ADDITIONAL INVESTIGATION REQUIREMENTS WORK PLAN SITE SS-02/05

Holloman Air Force Base
New Mexico

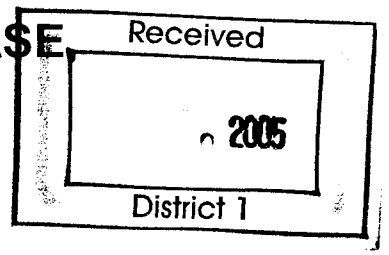
May 2005

Contract No.: DACA45-02-D-0023
Task Order No.: 7
Bhate Project No.: 9050043.01.01

Headquarters, Air Combat Command
Langley Air Force Base, Virginia

49 CES/CEV
Holloman Air Force Base, New Mexico

ADDITIONAL INVESTIGATION REQUIREMENTS WORK PLAN SITE SS-02/05 HOLLOMAN AIR FORCE BASE, NEW MEXICO



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Prepared For

U.S. Army Corps of Engineers
Omaha District
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May 2005

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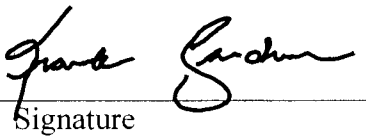
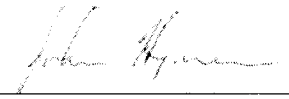
ADDITIONAL INVESTIGATION REQUIREMENTS WORK PLAN SITE SS-02/05 HOLLOMAN AIR FORCE BASE, NEW MEXICO

REVIEW SHEET

COMMITMENT TO IMPLEMENT THIS WORK PLAN		
Frank Gardner		5-6-05
Program Manager	Signature	Date
John Hymer		5-6-05
Site Manager	Signature	Date

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ADDITIONAL INVESTIGATION REQUIREMENTS WORK PLAN SITE SS-02/05 HOLLOMAN AIR FORCE BASE, NEW MEXICO

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ACRONYMS AND ABBREVIATIONS

AAF	Army Air Field
AF Fm	Air Force Form
AOC	Area of Concern
ANSI	American National Standards Institute
AST	Aboveground storage tank
AVGAS	Aviation gasoline
bgs	Below ground surface
Bhate	Bhate Environmental Associates, Inc.
BTEX	Benzene, toluene, ethylbenzene, xylene
°C	Degrees Celsius
cm/s	Centimeters per second
COC	Chain-of-custody
cu	Cubic
DRO	Diesel Range Organic
EPA	United States Environmental Protection Agency
ERP	Environmental Restoration Program
ERPIMS	Environmental Restoration Program Information Management System
°F	Degrees Fahrenheit
GRO	Gasoline Range Organic
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
HSA	Hollow stem auger
IDW	Investigative derived waste
IRP	Installation Restoration Program
LNAPL	Light nonaqueous phase liquid
LTM	Long Term Monitoring
MCL	Maximum contaminant level
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
NFA	No Further Action
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
OSHA	Occupational Safety and Health Administration
PA/SI	Preliminary Assessment/Site Investigation
PID	Photo ionization detector
POL	Petroleum, oil, and lubricants
PPE	Personal protective Equipment

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PVC	Poly-vinyl chloride
QA/QC	Quality assurance/quality control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
sf	Square feet
SOP	Standard operating procedure
SSHP	Site-Specific Safety and Health Plan
SVE	Soil Vapor Extraction
SVOC	Semi-volatile organic compounds
SWMU	Solid Waste Management Unit
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbons
USACE	United States Army Corps of Engineers
VOC	Volatile organic compounds
WRCC	Western Regional Climate Center
WSMR	White Sands Missile Range
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. 7, to prepare an Additional Investigation Work Plan for Environmental Restoration Program (ERP) Site SS-02/05 (Solid Waste Management Unit [SWMU] Area of Concern [AOC] T), petroleum, oil, and lubricant (POL) Storage Tanks Spill Sites 1 and 2 at Holloman Air Force Base (HAFB), New Mexico. The objectives of this Work Plan are outlined in correspondence dated February 9, 2005, from the New Mexico Environment Department (NMED) to Holloman AFB (see Attachment A) and are summarized as follows:

1. A two-year groundwater sampling program should be implemented. Samples should be collected on a quarterly or semi-annual basis for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).

2. Groundwater samples should be collected from MW-02/5-02. This well is located in the source area with historically the highest concentrations and would provide information on the affects of the soil excavation had on the groundwater plume.

3. At least one additional monitoring well should be installed approximately 100 feet east of the excavation to better define the groundwater plume. The only true down gradient well, MW-02/05-06, is located over 400 feet from the source area. As most petroleum plumes are <400 feet in length, especially at sites with flat gradients, this well is not useful for monitoring plume characteristics but is better suited as a sentinel well to monitor plume migration. A second well should also be considered to the southeast of MW-02/05-02 based on the historic groundwater flow direction.

4. Sampling and review of historical data from other site wells that have not been part of the Long Term Monitoring (LTM) program should be performed to ensure that groundwater conditions have not changed since the original investigations were performed. Wells such as MW-02/05-01, MW-02/05-07, and S1-MW3 should be included in the initial sampling event.

This document has been constructed to provide relevant information on the geologic, hydrologic, and other environmental conditions for HAFB and at the site. Information is provided for the entire Base and its surrounding environ as well as Site SS-02/05, specifically. Likewise, the procedures encompassing the well installation and development, groundwater sampling, and waste management are presented.

Historical site information referenced from previous investigative reports is provided in Appendix A of this Work Plan.

1.1 Description

1.1.1 HAFB

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). The following Base information has been taken from the *Characterization Summary and No Further Action (NFA) Documentation for Installation Restoration Program Sites SS-02/05 POL Yard (AOC T), SD-47 POL Washrack Area (SWMU 133), and SS-60 Building 828 (SWMU 230)* by Foster Wheeler (March, 1998) and the *2001 Long-Term Groundwater Monitoring Report, Holloman Air Force Base, New Mexico* by Foster Wheeler (July 2002).

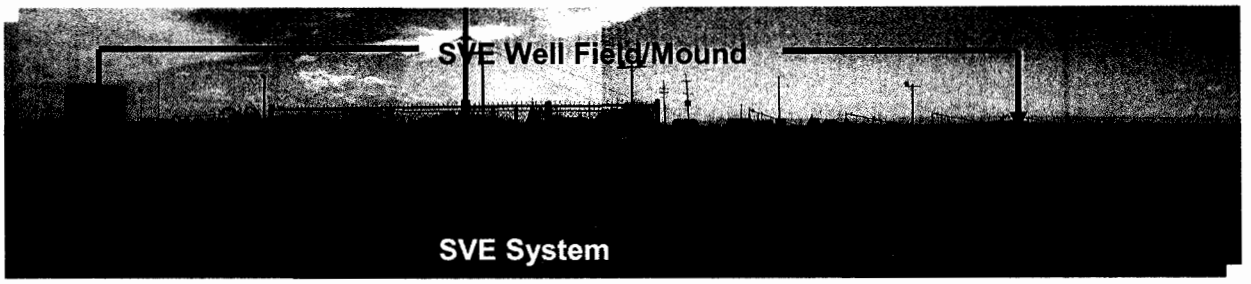
HAFB was first established in 1942 as Alamogordo Army Air Field (AAF). From 1942 through 1945, Alamogordo AAF served as the training grounds for over 20 different flight groups, flying primarily B-17s, B-24s, and B-29s. After World War II, most operations had ceased at the base. In 1947, Air Material 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.

1.1.2 Site SS-02/05

Installation Restoration Program (IRP) Site SS-02 is POL Fuel Site No. 1 and SS-05 is Fuel Site No. 2, both within Resource Conservation and Recovery Act (RCRA) Site AOC T. The sites are in close proximity to one another at the POL facility within the main base area and are considered as one site. The POL yard is on the eastern perimeter of the southeast corner of the Base, off Sabre Road (Figure 1-2). The POL site was previously occupied by fourteen 25,000-gallon aboveground diesel and jet fuel tanks. From the early 1960s to the late 1970s, the aboveground storage tanks (AST) were periodically overfilled at site SS-02. JP-4 and aviation gasoline (AVGAS) spills occurred throughout the unlined area. The total amount of fuel spilled is unknown. In 1987, the ASTs were removed but the support saddles were left in-place and covered with soil. At site SS-05, approximately 30,000 gallons of JP-4 fuel was released in 1978 when a drain valve was accidentally left open. Interviews with POL personnel indicated that the fuel accumulated in the southeast corner of the site. The fuel left the un-lined bermed area through a drain settling in a low spot southeast of the berm. It was estimated that 28,500 gallons were recovered during the initial clean-up response operations.

A Preliminary Assessment/Site Investigation (PA/SI) completed in 1988 and a Remedial Investigation (RI) in 1992 revealed concentrations in the soil up to 17,500 milligrams per kilogram (mg/kg) for total petroleum hydrocarbons (TPH) with benzene at a maximum concentration of 48 mg/kg. The maximum concentration for benzene in groundwater was 2.9

milligrams per liter (mg/L). A pre-design investigation in May 1993, determined a vadose zone, fuel contaminated area approximately 200 feet by 60 feet. A Soil Vapor Extraction (SVE) system was installed that became operational in April 1995. The site was designated as NFA pending the soil TPH to achieve less than 1,000 mg/kg via the SVE system. Furthermore, LTM of the site was to occur for 10 years to ensure tracking of any potential offsite migration.



In November 1999, free product was detected within the SVE system area. Approximately 800 gallons have been removed through the use of skimmers. In past LTM activities, typical fuel contaminants benzene, toluene, ethylbenzene, and xylene (BTEX) compounds have been regularly detected, with benzene and ethylbenzene detected above NMED Groundwater Quality Standards in 2002 (Foster Wheeler, 2002). During groundwater sampling conducted in 2003, only benzene was detected above the NMED Groundwater Quality Standards. Phase II activities have indicated that the groundwater beneath the spill area, and as far reaching as the eastern edge of Dillard's Draw, is impacted by BTEX constituents.

Investigations completed by Radian in 1992 and Foster Wheeler in 1993 resulted in a fairly well defined area of soil contamination surrounding the former AST area (i.e. present day mound) (Figure 1-3). Based upon their findings, the predominant depth for anticipated contamination was estimated to be from 14 to 20 feet below ground surface (bgs). The Radian effort concentrated their investigation in the perimeter of the mound, whereas Foster Wheeler looked at the center area. From these findings, the center area has the higher areas of contamination ranging from a high of about 17,000 mg/kg of TPH in the southeast to lows of 1,200 mg/kg TPH in the northern reaches. The Radian sampling along the eastern edge of the mound has no sample data for anything deeper than 12 feet. There may be contamination above the NMED level for TPH of 940 mg/kg in this region, particularly since groundwater flow is to the east (Dillard's Draw) based on their potentiometric surface map. Recent construction work to the immediate south revealed discolored soil with petroleum odors at approximately 4-feet bgs.

Excavation activities were initiated by Bhate in 2004 and involved excavating the soil in the area(s) defined by Radian and Foster Wheeler (Figure 1-4). The final limits of the excavation were approximately 32,600 square feet (sf). The depth of the excavation was approximately 22 feet; therefore the total amount of contaminated soil removed during the excavation activities at Site SS-02/05 was approximately 26,500 cubic (cu) yards. Of this volume, approximately 13,000 cu yards were treated at the HAFB FT-31 Landfarm. Confirmation samples were

collected from the sidewalls of the excavation and analyzed by an off-site laboratory for TPH-Gasoline Range Organics (GRO) and Diesel Range Organics (DRO) (U.S. Environmental Protection Agency (EPA) Method 8015B), VOCs (EPA Method 8206B), and SVOCs (EPA Method 8270C). Excavation continued until confirmation samples indicated that concentrations of TPH in the soils were below the NMED TPH limit of 940 mg/kg. Excavated soils were stockpiled on-site, and sampled at a frequency of one sample per 500 cu yards for overburden soil and one sample per site for impacted soils to determine disposal requirements. Contaminated soils were transported to the HAFB FT-31 Landfarm for treatment until the TPH levels were below 940 mg/kg. Currently, the excavation activities have been completed and final confirmation samples have been collected. Pending analytical results of the final confirmation samples, the excavation will be backfilled and graded to match the surrounding area. Overburden soils excavated from the site, and impacted soils with TPH concentrations below 940 mg/kg, will be used as backfill for the excavation.

1.2 Physiography

HAFB is located within the Sacramento Mountains Physiographic Province on the western edge of the Sacramento Mountains (Figure 1-5). 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. HAFB 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.

The SS-02/05 site lies adjacent to Dillard's Draw, to the east, at the farthest eastern extent of HAFB property (Figure 1-6). The immediate area's ground surface is relatively flat except for the elevated area of about three feet that encompasses the covered tank saddles. An asphalt service road circles the southern, eastern, and northern sides. Immediately adjoining the western side is a truck loading area that is comprised of a concrete overflow/spill pad. To the west are active aboveground fuel lines in support of the new fuel pumping station located to the south.

1.3 Surface Water

The Tularosa Sub-basin contains all of the surface flow within its boundaries. The nearest inflow of surface waters to the 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, with 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, which is a temporary feature of merely a few inches in depth during the rainy season.

Potable water is only found from a few 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 SS-02/05, surface water generally flows towards Dillard's Draw to the east.

1.4 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 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. Groundwater flow 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. The associated permeability reported at Site SS-02/05 is relatively low to moderate being on the order of $1x10^{-4}$ to $1x10^{-3}$ centimeters per second (cm/s) with depth to groundwater at 12 to 15 feet bgs and generally follows the surface topography (Figure 1-6).

Previous analyses indicate total dissolved solids (TDS) of greater than 10,000 mg/L in groundwater beneath HAFB. This exceeds the New Mexico Water Quality Control Commission (NMWQCC) limit for potable water and thus, is designated as unfit for human consumption. Likewise, EPA guidelines have identified the groundwater as a Class IIIB water source, characterized by TDS concentrations exceeding 10,000 mg/L.

1.5 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. 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 in the winter. Clear skies and low humidity permit 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 (WRCC, 2003). 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.

1.6 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 Sub-basin). Water carrying eroded gypsum, gravel, and other matter continues to flow into the basin.

The overlying alluvium of the Tularosa Sub-basin 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.

The SS-02/05 area's geology is similar to the soils found at the majority of HAFB. They are primarily comprised of silty sands with some clay. At depths approximately 12 to 15 feet bgs, there are caliche deposits commonly found. The soils tend to be hard packed to blocky and poorly sorted. The surface of the site is comprised of crushed gravels.

2 INVESTIGATION ACTIVITIES

The objective of the additional requirements Work Plan is to collect sufficient groundwater data to support the completion of a risk assessment evaluating groundwater exposure pathways relative to potential vapor impacts. This will be accomplished by installing two new groundwater monitoring wells downgradient of site SS-02/05 and sampling them along with the existing groundwater monitoring well network on a bi-annual basis for two years. Based on the existing groundwater monitoring wells installed at SS-02/05, it is anticipated that the new monitoring wells will be installed to a depth of 20 to 22 feet, which would be approximately 10 feet below the local water table (Foster Wheeler, 2002). Because this total area of disturbance is less than one acre, a project Storm Water Pollution Prevention Plan is not required.

2.1 Investigation Activities

Before site activities can begin, there are several pre-construction document and approval requirements to be met including Air Force Form (AF Fm) 332 approval, Base dig permit with utility clearances, and site security measures. Bhate will coordinate project requests for Base installation support services through the ERP office at HAFB. 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, and decontamination area(s), potential site hazards and emergency evacuation routes. Also reviewed at this time will be project procedures in accordance with the schedule and planned activities.

2.1.1 AF Form 332

AF Fm 332, included as Appendix B, authorizes construction work at HAFB and is required for the initiation of any construction work. This work request describes what activities will take place at the location. The AF Fm 332 also is the mechanism by which the utility clearance/dig permit is authorized. AF Form 332 will be initiated by Bhate personnel. Both the AF Fm 332 and dig permit will be reviewed by required Base personnel for their approvals to begin work in their area or that which may affect a utility under their authority. Prior to the submittal of AF Fm 332, the locations of the proposed wells will be clearly delineated with marker flags, stakes, or paint, as appropriate to the surface material.

2.1.2 Dig Permit/Utility Clearances

As noted above, utility clearance approvals will be completed by HAFB personnel. 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-down confirming the dig permit authorizations and make any required changes.

2.2 Well Installation Activities

2.2.1 Monitoring Well Locations

The proposed locations for the two groundwater monitoring wells to be installed during this program are shown on Figure 1-7. Based upon estimated area of the groundwater plume, one well will be installed approximately 100 feet east of the former AST location. The only existing downgradient well is MW-02/5-06. Well MW-02/5-06 is approximately 400 feet downgradient of the former AST location and most petroleum plumes are less than 400 feet in length; therefore, reducing the effectiveness of MW-02/5-06 in evaluating plume characteristics. MW-02/5-06 will serve as a sentinel well and be utilized in the LTM to monitor plume migration. Based on the direction of historic groundwater flow in the area, the second well will be installed southeast of MW-02/5-02 along the distal edge of the groundwater plume.

2.2.2 Monitoring Well Installation and Development

Wells will be constructed using hollow stem auger (HSA) drilling techniques. A geologist or engineer will log each borehole. Based upon the known depth to groundwater, soil borings and subsequent monitoring wells will be installed to a depth of approximately 20 to 22 feet. Each well will be completed with 10 feet of 2-inch diameter 0.020" slotted poly-vinyl chloride (PVC) screen. The remaining borehole casing will be comprised of flush threaded 2-inch PVC casing. The annular space surrounding the screen will be backfilled with 10/20 silica sand capped with at least 2 feet of bentonite pellets. The remaining annular space will be backfilled with neat cement. The surface completion will consist of a lockable and tamper proof 6-inch diameter steel cover and concrete pad (3 feet square). The completed wells will be developed to remove fine particulate and improve hydraulic communication with the surrounding saturated material.

The borehole cuttings will be screened with a photo ionization detector (PID) for the presence of hydrocarbons. If the soil is free of organic vapors, it will be spread on the ground surrounding the well. If PID screening of the soil indicates the presence of hydrocarbons, the soil will be placed in the landfarm at HAFB. Water from well development activities will be containerized in drums and transported off site for disposal in an appropriate manner.

2.3 Site Restoration

Upon completion of monitoring well installation, the well locations will be restored to the grading of the surrounding area. Drilling 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.

2.4 Groundwater Sample Collection

Groundwater sampling of the new and existing groundwater monitoring wells will be conducted biannually. The wells to be sampled during this program include: the two new wells, MW-02/05-01, MW-02/5-02, MW-02/05-03, MW-02/05-04, MW-02/05-05, MW-02/05-06, and MW-02/05-08. Documentation of all field sampling activities will be recorded in a bound field notebook. The goal of the bi-annual groundwater monitoring is to produce analytical results that will be used to perform a risk assessment to evaluate groundwater exposure pathways at SS-02/05. The results will also be submitted in a bi-annual monitoring report to NMED with other documentation describing activities conducted at SS-02/05 during the six month period.

Field activities at HAFB will be performed in accordance with the Site-Specific Health and Safety Plan (SSHP) and Quality Assurance Project Plan (QAPP) Addendum (see Appendices B and C of this Work Plan, respectively), the Basewide Health and Safety Plan (HASP) (Bhate, 2003), as well as other USACE mandated procedures for laboratories and activities such as groundwater sampling. Described below, however, is a summary of the bi-annual groundwater sampling activities to be conducted during the sampling program.

The water level in each well will be gauged to the nearest 0.01 feet using an electronic water level indicator prior to sampling. The depth to water information will be used to prepare a water table contour map and calculate the volume of water to be purged from the well prior to sample collection. Wells will be inspected for damage and integrity (i.e. roots, broken locks, or cracked casing). Any problems with the well will be documented in the field notes and presented in the biannual report.

Each well will be purged a minimum of three standing volumes or to dryness prior to sampling with disposable inert bailers. Wells will be allowed to recover to at least 70 percent of their original standing volume prior to analysis. Field parameters such as, pH, specific conductivity, dissolved oxygen, and temperature will be recorded at each well prior to sampling. One groundwater sample will be collected from each well as well as an associated duplicate sample. The groundwater samples will be analyzed for VOCs (EPA Method 8260B) and SVOCs (EPA Method 8270C).

The sample containers will be labeled, and chilled on ice at 4 degrees Celsius (°C). Strict chain-of-custody (COC) will be maintained until delivery to an offsite laboratory for analysis. Purge water derived from the wells will be containerized in drums for future disposal by HAFB pending sample analysis.

2.5 Sample Identification

Each environmental sample will be identified on the sample label and COC records for each sample collected, regardless of type. USACE duplicates will be paired with another random

sample as blind samples having a number in sequence with the regular samples. Nomenclature will adhere to the procedures and guidelines established in the Basewide QAPP (Bhate, 2003).

2.6 Project Laboratory

The analytical work for this project will be preformed by Associated Laboratories, 806 North Batavia, Orange, California 92868. The laboratory personnel with project certifications and requirements are discussed in the Basewide QAPP.

3 INVESTIGATION REPORT

The objective of the well installation and sampling program is to facilitate closure of the SS-02/05 site through a risk assessment of the VOCs and SVOCs present in the groundwater. The analytical results of groundwater samples collected during the sampling program will be used to evaluate the groundwater exposure pathways at the site and determine if VOCs and SVOCs present in the groundwater present a threat to potential receptors. Since the source area at SS-02/05 has been removed, if the completed groundwater evaluation indicates an acceptable level of risk, as defined by NMED, then no further remedial actions will be required and SS-02/05 can be considered for closure.

As previously stated, the groundwater beneath Site SS-02/05 is unfit for human consumption, based on the elevated TDS levels. According to a letter from NMED to Holloman AFB, dated January 25, 1993 (and updated on May 15, 1995), "Remediation of existing contamination in unprotected groundwater will not be required by NMED at Holloman AFB...." (Foster Wheeler, 1998). To qualify for this exemption, three conditions were specified in the letter:

1. No human or ecological receptor is or may be exposed to unacceptable risk from contact with the contaminated water.
2. Additional or continued contamination of the groundwater is not and will not be acceptable.
3. Any free-phase/light nonaqueous phase liquid (LNAPL) contamination will be removed from the surface of the groundwater.

Phase II investigative activities conducted at Site SS-02/05, indicated that while groundwater contamination exists beneath Site SS-02/05, it does not pose an unacceptable risk to human health or the environment due to incomplete exposure pathways. Removal of the soil contamination via the SVE system and excavation activities at the site has eliminated the potential for continued contamination of the groundwater. Previous groundwater samples collected at Site SS-02/05 have not detected the presence of any LNAPL.

For any VOCs or SVOCs that are detected in groundwater samples collected at SS-02/05 as part of this sampling program, the concentrations will be compared to existing NMED groundwater maximum contaminant levels (MCLs) as presented in Table 3-1.

Table 3-1. NMED Groundwater Standards

Analyte	Groundwater Standard	
	EPA MCLs (µg/L)	New Mexico Groundwater MCLs (µg/L)
VOCs		
Acetone	N/A	N/A
Benzene	5	10
Bromodichloromethane	N/A	N/A
Methyl tert-butyl ether	N/A	N/A

Analyte	Groundwater Standard	
	EPA MCLs (µg/L)	New Mexico Groundwater MCLs (µg/L)
Carbon Disulfide	N/A	N/A
Carbon Tetrachloride	5	10
Chloroform	N/A	N/A
1,2-Dichloroethane	5	10
cis-1,2-Dichloroethylene	70	N/A
1,2-Dichloropropane	5	N/A
Ethylbenzene	70	750
Methylene chloride	-	100
Methylethyl ketone	N/A	N/A
Styrene	100	N/A
Toluene	1,000	750
1,1,1-Tricholroethane	200	60
Trichloroethylene	5	100
m,p-Xylenes	10[1]	620[1]
o-Xylene	10[1]	620[1]
SVOC		
Butylbenzyl phthalate	N/A	N/A
Bis(2-Ethylhexyl)phthalate	N/A	N/A
Phenol	N/A	N/A

Note:
N/A – Groundwater standard not established
[1] Value based on total xylenes
µg/L = Micrograms per liter

4 HEALTH AND SAFETY REQUIREMENTS

Project Health and Safety practices will adhere to the Basewide HASP (Bhate, 2003) and the project SSHP Addendum (see Appendix B), for the investigation activities at Site SS-02/05. It is anticipated that no greater than modified level D personal protective equipment (PPE) will be required to complete the well installation and sampling activities at SS-02/05. This includes: Occupational Safety and Health Administration (OSHA) approved safety shoes, American National Standards Institute (ANSI) approved safety glasses (Z87.1) and hard hat (Z89.1-1997: Type I), sleeved shirt and long pants, and as required, hearing protection, leather work gloves, and/or nitrile gloves during sampling.

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5 INVESTIGATION-DERIVED WASTE MANAGEMENT

Investigation derived waste (IDW) generated by installing the new monitoring well and subsequent groundwater sampling activities (Table 5-1) will be managed and characterized according to the following guidelines. Purged groundwater will be containerized and maintained by HAFB until disposal, pending laboratory analysis. Other liquid wastes, such as decontamination rinses, are anticipated to be non-hazardous and as such, can be disposed of through the HAFB wastewater treatment plant (WWTP). PPE and other site non-hazardous debris/waste shall be disposed in standard trash receptacle.

Table 5-1. Proposed Waste Streams for SS-02/05 Additional Requirements Investigation

Activity	Waste Stream		
	PPE	Soil	Water
Well Installation	X	X	X
Equipment Decontamination	X	X	X
Groundwater Sampling	X		X

5.1 General Decontamination Procedures

All equipment, both small hand tools and large machinery (such as augers, etc.) will require some level of decontamination dependant upon its contact with the contaminated subsurface. Small hand tools can be decontaminated in five-gallon buckets at the site (Bhate standard operating procedures (SOP), Basewide QAPP).

5.2 Personal Protective Equipment

Prior to disposal, used PPE, disposable items, and the decontamination pad liner will be rinsed clean with tap water and diluted detergent solution. Cleaned PPE and presumed clean, based upon non-contact with contaminated soils, water or equipment, and other disposable clean items will be contained in trash bags and disposed of at the applicable receptacle.

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6 QAPP ADDENDUM

The laboratory performing the chemical sample analysis will follow the Final Quality Assurance Project Plan Addendum provided as Appendix C to this Work Plan.

6.1 Sample Identification

Each environmental sample will be identified on the sample label and chain-of-custody records for each sample collected, regardless of type. USACE duplicates will be paired with another random sample and will be blind samples. The duplicate samples will appear in sequence with the regular samples. The identifier nomenclature will adhere to the procedures and guidelines established in the Basewide QAPP.

6.2 Standard Operating Procedures

Applicable SOPs for completing the well installation and sampling activities are located in Appendix A of the Basewide QAPP.

6.3 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 and sample identification information. At a minimum, field log books will be utilized to record dates and times, sampling protocols, project numbers, and sampler's name. Other pertinent information will include COC numbers and air-bill tracking numbers. Chain-of-custody forms will be completed and included with each sample shipment; one COC per cooler.

6.4 Data Reporting

Data obtained during the investigation will be reported according to the Basewide QAPP and/or its respective project specific addendum. 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.

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7 WELL INSTALLATION AND GROUNDWATER SAMPLING ACTIVITIES

During the well installation and groundwater sampling activities at Site SS-02/05, 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 sub-contractors 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 and their responsibilities are listed in Table 7-1.

Table 7-1. Key Personnel and Responsibilities

Name	Project Title/Assigned Role	Phone Numbers
Mr. John Hymer	Field Team Leader/Site Health and Safety Officer	Work: (505) 491-9171
Mr. Jerry Pelfrey & Mr. Kevin Germann	Field Samplers	Work: (505) 491-8261
Mr. John Hymer	First Aid Personnel (Note-all onsite personnel are required to be trained in cardiopulmonary resuscitation and first aid)	Work: (505) 491-9171
Other Project Personnel		
Mr. Frank Gardner	Bhate Program Manager	Work: (970) 216-7819
Mr. Eric Lehnertz	Health and Safety Specialist	Work: (205) 918-4000
Mr. Mike D'Auben	QA/QC Specialist/Chemist	Work: (205) 918-4000
QA/QC = Quality Assurance/Quality Control		

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8 REFERENCES

Bhate Environmental Associates, Inc., December 2003. *Final Basewide Health and Safety Plan.*

Bhate Environmental Associates, Inc., November 2003. *Final Basewide Quality Assurance Project Plan.*

Bhate Environmental Associates, Inc., May 2005. *Quality Assurance Project Plan Addendum, Site SS-02/05, Additional Investigation Requirements, Holloman Air Force Base, New Mexico.*

Foster Wheeler, March 1998. *Characterization Summary and No Further Action (NFA) Documentation for Installation Restoration Program Sites SS-2/5 POL Yard (AOC T), SD-47 POL Washrack Area (SWMU 133), and SS-60 Building 828 (SWMU 230).*

Foster Wheeler, July 2002. *2001 Long-Term Groundwater Monitoring Report, Holloman Air Force Base, New Mexico.*

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