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8 Sep 04

MEMORANDUM FOR MR. JOHN KIELING
RCRA PERMITS MANAGEMENT PROGRAM
HAZARDOUS WASTE BUREAU (HWB)
NEW MEXICO ENVIRONMENT DEPARTMENT (NMED)
2905 RODEO PARK ROAD
SANTA FE, NM 87505

FROM: 377 MSG/CEVR
2050 Wyoming Blvd SE, Suite 118
Kirtland AFB NM 87117-5270

SUBJECT: Resource Conservation and Recovery Act Facility Investigation Work Plan for Solid Waste Management Unit WP-26, Sewage Lagoons and Golf Course Main Pond

1. The Environmental Management (EM) Branch at Kirtland Air Force Base (KAFB) is submitting replacement pages for the subject report, originally submitted to you 27 Jul 04. Included is one electronic version of the revised document.

2. The revised pages are 2-7, 2-10, 2-11, 3-3, 3-8, 3-9, 3-10, 4-1, B-10 and the Table of Contents. The revisions resulted in changes to intermediate pages that are also included. Installation of the soil vapor monitoring points within the sixteen Direct Push Technology (DPT) boreholes, analyses of the soil vapor samples collected from the sixteen DPT boreholes and the frequency of soil sampling during installation of the two boreholes installed using the Air Rotary Casing Hammer (ARCH) drilling method have been modified.

3. The original plan proposed real-time soil vapor sampling and analyses during installation of the pilot DPT soil boring to determine the placement of three soil vapor monitoring points in the final DPT soil boring. This plan would require use of an on-site laboratory. The revised plan proposes to install five soil vapor monitor points at predetermined depths in the DPT soil boring and use of an off-site laboratory for the analyses. The change is due to the potential for incomplete closure of the soil vapor sampling port during the DPT drilling process in the pilot borehole and the consequent inability to continue with the soil boring. Predetermined depths for setting the soil vapor monitor points within the DPT boreholes will avoid the potential problem. Additionally, the original plan required installation of a pilot and final DPT soil borehole, while the revised plan requires a single DPT borehole, resulting in a more efficient process.

4. The original plan for soil sampling within the two ARCH soil boreholes proposed sampling every 60 feet below a depth of 125 feet below grade surface (fbgs) to the proposed depth of 250 fbgs. The revised plan proposes soil sampling collection frequency every 20 feet below a depth of 125 fbgs within the two ARCH soil borings. This will result in a more comprehensive survey of the subsurface soil gas for more effective placement of the soil vapor sampling points.

5. If you have any questions, please do not hesitate to contact Mark Holmes of my staff at (505) 846-9005.

CARL J. LANZ, P.G., GS-13
Chief, Restoration Section

Attachments:
1. Replacement pages for RFI Workplan for WP-26
2. Revised Electronic Version of the RFI Workplan for WP-26

cc:
NMED HWB-KAFB, Mr. McDonald w Atch 1
USEPA-Region 6 (6PD-N), Ms. Thomas w Atch 1
NMED HWB-Chief, Mr. Bearzi, wo Atchs
HQ AFMC/CEVR, Ms. Linthicum, wo Atchs
AFCEE, Mr. Hatfield, wo Atchs
MWH, Ms. Jarocki, wo Atchs
KAFB CEVR, Mr. Lanz, wo Atchs
TVI, Admin Record, Montoya Campus
File

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2.2.3 Sampling Activities

The proposed scope of work at SWMU WP-26 includes conducting a soil gas survey, conducting a geophysical survey, sampling subsurface soil, installing monitoring wells, and sampling groundwater to define the aerial extent of TCE at the former sewage lagoons. The sampling activities conducted as part of this RFI work plan will follow the protocol specified in the Kirtland AFB Base-Wide Plans for the IRP (USAF, 1996).

2.2.3.1 Contaminant Source

The former sewage lagoons are the suspected source of TCE in soil gas and the perched aquifer. No impacts to the regional aquifer have been found.

2.2.3.2 Media Characterization

Soil Gas Survey

A soil gas survey will be performed by installing nested multi-depth soil gas sampling points. Sixteen boreholes will be drilled using direct-push technology (DPT) to an estimated depth of 100 to 125 ft below ground surface (bgs) (Figure 2-2). Five soil vapor monitoring points will be installed within each of the DPT boreholes every 25 feet (25, 50, 75, 100, and 125 ft bgs). The soil vapor monitoring points will be allowed to equilibrate with the subsurface for one to two weeks then soil gas samples will be collected in Summa® canisters from each monitoring point. The soil gas samples will be analyzed for VOCs by EPA Method TO-15 (EPA, 1999) using an offsite laboratory.

Two boreholes will be installed to a depth below perched groundwater, approximately 250 ft bgs, using the air rotary/casing hammer (ARCH) drilling method. These boreholes will be installed at locations corresponding to the highest soil gas concentrations detected in the DPT boreholes. Subsurface soil samples will be collected from these boreholes at 20-ft intervals beginning at 120 ft bgs using a split spoon sampler advanced ahead of the drill bit to collect undisturbed soil samples. One subsurface soil sample will also be collected from the bottom of each ARCH borehole to assess contaminant concentrations below the perched groundwater. The split spoon soil samples will be field screened with a photoionization detector (PID) to assess the presence of VOCs. The four soil samples with the highest PID readings will be submitted to the laboratory for analysis. If VOCs are not detected by the PID, then soil samples collected at 120, 160, and 200ft bgs and from the bottom of the borehole will be submitted for laboratory analysis. En Core® samplers will be used to preserve soil samples for VOC analyses. The subsurface soil samples will be analyzed for VOCs by EPA Method SW-846 8260, RCRA 8 metals by EPA Methods SW846 6010B/7470A (EPA, 1996), nitrate/nitrite by EPA 300, ammonia by EPA.350.2, total Kjeldahl nitrogen (TKN) by EPA 351.3 (EPA, 1993), and total organic carbon (TOC) by Walkley-Black (American Society of Agronomy [ASA], 1982).

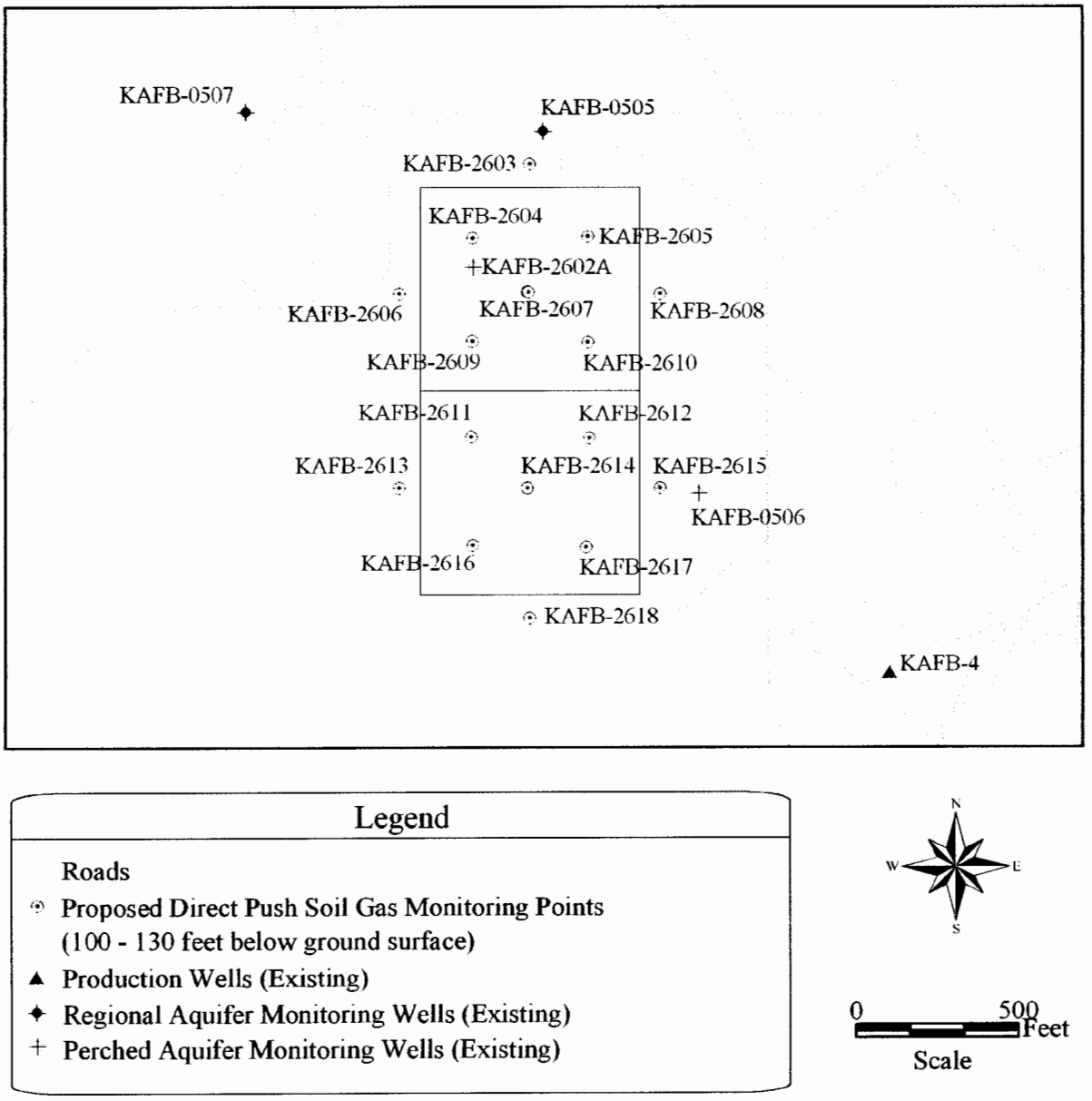

Figure 2-2. Proposed Locations of Soil Gas Monitoring Points for the *Resource Conservation and Recovery Act* Facility Investigation at Solid Waste Management Unit WP-26 Kirtland Air Force Base, New Mexico

The ARCH boreholes will be completed using vadose zone FLUTe™ (Flexible Liner Underground Technologies) systems fitted with four soil vapor monitoring points. The soil vapor monitoring points will be positioned at the depths of the highest PID readings or soil VOC concentrations. The manufacture's description of the vadose FLUTe™ is provided in Appendix C. The FLUTe™ system will be allowed to equilibrate with the subsurface for approximately one to two weeks then soil gas samples will be collected into Summa® canisters. The soil gas samples will be analyzed for VOCs by EPA Method TO-15 (EPA, 1999) using an offsite laboratory.

Based on the results of the soil gas and subsurface soil sampling, additional DPT and/or ARCH boreholes may be installed and sampled as described above. These additional boreholes would be installed to further characterize the aerial or vertical extent of contamination, as needed.

AquaTrack Geophysical Survey

An electric dipole study will be performed to investigate the lateral extent of perched groundwater in and around the former sewage lagoons at Kirtland AFB, New Mexico. AquaTrack is a patented geophysical technology used to map groundwater bodies. A small alternating current is introduced through electrodes placed in wells or in contact with surface water to be mapped. The strength of the resulting magnetic field generated by the flow of current through the water bodies is measured from the ground surface at multiple points in a grid pattern and recorded using a data logger. The locations of the measurements are determined and recorded using an integrated global positioning system (GPS) unit. The magnetic field data are then contoured and correlated to other hydrogeologic data.

The AquaTrack (groundwater mapping) survey will be conducted in and around the former sewage lagoons. The study will consist of energizing the regional aquifer monitoring well KAFB-0505 and the perched aquifer monitoring wells KAFB-2602A and KAFB-0506 (Figure 2-1). The current will follow the perched aquifer bodies and return to the regional aquifer monitoring well. Survey lines will parallel the north-south boundaries of the former sewage lagoons. Field data to be collected will include coordinate locations and strength of the magnetic field created by the dipole. The resultant data will be used to create maps showing the extent of the perched water bodies in and around the former sewage lagoons.

Perched Aquifer Monitoring Well Installation

Based on the results of the soil gas survey and the AquaTrack geophysical survey, two perched aquifer monitoring wells will be installed at locations indicating the presence of TCE in the subsurface and perched groundwater.

Groundwater samples will be collected from the newly installed groundwater monitoring wells and analyzed for VOCs by EPA Method SW-846 8260 (EPA, 1996), nitrate and nitrite by EPA Method 300, ammonia by EPA Method 350.2, and TKN bye EPA Method 351.3 (EPA, 1993).

The proposed scope of work is summarized in Table 2-2. Table 2-3 summarizes the number of QC samples, the analytical parameters, and the example sample identifiers required for this sampling and analysis effort.

Table 2-2. Proposed Sampling for Solid Waste Management Unit WP-26, Former Sewage Lagoons, Kirtland Air Force Base, New Mexico

Data Needs	Investigation Technique	Location	Number of Samples	Analysis	Selected Analytical Option
Determine aerial extent of TCE in soil gas	Install 5 soil vapor monitoring points in 16 direct push technology boreholes	Boreholes will be located in and around the former sewage lagoons	80	VOCs by EPA TO-15[a]	Definitive
Determine presence or absence of TCE, RCRA 8 metals, and nitrogen species in subsurface soil	Collect subsurface soil samples every 20 feet beginning at 120 feet below ground surface from 2 air rotary/casing hammer boreholes	Boreholes will be located in the areas of high soil vapor concentrations as determined by the initial soil vapor sampling.	8	VOCs by SW846 8260[b] RCRA 8 Metals by SW846 6010B/7470A[b] Nitrate/Nitrite by EPA 300[c] Ammonia by EPA 350.2[c] TKN by EPA 351.3[c] TOC by Walkley-Black[d]	Definitive
Determine vertical extent of TCE in soil gas	Install 4 soil vapor monitoring points using FLUTe™ in 2 air rotary/casing hammer boreholes	Boreholes will be located in the areas of high soil vapor concentrations as determined by the initial soil vapor sampling.	8	VOCs by EPA TO-15[a]	Definitive
Determine presence or absence of TCE and nitrogen species in perched groundwater	Collect groundwater samples from 2 perched aquifer monitoring wells	To be determined	2	VOCs by SW-846 8260[b] Nitrate/Nitrite by EPA 300[c] Ammonia by EPA 350.2[c] TKN by EPA 351.3[c]	Definitive

Notes:
[a] EPA, 1999
[b] EPA, 1996
[c] EPA, 1993
[d] ASA, 1982
ASA = American Society of Agronomy
EPA = U.S. Environmental Protection Agency
FLUTe™ = Flexible Liner Underground Technologies
RCRA = Resource Conservation and Recovery Act
TCE = trichloroethylene
TKN = total Kjeldahl Nitrogen
TOC = total organic carbon
VOC = volatile organic compound

Table 2-3. Proposed Sampling and Analyses for Solid Waste Management Unit WP-26, Kirtland Air Force Base, New Mexico

Sample Location	Sample Media	Sample Number[a]	Sample Depth (ft bgs unless otherwise noted)	Sample Analysis	EPA Method[b]
SWMU WP-26	Air	WP26-SG-2603-025027 WP26-SG-2603-050052 WP26-SG-2603-075077 WP26-SG-2603-100102 WP26-SG-2603-125127	25 50 75 100 125	VOCs	TO-15
	Soil	WP26-SB-2615-060062 WP26-SB-2615-120122 WP26-SB-2615-180182 WP26-SB-2615-xxxxxx	120 160 200 Below perched aquifer	VOCs RCRA 8 Metals Nitrate/Nitrite Ammonia TKN TOC	8260 6010B/7470A EPA 300 EPA 350.2 EPA 351.3 Walkley-Black
	Groundwater	WP26-GW-0523-001 WP-26-GW-0524-001	Perched aquifer Perched Aquifer	VOCs Nitrate/Nitrite Ammonia TKN	8260 EPA 300 EPA 350.2 EPA 351.3
Quality control samples[c]					
Field duplicate (collocated) samples[d]	Air	Eight samples to be determined in the field	TBD	VOCs	TO-15
Field duplicate samples[d]	Soil	One sample to be determined in the field	TBD	VOCs RCRA 8 Metals Nitrate/Nitrite Ammonia TKN TOC	8260 6010B/7470A EPA 300 EPA 350.2 EPA 351.3 Walkley-Black
Laboratory QA/QC samples (MS/MSD)[e]	Soil	One MS/MSD samples to be determined in the field	TBD	VOCs RCRA 8 Metals Nitrate/Nitrite Ammonia TKN TOC	8260 6010B/7470A EPA 300 EPA 350.2 EPA 351.3 Walkley-Black
Equipment Blank[f]	Soil	Two samples to be determined in the field	TBD	VOCs RCRA 8 Metals Nitrate/Nitrite Ammonia TKN TOC	8260 6010B/7470A EPA 300 EPA 350.2 EPA 351.3 Walkley-Black
Field duplicate samples[d]	Groundwater	One sample to be determined in the field	TBD	VOCs Nitrate/Nitrite Ammonia TKN	8260 EPA 300 EPA 350.2 EPA 351.3
Laboratory QA/QC samples (MS/MSD)[e]	Groundwater	One MS/MSD sample per analysis to be determined in the field	TBD	VOCs Nitrate/Nitrite Ammonia TKN	8260 EPA 300 EPA 350.2 EPA 351.3
Equipment Blank[f]	Groundwater	One sample to be determined in the field	TBD	VOCs Nitrate/Nitrite Ammonia TKN	8260 EPA 300 EPA 350.2 EPA 351.3

Notes:

[a] *Sample Number*—Denotes site designation-borehole number-sampling interval relative to ft bgs; for example, sample number WP26-SB-2615-060062 would be the soil sample collected at WP26, from soil boring 2615, at sampling interval of 60 to 62 ft bgs.

[b] EPA, 1999; EPA, 1993; EPA 1993; ASA, 1982.

[c] Estimated number of field QC samples.

[d] *Field Duplicate Samples*—A single sample split into two equal portions during a single act of sampling; to assesses the overall precision of the sampling and analysis program; collected at a frequency of 10 percent of the total number of samples. Field duplicate air samples will be collocated meaning that the air sample and duplicate will be collected in series from the same sampling port.

[e] *MS/MSD*—Collected for QA/QC purposes at a frequency of 5 percent of the total number of samples for each media type.

[f] *Equipment Blank*—Collected for verification of proper decontamination procedures.

Table 2-3. Proposed Sampling and Analyses for Solid Waste Management Unit WP-26, Kirtland Air Force Base, New Mexico (concluded)

ASA = American Society of Agronomy
bgs = below ground surface
EPA = U.S. Environmental Protection Agency
ft = foot or feet
MS/MSD = matrix spike/matrix spike duplicate
QA/QC = quality assurance/quality control
RCRA = *Resource Conservation and Recovery Act*
SWMU = solid waste management unit
TBD = to be determined
TKN = total Kjeldahl nitrogen
TOC = total organic carbon
VOC = volatile organic compound

Table 3-1. Laboratory Quality Control Sample Descriptions

Data Type	Media Type	Data Type Definition	Parameters
Definitive	Soil gas	Data that are collected using standard sampling methods[a], as defined in the available and applicable guidance, and using rigorous analytical methods of known precision and accuracy. The data are analyte-specific, with confirmation of both the analyte identity and concentration. The analytical methods provide tangible raw data (such as chromatograms, spectra, and digital values) in the form of paper printouts (hard copies) or electronic files that can be stored and recovered. These data are generated onsite or offsite and meet the method-specific quality control requirements.	EPA Method TO-15[b]
Definitive	Soil	Data that are collected using standard sampling methods[a], as defined in the available and applicable guidance, and using rigorous analytical methods of known precision and accuracy. The data are analyte-specific, with confirmation of both the analyte identity and concentration. The analytical methods provide tangible raw data (such as chromatograms, spectra, and digital values) in the form of paper printouts (hard copies) or electronic files that can be stored and recovered. These data are generated onsite or offsite and meet the method-specific quality control requirements.	EPA MethodSW846 8260[c] EPA Method SW846 6010B/7470A[c] EPA 300[d] EPA 350.2[d] EPA 351.3[d] Walkley-Black[e]
Definitive	Groundwater	Data that are collected using standard sampling methods[a], as defined in the available and applicable guidance, and using rigorous analytical methods of known precision and accuracy. The data are analyte-specific, with confirmation of both the analyte identity and concentration. The analytical methods provide tangible raw data (such as chromatograms, spectra, and digital values) in the form of paper printouts (hard copies) or electronic files that can be stored and recovered. These data are generated onsite or offsite and meet the method-specific quality control requirements.	EPA Method SW-846 – 8260[c] EPA 300[d] EPA 350.2[d] EPA 351.3[d]

Notes:
[a] EPA 1991; EPA, 1989
[b] EPA, 1999
[c] EPA, 1996
[d] EPA, 1993
[e] ASA, 1982
ASA = American Society of Agronomy
EPA = U.S. Environmental Protection Agency

3.2 Quality Assurance/Quality Control

Data quality refers to the level of reliability associated with a particular data set or data point. The data quality associated with environmental measurement data is a function of the sampling plan rationale, the sample collection procedures, and the analytical methods and instrumentation used in making the measurements. The overall QA objective for this project is to develop and implement procedures for field sampling, chain of custody, laboratory analysis, and data reporting that provide data that meet the project-specific DQOs and that are legally defensible.

QA objectives for laboratory measurement data are expressed in terms of the PARCC parameters. Data quality for this project will be assessed in terms of the PARCC parameters. The criteria against which

the data will be assessed are presented in Appendix B. In addition, the corrective action procedures to be followed in case of out-of-compliance calibration or QC sample failure are defined in Appendix B.

The QC samples that will be used to evaluate analytical data for this project are defined in Table 2-3, and their relation to PARCC parameters are described in *Final Base-Wide Plans for Investigations Under the Installation Restoration Program, Kirtland Air Force Base, Albuquerque, New Mexico*, DCQAP, Part II, QAPP Section 4.2 (USAF, 1996).

The frequency of QC sample collection is listed in Table 3-2. The contract laboratories will, at a minimum, analyze internal QC samples at the frequency specified by the analytical method and this RFI work plan.

3.2.1 Data Validation

As described previously, the validity of the field and analytical data will be evaluated using the PARCC parameters, which are statements that describe data quality and quantity. The PARCC parameters will be used to determine whether the DQOs of this investigation have been met by comparing QC sample results and standard procedures with acceptance criteria established for the RFI (Appendix B). For this project, all definitive data will be validated based on the principles outlined in the *National Functional Guidelines for Evaluating Organic and Inorganic Data Review* (EPA, 1994b) and *EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) (EPA, 1996).

3.3 Field Activities

The field activities that will be conducted under this RFI work plan are as follows:

- Install soil gas monitoring points;
- Sample soil gas to develop a horizontal and vertical profile for TCE and its degradation products;
- Sample subsurface soil to assess the presence or absence of TCE and its degradation products, metals, and nitrogen species;
- Install and develop perched aquifer groundwater monitoring wells;
- Survey the horizontal well locations relative to New Mexico State Plane Coordinates;
- Survey the vertical elevations of the wells to the nearest one-hundredth of one inch;
- Sample perched groundwater to determine the extent of TCE impact in the perched aquifer;
- Manage and dispose of investigation-derived waste (IDW).

Specific field activities conducted during the RFI investigation will comply with the SOPs in the *Final Base-Wide Plans for Investigations Under the Installation Restoration Program, Kirtland Air Force Base, Albuquerque, New Mexico* (USAF, 1996) unless modified in this work plan. The activities and applicable SOPs are shown in Table 3-3.

Table 3-3. Standard Operating Procedures for Field Activities

Field Activity	Applicable Standard Operating Procedures[a]
PID operation	SOP A3.9
Field records	Section 9 Volume II DCQAP
Equipment decontamination	SOP A2.1
Sample handling and analysis	Section 7, Volume II DCQAP
Soil and gas investigation	SOP A3.10
Borehole and sample logging	SOP A1.7
Monitoring well installation	SOP A1.8
Monitoring well sampling	SOP A1.2
Subsurface soil sampling	SOP A1.6
IDW management	Volume V of BWP, IDWMP

Notes:
[a] USAF, 1996
BWP = Base-Wide Plans
DCQAP = Data Collection Quality Assurance Plan
IDW = investigation-derived waste
IDWMP = Investigation-Derived Waste Management Plan
PID = photoionization detector
SOP = standard operating procedure

3.3.1 Soil Gas Survey

A soil gas survey will be performed by laying out sampling points in and around the former sewage lagoons. Figure 2-2 shows the proposed sample locations at WP-26. Sixteen boreholes will be installed using DPT. The DPT boreholes will be advanced to the depth of refusal (where friction can not be overcome by the technology), approximately 125 ft bgs.

Five soil vapor monitoring points will be installed in each DPT borehole and allowed to come into equilibrium with the subsurface. Equilibrium is anticipated to take approximately one to two weeks. Soil gas samples will then be collected from the individual monitoring points and be analyzed at an offsite laboratory by EPA Method TO-15 (EPA, 1999).

Two boreholes will be installed using the ARCH drilling method to a depth of approximately 250 ft. These boreholes will be located in the areas of highest soil gas concentrations indicated by the DPT boreholes. The ARCH boreholes will be fitted with a FLUTe™; each FLUTe™ will have four soil vapor monitoring points. Soil gas samples from these boreholes will be collected once the sampling points have reached equilibrium with the subsurface. These samples will be analyzed at an offsite laboratory by EPA Method TO-15 (EPA, 1999).

3.3.2 Soil Sampling

Subsurface soil samples will be collected through a split-spoon barrel retrieved from boreholes drilled with ARCH. Soil sampling and logging will be completed in accordance with SOPs A1.6 and A1.7, respectively, of the base-wide plans FSP (USAF, 1996). Samples will be shipped in containers supplied by the contract laboratory for analysis of VOC, RCRA 8 metals, nitrate/nitrite, ammonia, TKN, and TOC concentrations by EPA methods.

The proposed sampling scheme for SWMU WP-26 is summarized in Table 2-2. Table 3-2 summarizes the QA/QC approach that will determine additional samples required for data validation. Sample site designations will follow the Kirtland AFB guidelines as outlined in Section 4.2.1 of the base-wide plans FSP. The numbering system consists of an alpha-numeric code that identifies the sampling site, medium, location, and a sample depth. The media type codes include SB for subsurface soil, SG for soil gas, GW for groundwater, and FB for field blank. Borehole numbers will be used for the specific location code. Sample depths will be noted by six numbers, with the first three identifying the top of the sampling interval and the second three identifying the bottom of the sampling interval (for example, a sample collected from 25 to 27 ft bgs will be designated as 025027).

3.3.3 AquaTrack Geophysical Survey

An AquaTrack geophysical survey will be conducted to map perched water bodies in and around the former sewage lagoons as described in section 2.2.3.2. Data generated from this survey will be used in determining locations of the perched aquifer groundwater monitoring wells.

3.3.4 Monitoring Well Drilling and Sampling

Monitoring well design will be specific to each well installed under this work plan, allowing for site-specific variations in lithology, sampling, and screened interval. Boreholes will be drilled by the ARCH method, using an 9 5/8-inch-diameter tool, to approximately 220 ft bgs. The perched aquifer wells will be completed within the same zone as the existing monitoring well KAFB-0506. Care will be taken to ensure that the monitoring wells are completed within the correct perched zone and that the perching layer is not breached.

A lithologic log of returned drill cuttings will be prepared for each of the two boreholes. Borehole logs will be recorded on the field log sheets presented in Appendix D. Lithologic descriptions will follow the Unified Soil Classification System /American Society for the Testing of Materials conventions (USAF, 1996). Drill cuttings will be stockpiled on plastic sheeting until a disposal determination is made according to IDW management procedures (Section 4.3).

3.3.4.1 Monitoring Well Casing

Monitoring wells will be completed at the surface in accordance with Kirtland AFB specifications as presented in SOP A1.8 of the Base-Wide Plans FSP. The monitoring wells will not be cased off in the manner described in this SOP. A brief outline of the monitoring well construction is provided in the following paragraphs.

The wells will be constructed using 4-inch-inside diameter (ID), Schedule 80 polyvinyl chloride (PVC) casing with 1-ft silt traps, 10 to 20 ft of slotted screen, and approximately 2 to 3 ft of stickup at the surface. Centralizers will be used to stabilize the well casing within the borehole at 40-ft intervals. Screen length will be determined in the field based on the vertical extent of perched water in the borehole. Recent MWH experience shows that screen lengths of 10 to 20 ft are most effective for monitoring perched groundwater with great care being take not to breach perching layers during drilling. Well completions will be as follows:

- The sand filter pack type will be determined based on field observations and will extend from the bottom of the silt trap to 2 ft above the top of the screen. The filter pack sand will be placed through a tremie pipe. If necessary, a small amount of distilled water may be used to flush the sand down the tremie pipe during placement of the filter pack. Two feet of intermediate sand (sugar sand) will be placed above the filter pack.

- A bentonite seal, 50 ft thick, will be installed above the filter pack through a tremie pipe. The seal will be hydrated with clean potable water in 6-inch lifts. Setup time for the bentonite will be at the discretion of field personnel.

- The annular space above the hydrated bentonite seal will be backfilled with bentonite slurry instead of bentonite-cement grout as specified in the SOP. Bentonite slurries are effective in sealing off groundwater units above the screened and sand-packed intervals of a well. Slurries are less likely to damage the well casing than grout. The bentonite slurry will be installed through a tremie pipe. The bentonite slurry will extend from the bentonite seal to approximately 50 ft bgs.

- The remaining 50 ft of annular space will be filled with bentonite-cement grout consisting of 94 pounds of Portland cement, 3 percent by weight sodium bentonite powder, and 7 gallons of contaminant-free water. The bentonite-cement grout will be placed using a grout pump and tremie pipe to within 5 ft of the land surface. The grout will be allowed to set for at least 24 hours before well development begins.

4.0 PROJECT MANAGEMENT

This section outlines the project management milestones and deadlines, introduces the SSHP, and addresses SOPs and requirements for IDW and community relations.

4.1 Project Scheduling and Reporting Requirements

The proposed schedule for implementation of this investigation is presented in Table 4-1. If additional borehole installations are necessary to define the aerial or vertical extent of contamination the schedule will be revised to reflect the additional investigation.

Table 4-1. Proposed Schedule for *Resource Conservation and Recovery Act* Facility Investigation at Solid Waste Management Unit WP-26

Activity	Duration (calendar days)	Start Date	Finish Date
Preparation of Plans			
Submit draft WP-26 RFI Work Plan to AFCEE/Base		31 March 2004	31 March 2004
Draft WP-26 RFI Work Plan review	70	1 April 2004	10 June 2004
Prepare final WP-26 RFI Work Plan and RTC	35	11 June 2004	16 July 2004
Submit final WP-26 Work Plan to AFCEE/Base/NMED			16 July 2004
Field Investigation			
AquaTrack Geophysical Survey		Completed	17 June 2004
Mobilize soil gas survey equipment	1	20 September 2004	20 September 2004
Install soil vapor monitoring points	21	21 September 2004	11 October 2004
Collect and analyze soil vapor monitoring points	20	4 October 2004	24 October 2004
Mobilize drilling equipment	2	8 November 2004	10 November 2004
Construct and sample vadose zone FLUTes	14	11 November 2004	25 November 2004
Construct and sample WP-26 monitoring wells	14	25 November 2004	8 December 2004
Laboratory Analysis and Data Validation			
Conduct offsite laboratory analysis of soil, soil gas, and groundwater samples	105	4 October 2004	24 December 2004
Validate data	30	25 December 2004	25 January 2004
Document Assessment			
Prepare draft WP-26 RFI Report	90	8 December 2004	8 March 2005
Submit draft WP-26 RFI Report to AFCEE/Base		9 March 2005	9 March 2005
Draft WP-26 RFI Report review	30	9 March 2005	9 April 2005
Prepare final WP-26 RFI Report and RTC	30	10 April 2005	10 May 2005
Submit final WP-26 RFI Report to AFCEE/Base/NMED		10 May 2005	10 May 2005

Notes:
AFCEE = Air Force Center for Environmental Excellence
Base = Kirtland Air Force Base
NMED = New Mexico Environment Department
RFI = *Resource Conservation and Recovery Act* Facility Investigation
RTC = response to comments

4.2 Health and Safety Plan

An SSHP addendum to the Kirtland AFB Base-Wide SSHP (USAF, 1996) has been prepared and is included as Appendix A. Health and safety practices specified in the Kirtland AFB Base-Wide SSHP will be adhered to unless modified by the SSHP addendum.

4.3 Investigation-Derived Waste Plan

Handling and disposing of IDW will follow SOPs included in the IDWMP, Volume V, of the base-wide plans (USAF, 1996).

4.3.1 Drill Cuttings

Soil cuttings recovered during drilling operations are expected to be non-hazardous, native material. Cuttings will be stored on plastic sheeting at the site and secured. During drilling, cuttings will be periodically screened with a PID to assess the presence of VOC contamination. Upon the completion of drilling, a sample will be composited from the cuttings stockpile for analysis to determine a full suite of toxicity characteristic leaching procedure (TCLP) parameters. The full suite of TCLP will include analyses for VOCs, semivolatile organic compounds (SVOCs), the eight RCRA-listed metals (arsenic, barium, cadmium, chromium VI, lead, mercury, selenium, and silver), pesticides, and herbicides. The TCLP results will be used to determine the ultimate disposal options for the drill cuttings.

4.3.2 Decontamination Water and Well Development Water

The drill rig will be decontaminated between each well to reduce or eliminate the possibility of cross-contamination. Decontamination will be conducted on a concrete pad constructed for that purpose. Wastewater from the decontamination pad will be stored in securely covered drums pending the receipt of analytical results for VOCs, SVOCs, and RCRA metals.

Development and purge water will initially be contained, secured, labeled, and held onsite pending receipt of sampling results. If PID field screening during drilling does not indicate the presence of contamination and the groundwater sampling data indicate that the groundwater from the wells is not contaminated, the contained decontamination, purge, and development water will be released to the surface at the site. Prior to release, appropriate notifications will be given and/or permission obtained from involved agencies.

Table B-2. Data Quality Objectives and Data Types/Issues

Sampling Program	Data Quality Objectives and Rationale	Data	Method[a]	Data Type	Data Uses
Soil vapor sampling	Collect soil vapor samples to determine TCE-impacted soil vapor.	VOCs	TO-15	Definitive	Site characterization
Subsurface soil sampling	Collect soil samples to determine TCE-, metals-, and nitrogen-impacted sediments.	VOCs	SW-846 8260B	Definitive	Site characterization
		RCRA 8 Metals	SW-846 610B/7470A	Definitive	
		Nitrate/Nitrite	EPA 300	Definitive	
		Ammonia	EPA 350.2	Definitive	
		TKN	EPA 351.3	Definitive	
		TOC	Walkley-Black	Definitive	
Groundwater sampling	Collect groundwater samples to determine plume boundaries of TCE-impacted groundwater.	Dissolved oxygen	Dissolved oxygen probe	Screening	Site characterization
		Temperature	Digital thermometer	Screening	
		pH	pH probe	Screening	
		Specific conductivity	Conductivity meter	Screening	
		Oxidation-reduction potential	EH meter	Screening	
		Turbidity	Turbidity meter	Screening	
		VOCs	SW-846 8260B	Definitive	
		Nitrate/Nitrite	EPA 300.0	Definitive	
		Ammonia	EPA 350.2	Definitive	
		TKN	EPA 351.3	Definitive	
Water and soil investigation-derived waste	Collect soil and water composite samples to determine waste disposal	VOCs	SW-846 8260B	Definitive	Waste disposal
		SVOCs	SW-846 8270C	Definitive	
		Organochlorine pesticides	SW-846 8081A	Definitive	
		Organochlorine herbicides	SW-846 8151A	Definitive	
		RCRA 8 metals	SW-846 6010B/7470A	Definitive	

Notes:
[a] Analytical Methods:
EPA, 1996; EPA, 1993; EPA, 1999; ASA, 1982
ASA = American Society of Agronomy
EPA = U.S. Environmental Protection Agency
EH = hydrogen electrode
RCRA = *Resource Conservation and Recovery Act*
SVOC = semivolatile organic compound
SW = solid waste
TCE = trichloroethylene
TKN = total Kjeldahl nitrogen
TOC = total organic carbon
VOC = volatile organic compound

- Matrix spike duplicate (soil and groundwater)—5 percent of the total number of samples (that is, 1 matrix spike duplicate sample for every 20 environmental samples collected); and

- Trip blank samples will accompany the empty sample bottles from the laboratory to the site. One set of trip blank samples will be placed in each sample cooler containing sample vials for VOC analysis at the start of each day of sampling and remain in the cooler throughout the day. The trip blanks will then be shipped with the samples to the laboratory. Trip blanks will not be submitted with soil samples.

The QA/QC samples will be analyzed for the same suite of chemical parameters as the environmental samples collected.

The method-specific QC procedures, frequency of QC sample analysis, QC acceptance criteria (control limits), practical quantiation limits (PQLs), and corrective action are included in Attachment 1 of this project-specific QAPP.