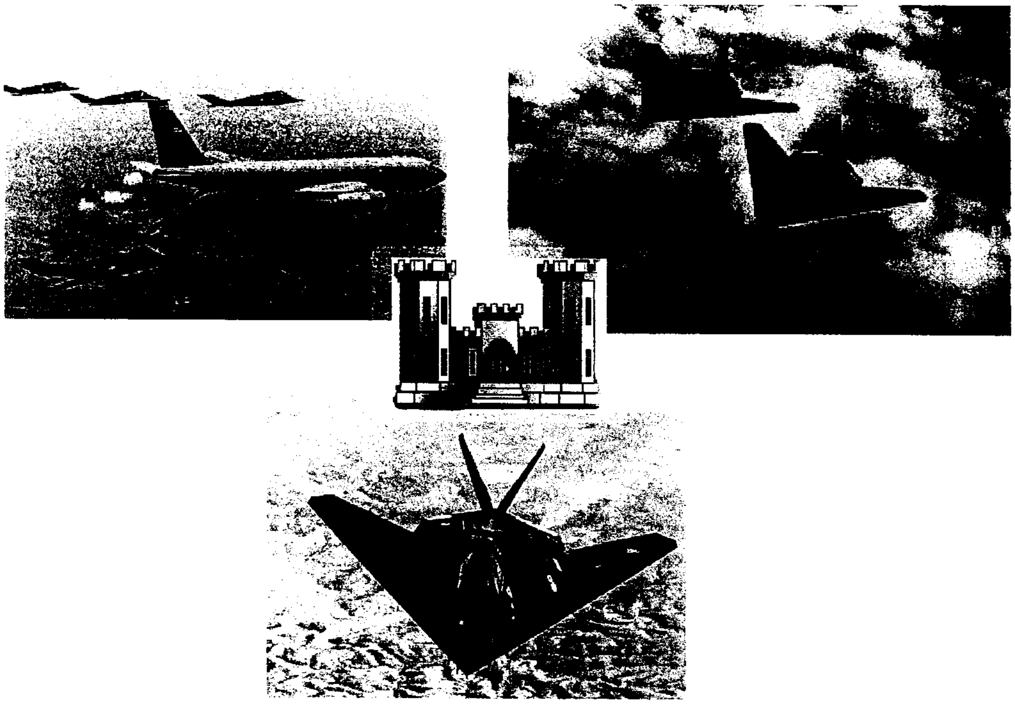
BASE HOSPITAL UST VOLUNTARY CORRECTIVE MEASURES COMPLETION REPORT



Holloman Air Force Base
New Mexico

July 2005

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Delivery Order No.: 03
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Headquarters, Air Combat Command
Langley Air Force Base, Virginia

49 CES/CEV
Holloman Air Force Base, New Mexico

BASE HOSPITAL UST
VOLUNTARY CORRECTIVE MEASURES
COMPLETION REPORT

HOLLOMAN AIR FORCE BASE
ALAMOGORDO, NEW MEXICO

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July 2005

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BASE HOSPITAL UST VOLUNTARY CORRECTIVE MEASURES COMPLETION REPORT

HOLLOMAN AIR FORCE BASE ALAMOGORDO, NEW MEXICO

REVIEW SHEET

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BASE HOSPITAL UST VOLUNTARY CORRECTIVE MEASURES COMPLETION REPORT

HOLLOMAN AIR FORCE BASE ALAMOGORDO, NEW MEXICO

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LIST OF ACRONYMS AND ABBREVIATIONS

AAF	Army Air Field
AF Fm	Air Force Form
AST	Aboveground storage tank
Bhate	Bhate Environmental Associates, Inc.
bgs	Below ground surface
BHUST	Base Hospital Underground Storage Tank
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CES/CEV	Civil Engineeing Squadron/Combat Engineer Vehicle
cy	cubic yard
DRO	Diesel-range organics
EPA	Environmental Protection Agency
°F	Degree Fahrenheit
ft	foot or feet
FT-31	Fire Training Area 31
GRO	Gasoline-range organics
HAFB	Holloman Air Force Base
mg/kg	Milligrams per kilogram
NFA	No Further Action
NMED	New Mexico Environment Department
ORO	Oil-range organics
PCB	Polychlorinated biphenyl
PCS	Petroleum-contaminated soil
PID	Photoionization detector
QAPP	Quality Assurance Project Plan
SSHP	Site Safety and Health Plan
SSL	Soil Screening Level
SVOC	Semi-volatile organic compound
TPH	Total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers
UST	Underground storage tank
VCM	Voluntary Corrective Measures
VOC	Volatile organic compound
WRCC	Western Regional Climatic Center
WSMR	White Sands Missle Range

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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-D-0008, Delivery Order No. 3, to conduct Voluntary Corrective Measures (VCMs) at several of the Areas of Concern on Holloman Air Force Base (HAFB), New Mexico. The VCMs include multiple tasks as outlined in the USACE Scope of Services dated February 24, 2003. This report documents the VCMs performed to remove petroleum-contaminated soil (PCS) from the former Base Hospital underground storage tank (BHUST).

This document describes the activities of the VCM at the BHUST site. Also, the report summarizes the previously known subsurface conditions and the extent of PCS. The conclusion of the document requests that New Mexico Environment Department (NMED) issue a No Further Action (NFA) for this site based upon Criterion #5 which states (NMED, 1995):

> *"The site was characterized or remediated in accordance with applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use."*

This criterion was accomplished by permanently removing the PCS present at the site which had exceeded the NMED Soil Screening Levels (SSLs).

1.1 Technical Approach

Activities were conducted in accordance with the *Voluntary Corrective Measures Base Hospital UST Work Plan* (*VCM Work Plan*) (Bhate, 2004), the *Basewide Health and Safety Plan* (Bhate 2003a), and the *Basewide Quality Assurance Plan* (*Basewide QAPP*) (Bhate, 2003b).

1.2 Report Organization

The remainder of this report is organized as follows:

- Section 2 provides a summary of previous investigations and describes the extent of soil contamination before any VCM was performed.
- Section 3 summarizes the VCM PCS excavation and soil sampling activities.
- Section 4 provides conclusions and recommendations for the Request for NFA based upon NMED Criterion #5.

1.3 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 6 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.

1.3.1 Physiography

HAFB is located within the Sacramento Mountains Physiographic Province on the western edge of the Sacramento Mountains (Figure 2). 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 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.

1.3.2 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).

The BHUST site is located within Drainage Area 2 (DA-002), as described in the Draft *Storm Water Pollution Prevention Plan* (SWPPP), prepared by CH2M Hill and dated September 2003. Storm water flow in this 113-acre DA is generally to the east through runoff and conveyance.

1.3.3 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.

1.3.4 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 results in the arid conditions, which with the topographically induced wind patterns combined 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.

1.3.5 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 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 Basin). Water carrying eroded gypsum, gravel, and other matter continues to flow into the basin.

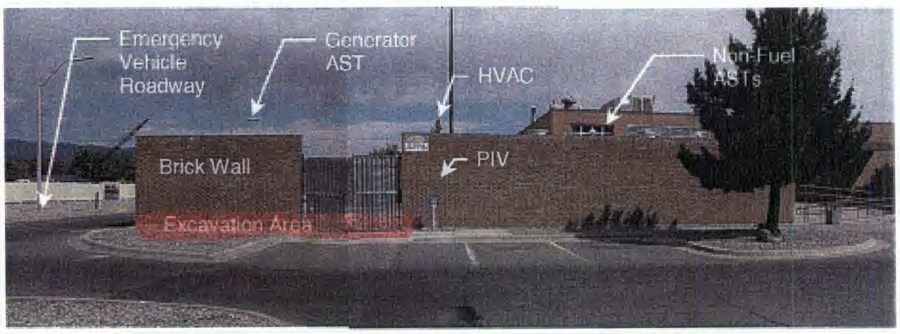
As the Tularosa Basin is a bolson, which is a basin with no surface drainage outlet, sediments carried by surface water into a closed basin are bolson deposits. The overlying alluvium generally consists of unconsolidated gravels, sands, and clays. Soils in the basin are derived from the adjacent ranges 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.

2 BHUST SITE BACKGROUND

Records indicate the underground storage tank (UST) was installed at the Base Hospital in the early 1970s for storage of diesel fuel for the back-up generator. The UST was last used in early 1991 and abandoned by filling in place with sand on February 25, 1991. At that time, the UST abandonment was considered a clean closure. The site currently has a new 10,000-gallon aboveground storage tank (AST) within secondary containment, partially situated over the former UST location. A new 7-inch steel-reinforced concrete slab that serves as a loading and unloading area for hospital maintenance covers the remainder of the area.

2.1 Site Description

Building 15, the Base Hospital, is located at the corner of 1st Street and Arnold Avenue on HAFB (Figure 3). The site is located on the north end of the hospital, adjacent to the west parking lot and the ambulance driveway. A brick and concrete block privacy wall which surrounds the hospital utility and mechanical equipment is evident from the front parking area (Photograph 1).



Photograph 1. Front View of Base Hospital UST Area

Photograph 2 provides detail for the interior of the walled area. Within this area there are the existing diesel fuel aboveground storage tank (AST) for the back-up generator, two medium size heating, ventilation, and air conditioning (HVAC) units, and two additional large ASTs to the right (south) with the contents unknown. To the immediate north, or left in Photograph 1, is the emergency roadway for the hospital emergency vehicles. In front of the privacy wall, and where the PCS is located, exists a concrete sidewalk.

Photograph 2. Inside View of Hospital Area

2.2 Summary of Previous Investigations

The UST was removed on July 28, 1999, and the AST was installed at the same location (Figure 4). During removal, contamination was identified in subsurface soils as discoloration and petroleum hydrocarbon odors, but no free product was observed on the groundwater. Two soil samples were collected from the sidewalls and bottom of the excavation in compliance with NMED UST regulations and analyzed for total petroleum hydrocarbon-diesel range organics (TPH-DRO); benzene, toluene, ethylbenzene and xylenes (BTEX); and polychlorinated biphenyls (PCBs). The release was confirmed by laboratory analytical results on July 28, 1999. The NMED UST Bureau was subsequently notified of the release.

The cause of the release was undetermined. Interviews with employees indicated that the release may have been due to periodic overfilling. This was consistent with the location of the highest TPH concentrations, which appeared below the reported location of the fill port for the former UST. The release of diesel fuel was estimated at not to exceed 1,000 gallons. There was no sign of free-phase product on the water table and the extent of soil contamination suggested that the amount of released diesel fuel did not exceed the estimate.

Subsequent remediation at the site involved the removal of PCS from the area beneath and just to the west AST following an additional soil sampling and investigation of the area (Foster Wheeler, 1999).

2.2.1 Initial Site Investigation

In October and November 1999, Foster Wheeler initiated an investigation at the BHUST site. There were 16 locations with a total of 22 soil samples collected from the area during the investigation (Figure 5) and submitted to the laboratory for analysis (Appendix A1). Locations were sampled at continuous 1-foot increments with intervals of the highest photo-ionization detector (PID) readings analyzed by a fixed-base laboratory. Analyzed samples were predominantly collected from mid depths ranging from 1 foot (ft) to a maximum depth of 10.5 feet (ft) below ground surface (bgs) with a modal depth interval of 4 to 5 ft. Samples from three locations; SB-06, SB-13 and SB-14, demonstrated TPH levels above the NMED allowable limit of 880 milligrams per kilogram (mg/kg), at 1,890 mg/kg, 8,190 mg/kg, and 3,970 mg/kg, respectively. Samples from locations SB-11 and SB-07 also indicated TPH contamination, but concentrations in these samples were below 880 mg/kg. TPH concentrations were 230 mg/kg and 430 mg/kg, respectively. The remaining locations sampled had concentrations below the laboratory method detection limit and were reported as not-detected.

2.2.2 Expanded Site Investigation

The area of concern for soil contamination above the NMED guidelines was limited to the proximity of SB-06, SB-13, and SB-14. These three locations are on the outside of the north wall. To further delineate the vertical and lateral boundaries of the contaminated soil, additional soil samples were collected in April 2004 and submitted to the laboratory for analysis (Appendix A2). These are shown as locations DP-01 through DP-04 (Figure 5). Location DP-03 indicated TPH contamination at a concentration of 2,080 mg/kg from the 3 to 4 ft bgs interval. The soils sampled below this depth from 6 to 7 ft bgs demonstrated a sharp decline at this location having a TPH concentration of 165 mg/kg. The remaining samples collected did not indicate any petroleum hydrocarbon contamination above the NMED level for diesel. The sample from location DP-04, near the large non-fuel ASTs, had a TPH concentration of 701 mg/kg and is below the NMED allowable limit for TPH-DRO of 880 mg/kg.

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3 VCM EXCAVATION AND SAMPLING ANALYTICAL RESULTS

Petroleum hydrocarbon contamination exceeding the NMED allowable limit for diesel (880 mg/kg) at the site was limited to a small area west northwest of the former UST location and from soils samples collected during the site investigations and was present at depths ranging from 3 to 8 ft bgs. The 880 mg/kg action level for PCS is found listed in Table 2 of the NMED Residential Direct Exposure Limit for diesel fuel in the *TPH Screening Guidelines*, June 24, 2003 (Appendix E to the VCM Work Plan, Bhate, 2004).

3.1 Pre-Excavation Activities

Before excavation and other site activities began, several pre-construction documents and approvals were required. These included a Form 332 approval, dig permit with utility clearances, site security measures, and facility manager notification of the intended operations. Excavation activities were coordinated with the Base installation support services through the 49th Civil Engineering Squadron/Combat Engineer Vehicle (CES/CEV).

3.1.1 AF Form 332

The initial completed and approved Air Force Form (AF Fm) 332, was obtained on March 25, 2004, for the expanded site investigation activities conducted in April 2004. The work order described the activities taking place at the location. Also, the AF Fm 332 was the mechanism by which the utility clearance/dig permit was authorized. Because the actual excavation activities did not commence until November 2004, the AF Fm 332 and dig permit were renewed on October 15, 2004.

3.1.2 Dig Permit/Utility Clearances

As noted above, utility clearance approvals were completed by the appropriate HAFB utility office. Upon receipt of the approved/renewed dig permit with the utility clearances, a site walk-through was conducted to confirm the dig permit authorizations and any required changes were noted.

3.1.3 Field Variance

On October 15, 2004, a Field Variance to modify the VCM Work Plan submitted by Bhate, dated June 2004, was initiated (Appendix B). In a letter dated August 30, 2004, NMED requested that two sidewall confirmation samples be collected from any side wall that is over 18 feet in length and that samples be biased toward areas with the greater potential for contamination. The *VCM Work Plan* stated that one sample would be collected every 20 linear feet. Also, the *VCM Work Plan* stated that excavated soil to be used as backfill would be sampled one for every 100 cubic yards (cy). NMED suggested sampling once per every 200 cy. The variance to the *VCM Work Plan* took effect on October 18, 2004.

3.2 Excavation Activities

Excavation of the PCS impacted soils began on November 2, 2004, and was completed on November 5, 2004. Activities were conducted in accordance with the *VCM Work Plan* (Bhate, 2004) and the variance dated October 18, 2004. Photographs of the VCM activities are included as Appendix C.

In the *VCM Work Plan* (Bhate, 2004), the total impacted soils were estimated at less than 300 cy. Once the contaminated area was excavated, the width of the impacted soils was much narrower than anticipated. Therefore, the actual total impacted yardage excavated was 90 cy. The limits of the final excavation are shown on Figure 6.

3.2.1 Demolition

Excavation of PCS required demolition of part of the brick wall surrounding the current AST courtyard and part of the pedestrian sidewalk. Therefore, Mesa Verde Enterprises, Alamogordo, New Mexico, mobilized to the site on November 1, 2004, to conduct the demolition.

3.2.2 Soil Excavation and Segregation

The overburden soils are those which have historically demonstrated no contamination and the source of the contamination is not from a surface release. These soils were carefully removed and transported directly to the FT-31 Landfarm for storage in Cell B-3 until confirmation sampling results were obtained and the excavation could be backfilled. This was done because of the limited space around the BHUST site, and so that the ambulance driveway would remain unrestricted. The un-impacted overburden stockpiled for reuse was 90 cy.

PCS impacted soils were removed from the excavation, loaded directly into trucks, and transported to the FT-31 Landfarm for treatment. Soils were deposited in Landfarm Treatment Cell B-4. Once the excavation was open, impacted soils in the smear zone were in a much narrower band than anticipated. Total impacted soils excavated at the BHUST site were 90 cy.

3.3 Confirmation Soil Sampling and Analytical Procedures

Soil samples were collected from the sidewalls of the excavation, the stockpiled soils, and the impacted soils treated in the landfarm in accordance with the *VCM Work Plan* (Bhate, 2004), the variance dated October 18, 2004, and the *Basewide QAPP* (Bhate, 2003b).

To determine the effectiveness of the VCM, initial confirmation soil samples were collected from the sidewalls of the excavations on November 4, 2004, at a frequency of one sample per 20 linear feet of sidewall. If the sidewall was greater than 18 feet in length, two sidewall samples were collected. A total of 8 initial sidewall samples were collected from the excavation at 7 feet bgs. Sidewall confirmation samples were analyzed by the offsite laboratory for the following:

- TPH as DRO, gasoline-range organics (GRO), and oil-range organics (ORO) by Environmental Protection Agency (EPA) Method 8015 Modified
- Volatile organic compounds (VOCs) by EPA Method 8260B

- Semi-volatile organic compounds (SVOCs) by EPA Method 8270C

One soil sample was collected from the stockpiled overburden soil. The variance for the VCM Work Plan stated that one sample per 200 cubic yards would be collected to determine the appropriate classification of the soil. Since the overburden soil was only 90 cy, one sample was collected on November 15, 2004. The sample was submitted to the offsite laboratory and analyzed for TPH by EPA Method 8015 Modified, VOCs by EPA Method 8260B, and SVOCs by EPA Method 8270C.

One soil sample was also collected from the landfarmed soils on November 4, 2004. These soils were sampled again on December 7, 2004, after treatment in the FT-31 landfarm. The sample was submitted to the offsite laboratory and analyzed for TPH by EPA Method 8015 Modified, VOCs by EPA Method 8260B, and SVOCs by EPA Method 8270C.

3.4 Confirmation Soil Sampling and Analytical Results

Soil samples were analyzed by Associated Laboratories, Orange, California. Copies of laboratory reports and data validation findings are provided in Appendix D.

3.4.1 Excavation Sidewall Soil Analytical Results

Confirmation samples were collected at a total of nine locations at a depth of 7 feet bgs (Figure 7). Samples were collected according to the protocol presented in Section 4 of the *VCM Work Plan* (Bhate, 2004). Due to high field-screening readings in the area of sidewall sample SW01-7, the area was over excavated and then sample SW09-7 was collected to confirm the limits of the excavation. Laboratory analytical results from sample SW01-7 showed that the TPH concentration, 711 mg/kg, did not exceed the SSL of 880 mg/kg; however, TPH concentration in sample SW09-7 was much lower than SW01-7 at 267 mg/kg.

The results of the sidewall sampling for the BHUST excavation confirmation samples are presented in Table 3-1 and summarized in Figure 7.

3.4.2 Stockpile Analytical Results

One soil sample was collected from the stockpiled overburden soil, HUST-OB. Concentrations of TPH were below the SSLs for residential soil; therefore, the soils were used as backfill in the excavation. Analytical results are summarized for the additional confirmation samples in Table 3-2.

3.4.3 Stockpile Analytical Results

One soil sample was collected from the PCS impacted soil, FLHUST-L1B4P. The concentration of TPH in the sample was above the SSL. After treatment in the landfarm, the soils were resampled. TPH was detected in sample FLHUST-L1B4R-1.0 at a concentration below the SSL. Analytical results are summarized for the additional confirmation samples in Table 3-2.

3.5 Site Restoration

Site restoration activities for the project began on November 5, 2004, with backfilling the excavation with clean soil stockpiled during the excavation and additional base reuse material as needed. The backfill was compacted with a small remote controlled vibrating compactor.

3.5.1 Compaction

Borrow soil from the HAFB reuse area was used as additional fill to backfill the excavation to within 1 foot of final grade. Compaction testing was conducted by Southwest Engineering, Inc., Las Cruces, New Mexico. Three compaction samples were collected on November 8, 2004. Each sample passed the compaction requirement of 95%. The final 1-foot lift was backfilled on November 9, 2004, and three additional compaction samples were collected from the final grade. Each sample passed the 95% compaction requirement. Copies of the compaction testing results area included as Appendix E.

3.5.2 Sidewalk Reconstruction

The sections of sidewalk which were removed prior to the excavation were replaced using similar construction methods and matched in appearance to that which was removed. The design and construction, inclusive of materials, were completed by matching of the new sidewalk to the existing sidewalk.

3.5.3 Brick and Mortar Privacy Wall

The sections of the brick and mortar privacy wall which were removed prior to the excavation were replaced with similar construction and matched in appearance to that which was removed. The design and construction, inclusive of materials, were completed by matching of the new privacy wall to the existing privacy wall.

3.5.4 Grass Areas

The areas of grass or landscape materials which were removed or damaged during the excavation were replaced with similar design and matched in appearance to that which was removed.

3.5.5 Asphalt Parking Area

The area of vehicle parking which was removed or damaged during the excavation was replaced with similar construction and matched in appearance to that which was removed. The design and construction, inclusive of materials, was completed by matching of the new paved area to the existing paved area.

3.6 PCS Transportation and Disposal

R&R Environmental, Inc., Alamogordo, New Mexico, transported approximately 90 cy of PCS in excess of 880 mg/kg to the FT-31 Landfarm facility on HAFB. Approximately 90 cy of uncontaminated overburden soils were also transported to the landfarm area for temporary storage. The waste manifest (list of truck runs) for contaminated and overburden soil from the excavation is presented in Appendix F.

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4 CONCLUSIONS AND RECOMMENDATIONS

PCS identified in the previous investigations at the BHUST site were excavated and transported to the FT-31 Landfarm for treatment. Soil samples collected from the sidewalls of the excavation (confirmation samples) provide documentation of the complete removal of soil containing petroleum hydrocarbons, VOCs, or SVOCs in excess of the NMED SSLs.

Soil that was analyzed during the excavation process and determined to be acceptable for backfilling was transported to the FT Landfarm area for storage. These soils, along with imported clean material, were then transported back to the site as backfill for the excavation. Based upon the sampling, laboratory analytical results, and documentation of excavation and disposal provided, no further action (NFA) is recommended for the BHUST site.

NFA for this site is based upon NMED Closure Criterion #5 which states:

> *"The site was characterized or remediated in accordance with applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use."*

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5 REFERENCES

Bhate Environmental Associates, 2003a. *Basewide Health and Safety Plan, Holloman AFB, New Mexico, December 2003.*

Bhate Environmental Associates, 2003b. *Basewide Quality Assurance Plan, Holloman AFB, New Mexico, November 2003.*

Bhate Environmental Associates, 2004. *Voluntary Corrective Measures Base Hospital UST Work Plan, Holloman AFB, New Mexico, June 2004.*

CH_2M Hill, September 2003. *Draft Storm Water Pollution Prevention Plan for Holloman Air Force Base, New Mexico.*

Foster Wheeler Environmental Corporation, 1999. *On-Site Investigation Report for the Petroleum-Contaminated Soil Investigation at Building 15 (Base Hospital) Holloman Air Force Base, New Mexico*, December 8, 1999.

Foster Wheeler Environmental Corporation and Radian Corporation, June 1995. *Draft Final Phase II RCRA Facility Investigation Report, Table 1 Solid Waste Management Units*, Holloman Air Force Base, New Mexico, Volume I.

New Mexico Water Quality Control Commission, September 15, 2002, *New Mexico Water Quality Control Commission Regulations* (20.6.2 NMAC).

NMED (New Mexico Environment Department), 1995, *Guidance for Evaluation of NFA (No Further Action Proposals.*

NMED (New Mexico Environment Department), February 2004, *Technical Background Document for the Development of Soil Screening Levels Revision 2.* Hazardous Waste Bureau, Ground Water Quality Bureau, and the Voluntary Remediation Program.

NMED (New Mexico Environment Department), June 24, 2003, *New Mexico Environment Department TPH Screening Guidelines.*

Radian Corporation, 1993, *Phase I RCRA Facility Investigation.*

Western Regional Climate Center (WRCC), 2003. Desert Research Institute State Narrative Web Page, http://www.wrcc.dri.edu/narratives/NEWMEXICO.htm.

White Sands Missile Range (WSMR), 2003. Public Affairs Office, Site Informational Web Page, http://www.wsmr.army.mil/paopage/Pages/WU%2360.htm.

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FIGURES