HAFB 2003

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DEC 2003
NMED Hazardous
Waste Bureau

November 26, 2003

Ms. Sandra Martin
NMED/Hazardous Waste Bureau
2905 Rodeo Park Drive East
Santa Fe, New Mexico 87505-6303

Subject: ***Work Plan for Additional Soil Borings and Monitoring Well Installations***
SWMU 123
Holloman AFB, New Mexico
USACE – Omaha District
Contract No. DACA45-03-D-0008, D.O. No. 2
Bhate Project No. 9030092.05

Dear Ms. Martin,

Please find enclosed three copies of the final *Work Plan for Additional Soil Borings and Monitoring Well Installation, SWMU 123, Holloman AFB, New Mexico.*

Bhate Environmental Associates, Inc. appreciates the opportunity to provide services to the U.S. Army Corps of Engineers, Holloman Air Force Base and the State of New Mexico. If you have any questions or need additional assistance, please feel free to contact us at (205) 918-4000.

Cordially,
BHATE ENVIRONMENTAL ASSOCIATES, Inc.

Frank Gardner, P.G.
Program Manager

Enclosures

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BHATE ENVIRONMENTAL, IN

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Phone (205) 918-4000 • Fax (205) 918-4050

LETTER OF TRANSMITTAL

DATE	JOB NO
11-26-03	9030025

ATTENTION: MR. TOM ZINK

RE: WORK PLAN FOR ADDITIONAL SOIL BORINGS AND MONITORING WELL INSTALLATIONS

TO: US ARMY CORPS OF ENGINEERS
106 SOUTH 15TH STREET
OMAHA, NEBRASKS 68102-1618

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

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COPY TO ______ SIGNED: FRANK GARDNER

If enclosures are not as noted, kindly notify us at once.

ADDITIONAL SOIL BORING & MONITORING WELL INSTALLATIONS

WORK PLAN

SWMU 123

Holloman Air Force Base
New Mexico

November 2003

CONTRACT NO. DACA45-03-D-0008
DELIVERY ORDER NO. 02, WAD 005
Bhate Project No. 9030092.05

Headquarters, Air Combat Command
Langley Air Force Base, Virginia

49 CES/CEV
Holloman Air Force Base, New Mexico

WORK PLAN FOR ADDITIONAL SOIL BORINGS AND MONITORING WELL INSTALLATIONS

SOLID WASTE MANAGEMENT UNIT 123

HOLLOMAN AFB, NEW MEXICO

Prepared For:

49 CES/CEV
Holloman Air Force Base
New Mexico

Under Contract To:
U.S. Army Corp of Engineers
Omaha District
Under Contract No. DACA45-03-D-0008
Delivery Order No. 2

Prepared By:
Bhate Environmental Associates, Inc.
1608 13th Avenue South
Suite 300
Birmingham, Alabama 35205
Bhate Project Number: 9030092.05

November 2003

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WORK PLAN FOR ADDITIONAL SOIL BORINGS AND MONITORING WELL INSTALLATIONS SWMU 123

HOLLOMAN AFB, NEW MEXICO

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ACRONYMS AND ABBREVIATIONS

AAF	Army Air Field
AOC	Area of Concern
AFB	Air Force Base
AF Fm	Air Force Form
amsl	Above Mean Sea Level
ANSI	American National Standards Institute
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
bgs	Below Ground Surface
Bhate	Bhate Environmental Associates, Inc.
BTEX	Benzene, toluene, ethylbenzene, xylenes
CES/CEV	Civil Engineering Squadron/Combat Engineer Vehicle
cm	Centimeter
cm/sec	Centimeter per second
COC	Chain-of-Custody
CRZ	Contaminant Reduction Zone
DoD	Department of Defense
DQOs	Data Quality Objectives
DRMO	Defense Reuse and Maintenance Operations
DRO	Diesel-Range Organics
EZ	Exclusion Zone
FID	Flame Ionization Detector
gpm	Gallons per minute
GRO	Gasoline-range organics
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
hr	Hour
IDW	Investigation Derived Waste
IRA	Interim Remedial Action
IRP	Installation Restoration Program
kg	Kilogram
L	Liter
lbs	Pounds
LTM	Long Term Monitoring
mg	Milligram
mL	milliliter
NFA	No Further Action
NMED	New Mexico Environment Department
ORO	Oil-Range Organics
OSHA	Occupational Safety and Health Administration

ACRONYMS AND ABBREVIATIONS

(Continued)

OWS	Oil water Separator
PA/SI	Preliminary Assessment/Site Investigation
PCBs	Polychlorinated biphenyls
PCS	Petroleum-Contaminated Soils
PID	Photo Ionization Detector
POL	Petroleum, Oil and Lubricants
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
sec	Second
SSL	Soil Screening Level
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compounds
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds
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-0008, Delivery Order No. 2, to conduct additional investigation activities, including soil borings and monitoring well installation at Holloman Air Force Base (HAFB), New Mexico. The New Mexico Environment Department (NMED) Hazardous Waste Bureau Provided a Notice of Deficiency (NOD), dated August 17, 2001, following review of a letter dated April 27, 1999, with the subject heading "Results of Additional Soil Sampling for Remediation of the POL-Contaminated Solid Waste Management Unit (SWMU) 123, at Holloman Air Force Base". A recommendation was made for no further action (NFA) at the SWMU 123 site based on additional sampling that took place for remediation of the site. THE NOD required additional information prior to making a final determination for NFA.

The Work Plan has been constructed to acquire the additional information requested by NMED.

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, HAAF also serves as the training center for the German Air Force's Tactical Training Center.

1.1 Project Background

Initial site reclamation activities at SWMU 123 began in August 1995, and fifty cubic yards of total recoverable petroleum hydrocarbons (TRPH) contaminated soil was removed during these activities (Foster Wheeler, April 1999). No tank was identified during the excavation activities and is believed that the waste oil tank had already been removed. In March 1997, an additional 132.5 cubic yards of TRPH contaminated soil was removed at SWMU 123. Following the completion of the field excavation, confirmation soil samples were collected and are presented in the Final Closure Report Addendum for Phase II Remediation of POL-Contaminated Site (Foster Wheeler, 1997). The analytical results from the confirmation soil samples are summarized in Table 1-1.

Table 1-1. Previous Soil Sampling Results

Sample Number	EPA Analytical Method	Date Sampled	TRPH (mg/kg)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylenes (mg/kg)
SWMU123-SB-A-7	TRPH=418.1 BTEX=8021	01/21/99	3680	<0.1	<0.1	0.5	21
SWMU123-SB-A-9	TRPH=418.1 BTEX=8022	01/27/99	3500	<0.2	61	21	110
SWMU123-SB-B-4	TRPH=418.1 BTEX=8023	01/22/99	<10	<0.005	0.02	0.01	0.02
SWMU123-SB-C-2	TRPH=418.1 BTEX=8024	01/22/99	144	0.02	0.9	0.3	1.2
SWMU123-SB-C-6	TRPH=418.1 BTEX=8025	01/22/99	<10	<0.005	0.03	0.02	0.06
SWMU123-SB-C-9	TRPH=418.1 BTEX=8026	01/27/99	7400	<0.2	110	190	270
SWMU123-SB-E-2	TRPH=418.1 BTEX=8027	01/22/99	90	<0.005	0.2	0.02	0.2
SWMU123-SB-E-6	TRPH=418.1 BTEX=8028	01/22/99	<10	<0.005	<0.005	<0.005	1.6
SWMU123-SB-E-9	TRPH=418.1 BTEX=8029	01/27/99	4000	<0.2	42	15	69
SWMU123-SB-I-2	TRPH=418.1 BTEX=8030	02/11/99	304	0.5	9.6	7.9	9.9
SWMU123-SB-I-6	TRPH=418.1 BTEX=8031	02/11/99	3000	1.1	22	32	46
SWMU123-SB-J-2	TRPH=418.1 BTEX=8032	02/12/99	48	0.04	0.3	0.7	0.5
SWMU123-SB-J-8	TRPH=418.1 BTEX=8033	02/12/99	1825	0.7	24	26	47

1.1.1 Site Description

SWMU 123, identified as a waste oil tank area, is located adjacent to the petroleum, oil, and lubricants (POL) washrack, approximately 50 feet south of Building 703. The size and construction material of the waste oil tank at SWMU 123 is unknown, and the tank has been removed. The waste oil tank is assumed to have received washwater, waste oil, and fuels from the oil water separator (OWS) located west of the former waste oil tank (Radian, October 1994).

1.1.2 Physiography

HAFB is located within the Sacramento Mountains Physiographic Province on the western edge of the Sacramento Mountains. 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.

1.2 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.

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

1.3 Climate

As a whole, New Mexico has a mild, arid to semi-arid continental climate characterized by light precipitation totals, abundant sunshine, relatively low humidity and relatively large annual and diurnal temperature range. The climate of the Central Closed Basins varies with elevation. The Base is found in the low areas and is characterized by warm temperatures and dry air. Daytime temperatures often exceed 100°F in the summer months and middle 50s in the winter. A preponderance of clear skies and relatively low humidity permits rapid night time cooling resulting in average diurnal temperature ranges of 25 to 35°F. Potential evapotranspiration, at 67 inches per year, significantly exceeds annual precipitation, usually less than 10 inches (Foster Wheeler and Radian, 1997). The very low rainfall amounts resulting in the arid conditions, which with the topographically induced wind patterns combining with the sparse vegetation, tend to cause localized "dust devils". Much of the precipitation falls during the mid-summer monsoonal period (July and August) as brief, yet frequent, intense thunderstorms culminating to 30 – 40% of the annual total rainfall.

1.4 Geology

The sedimentary rocks which make up the adjacent mountain ranges are between 500 and 250 million years old. During the period when the area was submerged under the shallow intra-continental sea, the layers of limestone, shale, gypsum and sandstone were deposited. In time, these layers were pushed upward through various tectonic forces forming a large bulge on the surface. Approximately 10 million years ago the center began to subside resulting in a vertical drop of thousands of feet leaving the edges still standing (the present day Sacramento and San Andreas mountain ranges). In the millions of years following, rainfall, snowmelt and wind eroded the mountain, transporting sediments, and depositing them in the valley (*i.e* Tularosa Basin). Water carrying eroded gypsum, gravel, and other matter continues to flow into the basin.

The Tularosa Basin is characterized as a bolson, which is defined as a basin in an arid or semi-arid region with a playa at its lowest point. Bolsons are characterized as being the focus of local runoff. Therefore sediments that are carried by runoff into the bolson are termed 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 bolson'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 SOIL BORING INSTALLATION AND SAMPLING

The field work for the additional soil boring installations will be conducted in accordance with HAFB Standard Operating Practices (SOPs) 1 through 10. These SOPs outline methodologies for soil boring advancement, soil, and groundwater sampling, soil sample description, field screening, sample management, equipment decontamination, and chain-of-custody procedures. These SOPs are located in the *Draft Basewide Quality Assurance Project Plan* (Bhate 2003) and will be referenced to accomplish specific tasks.

2.1 Soil Boring Installation

A maximum of 15 soil borings will be installed in the vicinity of the POL wash-rack located at SWMU 123. Eleven of the soil borings will be installed utilizing direct push technology (DPT) for soil sampling purposes only. The remaining four soil borings will be installed and converted into monitoring wells using a hollow-stem auger drill rig. Soil samples will be collected in accordance with SOPs HAFB-1, -4, -7 and -10. Table 2-1 lists all of the proposed soil borings with the corresponding rationale for their installation. A general site map with the proposed soil boring and monitoring well locations is attached as figure 2.

Soil borings numbered DPT-1 through DPT-11, will be installed using DPT for soil sampling purposes only. All DPT soil borings will be installed to the groundwater table which is estimated to be 12 feet bgs. DPT-1 through DPT-4 will be installed along the outside perimeter of the previously collected soil samples collected from under the POL wash rack. Soil borings DPT-5 through DPT-7 are optional borings to be installed as necessary to adequately define the horizontal and vertical extent of the contamination, if field screening and visual observation of collected soil samples from borings DPT-1 through DPT-4 indicate the presence of contamination. These borings will be located outward from the perimeter of DPT soil borings DPT-1 through DPT-4.

Soil borings DPT-8 through DPT-11 are optional borings to be installed after inspection of the wash racks drainage system. If the drainage is found to be localized in specific areas, a boring will be installed within these areas in order to further delineate the contamination plume.

Soil borings SB-1 through SB-4 will be installed for the purpose of soil sampling as well as monitoring well installation. Soil boring SB-1 will be installed adjacent to SWMU123-SB-C. This boring was sampled on January 27, 1999 and shows the highest concentration of TRPH (7400 mg/kg at 9 feet bgs). Soil borings SB-2 and SB-3 will be located approximately 40 feet southwest and southeast of SB-1 in the suspected down gradient groundwater flow direction. The suspect groundwater flow direction is estimated from historic groundwater flow patterns in the vicinity of SWMU 123. Soil boring SB-4 will be located up-gradient of soil boring SWMU123-SB-C to further delineate the horizontal extent of the contaminant plume.

Each of these four soil borings (SB-1 through SB-4) will be advanced to at least 5 feet below the groundwater table, which is estimated to be at 12 feet bgs. This will aid in further delineating the extent of contamination, as previous borings were terminated at 9 feet bgs.

Table 2-1. Proposed Borings and Rationale

Soil Boring Number	Rationale
SB-1	Will be used for the installation of monitoring well MW-1. According to previous soil samples, it will be located in the most contaminated area. Soil and groundwater samples will help delineate the vertical and horizontal extent of the contamination plume. Most likely location for the presence of free-phase product.
SB-2	Will be used for the installation of monitoring well MW-2. Located in the down gradient groundwater flow direction. Soil and groundwater samples will help delineate the vertical and horizontal extent of the contaminant plume.
SB-3	Will be used for the installation of monitoring well MW-3. Located in the down gradient groundwater flow direction. Soil and groundwater samples will help delineate the vertical and horizontal extent of the contaminant plume.
SB-4	Will be used for the installation of monitoring well MW-4. Located in the down gradient groundwater flow direction. Soil and groundwater samples will help delineate the vertical and horizontal extent of the contaminant plume.
DPT-1, 2, 3, and 4	Will be used to collect soil samples along the perimeter of the previously sampled area of the washrack to help delineate the vertical and horizontal extent of the contaminant plume.
DPT-5, 6, and 7	Optional samples. These borings will be installed to obtain additional soil samples for a more complete picture of the contaminant plume if contamination is suspected from field screening results and visual observation of borings DPT-1, 2, 3, and 4. These borings will be located in the field as necessary.
DPT-8, 9, 10, and 11	Optional samples. These Borings will be installed to collect soil samples if, upon examination of the drainage system of the washrack, areas of possible contamination caused by drainage are discovered.

2.1.1 Dig Permit/Utility Clearances

The appropriate utility clearance approvals will be completed in accordance with SOP HAFB-3. Upon receipt of the approved dig permit with the utility clearances, the site supervisor or other authorized project personnel will complete a site walk-down confirming the dig permit authorizations and make any required changes.

2.1.2 Site Security

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

2.2 Soil Screening

During soil sampling, soils will be screened in the field for contamination following SOP HAFB-6 and 7. Initial screening will be visual; observance for discoloration. Likewise, soils will be screened utilizing soil-headspace screening techniques using a flame ionization detector/photoionization detector (FID/PID). A small sample of soil collected from each depth interval will be placed into a zip-lock™ or similar disposable bag and allowed to sit undisturbed for at least fifteen minutes. The headspace will then be analyzed with the FID/PID. Readings will be recorded in the field book and used for selection of samples to be submitted to the laboratory for analysis.

2.3 Soil Sampling

Soils will be sampled continuously from the ground-surface to the termination depth of the soil boring. Soil sampling will be performed in accordance with SOP HAFB-1, 4, 5, and 7. A soil sample collected from 1 foot above the groundwater table and a second sample collected from the interval with the highest FID/PID reading will be submitted for laboratory analysis. As requested by NMED, all analytical results will be reported as values less than numerical reporting limits rather than reporting results as non-detections.

A total of 30 soil samples will be collected from the soil borings and will be analyzed for VOCs by US EPA method 8260B, SVOCs by US EPA method 8270C, RCRA 8 metals by US EPA method 6010B/7471A, Diesel Range Organics (DRO), Gasoline Range Organics (GRO), Oil Range Organics (ORO) by US EPA method 8015B and pH by US EPA method 9045B/C. Additionally, one soil sample from DPT-1 will be analyzed for polychlorinated biphenyls (PCBs) per US EPA method 8082. Table 2-2 summarizes the soil analysis strategy.

Three duplicate samples and 1 matrix spike/matrix spike duplicate (MS/MSD) will also be collected for a total of 34 soil samples collected and submitted for analysis. It is expected that duplicate and MS/MSD samples will be collected from the most contaminated sample locations.

Table 2-2. Soil Analysis Strategy

Analysis	EPA Method	Primary	Duplicates	MS/MSD	Total	QA
VOC	8260B	30	3	1	34	1
SVOC	8270C	30	3	1	34	1
RCRA 8 Metals	6010B/7471A	30	3	1	34	1
DRO	8015B	30	3	1	34	1
GRO	8015B	30	3	1	34	1
ORO	8015B	30	3	1	34	1
pH	9045 B/C	30	3	1	34	0

2.4 Sample Identification

Each environmental sample collected will be identified on the sample label and COC records, regardless of type. USACE duplicates will be paired with another random sample and will be collected as blind samples. Sample documentation, handling, and shipping will be in accordance with SOP HAFB-1. The duplicate samples will appear in sequence with the regular samples. The sample identifier nomenclature will be as follows:

SWMU123-SB01-12-MS

Site alpha-numeric identifier: SWMU123

Sample type identifier: SB = soil boring, DP = direct push boring

Sequential soil boring number: 01, 02, etc

Ending depth of sample interval: 12

Reserved for QA sample identifiers: FD = field duplicate, MS = matrix spike, MSD = matrix spike duplicate

3 MONITORING WELL INSTALLATION

The field work for the additional monitoring well installations will be conducted in accordance with HAFB SOPs 1 through 10, and the USACE *Monitor Well Design, Installation, and Documentation at Hazardous and/or Toxic Waste Sites* Engineer Manual.. These documents outline methodologies for monitoring well installation and development, groundwater sampling, sample management, equipment decontamination, and chain-of-custody procedures.

3.1 Monitoring Well Construction

As discussed in section 2, soil borings SB-1 through SB-4 will be installed utilizing hollow stem auger drilling techniques for the purpose of completing them as Type-II monitoring wells, Table 3-1 summarizes the proposed monitoring well locations and the corresponding rationale for their installation. The soil borings/ monitoring wells will be numbered the same as the soil borings. The monitoring wells will be used to determine groundwater flow direction, check for the presence of free-phase product, and will allow the collection of groundwater samples to determine if groundwater has been impacted in the absence of free-phase product. Each monitoring well will be completed with 10 feet of 0.001 inch factory slotted, 2-inch diameter, Schedule 40, PVC well screen. The screen will be placed so that it intersects the ground-water table with 7 feet below and 3 feet above the interface. The remainder of the monitoring well will be constructed from 2-inch diameter, schedule 40, PVC riser. The annular space around the well screen will be back filled with coarse grained, quartz sand, filter pack to approximately 2 feet above the well screen. A granular bentonite seal at least 2-feet in thickness will be placed on top of the filter pack. The remaining annular space will be backfilled with a Portland cement-bentonite grout mixture to the ground surface. Surface completion will be constructed with a 2-foot x 2-foot x 4-inch concrete pad, and a steel protective casing.

3.2 Monitoring Well Development

Each of the four monitoring well will be adequately developed as outlined in the USACE *MonitorWell Design, Installation, and Documentation at Hazardous and/or Toxic Waste Sites* Engineer Manual. Monitoring well development will take place by over-pumping each well until at least five well volumes have been removed, the turbidity of the water is below 10 NTUs for at least three consecutive readings, and the pH, specific conductivity, and dissolved oxygen, have stabilized for at least three consecutive readings.

Table 3-1. Proposed Monitoring Wells and Rationale

Monitoring Well Number	Rationale
MW-1	According to previous soil samples, it is located in the most contaminated area. Groundwater sampling will help in delineating the horizontal and vertical extent of the contaminant plume (only sampled if free-phase product is not present). Most likely location for the presence of free-phase product. Necessary for an accurate potentiometric map.
MW-2	Located in the down-gradient groundwater flow direction. Groundwater sampling will help delineate the contaminant plume. Necessary for an accurate potentiometric surface map.
MW-3	Located in the down-gradient groundwater flow direction. Groundwater sampling will help delineate the contaminant plume. Necessary for an accurate potentiometric surface map.
MW-4	Located in the up-gradient groundwater flow direction. Groundwater sampling will help delineate the contaminant plume. Necessary for an accurate potentiometric surface map.

3.3 Groundwater Sampling

Groundwater samples will be collected and managed in accordance with SOP HAFB-1 and 8. As requested by NMED, all analytical results will be reported as values less than numerical reporting limits rather than reporting results as non-detections. Each of the 4 monitoring wells will be sampled for VOCs by US EPA method 8260B, SVOCs by US EPA method 8270C, RCRA 8 metals by US EPA method 6010B/7470A, Diesel Range Organics (DRO), Gasoline Range Organics (GRO), and Oil Range Organics (ORO) by US EPA method 8015B. Table 3-2 summarizes the groundwater analysis strategy.

One duplicate sample and one MS/MSD sample will be collected from monitoring well MW-1 for a total of 6 groundwater samples. A trip blank will be included in the groundwater sample shipment and analyzed for VOCs. Groundwater samples will not be collected from any monitoring well containing free product.

Table 3-2. Groundwater Analysis Strategy

Analysis	Method	Primary	Duplicates	MS/MSD	Tripblanks	Total	QA
VOC	8260B	4	1	1	1	7	1
SVOC	8270C	4	1	1	0	6	1
RCRA 8 Metals	6010B/7470A	4	1	1	0	6	1
DRO	8015B	4	1	1	0	6	1
GRO	8015B	4	1	1	0	6	1
ORO	8015B	4	1	1	0	6	1

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4 HEALTH AND SAFETY REQUIREMENTS

Project Health and Safety practices will adhere to the *Basewide HASP* (Bhate, 2003). A project Activity Hazard Analysis has been attached as Attachment A for the drilling activities at SWMU 123. It is anticipated that no greater than modified Level D personal protection equipment (PPE) will be required to complete the sampling activities at SWMU-123. This includes: OSHA approved safety shoes, 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 QAPP ADDENDUM

The site specific QAPP is provided in Attachment B.

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6 INVESTIGATION-DERIVED WASTE MANAGEMENT

Investigative-Derived Waste (IDW) will be managed and characterized according to SOP HAFB-9 and the approach presented in Table 5-1. Whenever possible, waste minimization techniques will be used to reduce the amount of IDW. Wastes generated during this field program will be characterized using the analytical results available from samples collected. The management of IDW generated in the field will be specified for each waste stream category indicated in Table 5-1. A summary of IDW management for each waste stream is presented in the following sections.

Table 6-1. Proposed Waste Streams for the Investigation Activities

Activity	Waste Stream			
	Soil Cuttings	Recycled Material	PPE	Decontamination Water
Soil Sampling	X		X	X
Equipment Decontamination			X	X

6.1 Equipment Decontamination

Small equipment, such as sampling tools, will be decontaminated in accordance with the *Draft Basewide QAPP* (Bhate, 2003). Heavy equipment, such as the drill rig, DPT rig, etc., will be decontaminated at a temporary decontamination pad set up at the site. The containers and decontamination pad will be managed in a secure area and the decontamination water will be either allowed to evaporate or combined with the treated groundwater and discharged to the Base wastewater treatment plant. Decontamination water is anticipated to be non-hazardous and as such, can be disposed of through the WWTP. Sediment remaining in the decontamination pad area after the water has either evaporated or been discharged to the WWTP, will be combined with the soil to be remediated in the onsite landfill.

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

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

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7 SAMPLE DOCUMENTATION

Sample documentation, identification and tracking will adhere to the prescribed methods found in SOP HAFB-1. Sampling activities will include documentation of significant activities, significant occurrences and sample identification information. At a minimum, field log books will be utilized to record dates and times, sampling protocols, project numbers, and sampler's name. Other pertinent information will include COC numbers and air-bill tracking number. COC forms will be completed and included with each sample shipment.

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8 DATA REPORTING

Data obtained during the additional investigation activities, 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 required for this project.

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9 ORGANIZATION AND SCHEDULE

During the field operations at the SWMU 123 site, *Mr. Jerry Pelfry* will serve as the Bhate Site Manager overseeing and directing the activities. Mr. Pelfry will also provide on-site management of sub-contractors for the project. *Mr. Frank Gardner* is the Bhate Program Manager and will ensure required project documents, contractual agreements and other program tasks are completed.

The field work will be performed in the fall-winter of 2003.

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10 REFERENCES

Bhate Environmental Associates, Inc., July 2003. *Draft Basewide Health and Safety Plan.*

Bhate Environmental Associates, Inc., July 2003. *Draft Basewide Quality Assurance Project Plan.*

US Army Corps of Engineers, August 1994. *Monitor Well Design, Installation, and Documentation at Hazardous and/or Toxic Waste Sites.*

Foster Wheeler Environmental Corporation, April 1999. *Letter Report Remediation of the POL-Contaminated SWMU 123, Holloman Air Force Base, New Mexico.*

New Mexico Environment Department, August 2001. *Notice of Deficiency on SWMU 123, (Building 704, waste oil Tank), Holloman Air Force Base, New Mexico.*

Radian Corp., December 1995. *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Holloman Air Force Base, New Mexico.*

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