SAMPLING AND ANALYSIS PLAN

HARDFILL 49A REMEDIATION ACTION PROJECT NO. JREZ 2000-7005

REMEDIATION OF FUEL CONTAMINATED SITES PROJECT NO. JREZ 2000-7007

GRIFFISS AIR FORCE BASE, NEW YORK

CONTRACT: F41624-01-D-8544
TASK ORDER: 0002
CDRL #A002

PREPARED FOR:

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FEBRUARY 2002

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FINAL

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FEBRUARY 2002

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LIST OF ACRONYMS

AFCEE	Air Force Center for Environmental Excellence
CAR	Corrective Action Request
cfm	Cubic foot per minute
COC	Chain-of-Custody
DT	Data Tracker
eV	Electron Volts
FSP	Field Sampling Plan
FT	Field Sampling Team
GAFB	Griffiss Air Force Base
HASP	Health and Safety Plan
NYSDEC	New York State Department of Environmental Conservation
PID	Photoionization Detector
PPE	Personal Protective Equipment
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
RDWP	Remedial Design Work Plan
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SHSO	Site Health and Safety Officer
SVOC	Semivolatile Organic Compound
VMP	Vapor Monitoring Point
TVH	Total Volatile Hydrocarbon
VOC	Volatile Organic Compound

SECTION 1

INTRODUCTION

1.1 PURPOSE

This Sampling and Analysis Plan (SAP) is comprised of the Field Sampling Plan (FSP) and the Air Force Center For Environmental Excellence (AFCEE) Quality Assurance Project Plan (QAPP), Version 3.1 (August 2001). The FSP describes in detail the sampling and data gathering methods and procedures to be used during the remedial action at Griffiss Air Force Base (GAFB). A detailed description of the site, the site history and background, and a description of the site-related contamination for each area are provided their respective Remedial Design Work Plans (RDWP). This SAP should be used in conjunction with the project QAPP and the AFCEE QAPP to guide all field and laboratory sampling and measurement conducted as part of the pre-design and design activities for the GAFB site. Compliance with these documents ensures that data is collected, reviewed, and analyzed in a consistent manner. Any exception or deviation from this FSP or the AFCEE QAPP shall be done so through a variance and submitted as an addendum to this SAP. Chapter, subtitle, paragraph, page, and line shall identify variances and have appropriate justification for the change. If any additional analytical methods are required that are not included in either the SAP or QAPP, they must be included in the addendum to the SAP with associated quality control requirements. The AFCEE team Chief for the project must approve all variances prior to their inclusion with the SAP.

1.2 SAMPLING OBJECTIVES

The main objective of the field sampling activities is to generate data necessary to:

- Confirm the removal of all material with lead concentrations exceeding the New York State standards in the Hardfill 49A area;
- Confirm the removal of all material with petroleum and metal concentrations exceeding New York State standards in Tank Farms 1 & 3 areas;
- Characterize the degree of pesticide PCB contamination and confirm the removal of all material with concentrations exceeding New York State standards in Nosedock 1 & 2 areas;
- Assess the current contaminant levels prior to start up of the bioventing system in the Apron 1 area;
- Characterize and define the extent and degree of any volatile organic compound (VOC) and semivolatile organic compound (SVOC) contamination in the Pumphouse 1 & 2 areas; and,
- Monitor, on a quarterly basis, post construction soil vapor for VOC contamination in the Apron 1 area, groundwater samples for VOCs and natural attenuation in the

Pumphouse 1 & 2 areas, and soil vapor samples for VOC contamination in the Pumphouse 2 area.

Tables 1.1 and 1.2 provide additional information regarding sampling objectives, sampling data uses, as well as a summary of the samples taken and the analyses performed. The analysis methods mentioned in Table 1.2 are in compliance with methods stated in the AFCEE QAPP.

TABLE 1.1

SAMPLING OBJECTIVES AND DATA USES

Sampling/Monitoring Activity	Objective	Intended Data Usage
Confirmation Soil Sampling	Confirm that New York State and site objectives have been met following excavation in Hardfill 49A, Tank Farms 1 & 3, and Nosedock 1 &2 areas.	Data will be used to confirm these areas have been cleaned to the site objectives, and that remaining soils are acceptable to be left in place.
Soil Sampling at VMP, Monitoring Well, and Vent Well locations.	Further characterize the site conditions and extent of contamination existing onsite.	Data will be used to assist in delineating the contamination limits and in designing the remediation systems.
Groundwater Sampling	Monitor groundwater quality conditions that exist onsite and assist in delineating the extent of contamination that exists at the various areas onsite.	The groundwater sample results will be used in the design of the bioventing system and monitoring natural attenuation.
Soil Vapor Sampling	Is used to provide an initial indication of the extent of contamination in subsurface soils within the bioventing treatment area.	Data will be used to confirm the design of the bioventing system initially, and will measure its effectiveness following implementation.

TABLE 1.2

SUMMARY OF SAMPLES AND ANALYSES

Sample Description	Parameters	Analytical Method
Soil		
Hardfill 49A Confirmation Samples	Lead & other RCRA Metals	SW6010B, SW6020, SW-946 AA, and SW1311, NYOSH 7300
Tank Farms 1 & 3 Confirmation Samples	VOCs	SW8021
Nosedocks 1 & 2 Characterization and Confirmation Samples	Pesticides & PCBs	SW4020 (PCBs by Immunoassay)
Apron 1	VOCs SVOCs	SW8021 SW8270C
Pumphouse 1 Product Recovery Wells	VOCs SVOCs	SW8021 SW8270C
Pumphouse 1 & 2 Monitoring Wells	VOCs SVOCs	SW8021 SW8270C
Pumphouse 2 Wells	VOCs SVOCs	SW8021 SW8270C

Groundwater		
Tank Farms 1 & 3 Quarterly Monitoring Samples	VOCs, SVOCs, ferrous iron, nitrate/nitrite/nitrogen, sulfate, sulfide, total organic carbon (TOC), total dissolved solids (TDS), temperature, dissolved oxygen (DO), turbidity, oxidation-reduction potential and conductivity	SW8021 (VOCs), SW8270C (SVOCs), HACH 8146 (ferrous iron), EPA 353.1 (nitrate/nitrite), SW9035/9036/9038 (sulfate), EPA 9030 (sulfide), SW9060 (TOC), E160.1 (TDS), E170.1 (temperature), E360.1 (DO), E380.1 (turbidity), ASTM D1498 (Redox potential), SW9050A (conductivity)
Pumphouse 1 & 2 Quarterly Monitoring Samples	VOCs/MTBE, and natural attenuation parameters	SW8021 (VOCs), HACH 8146 (ferrous iron), EPA 353.1 (nitrate/nitrite), SW9035/9036/9038 (sulfate), EPA 9030 (sulfide), SW9060 (TOC), E160.1 (TDS), E170.1 (temperature), E360.1 (DO), E380.1 (turbidity), ASTM D1498 (Redox potential), SW9050A (conductivity), E310.1 (Alkalinity), Temperature & pH (field tests)
Soil Vapor		
Nosedock 1& 2 and Apron 1 Area Quarterly Samples	VOCs	SW8021
Pumphouse 2 Quarterly Samples	VOCs	SW8021

SECTION 2

SAMPLING EQUIPMENT AND PROCEDURES FOR FIELD EQUIPMENT DECONTAMINATION, WASTE MANAGEMENT, AND EQUIPMENT CALIBRATION

2.1 FIELD EQUIPMENT CHECKLIST

A general list of equipment necessary for field measurement and sample collection includes:

- Appropriate sample containers (see QAPP);
- Chain-of-Custody seals and record forms;
- Field sample record forms;
- Log book and indelible ink markers;
- Phosphate-free decontamination soaps (such as Alconox), reagent-grade solvents, and deionized water to be used for decontaminating equipment between sampling stations;
- Buckets, plastic wash basins, plastic drop cloths, and scrub brushes to be used for decontaminating equipment;
- Camera and film for use in documenting sampling procedures and sample locations;
- Stakes to identify sampling locations;
- Shipping labels and forms;
- Knife;
- Bubble wrap or other packing/shipping material for sample bottles;
- Strapping tape;
- Clear plastic tape;
- Coolers;
- Duct tape;
- Rope;
- Resealable plastic bags;
- Portable field instruments (photoionization detector (PID), metal detector, combustible gas indicator, conductivity meter, pH/temperature/conductivity

meter, dissolved oxygen meter, redox probe, electronic water level indicator, etc.); and

- Health and safety equipment.

2.2 EQUIPMENT DECONTAMINATION

2.2.1 Drilling Equipment Decontamination

All drilling equipment including drill rigs, augers, bits, rods, tools, split-spoon samplers, and tremie pipe will be cleaned with a water source, and scrubbed with a wire brush to remove dirt, grease, and oil before beginning work. Tools, drill rods, and augers will be placed on sawhorses or polyethylene plastic sheets following steam cleaning. Direct contact with the ground will be prevented. All augers, rods, and drilling tools will be decontaminated at the conclusion of drilling each boring.

2.2.2 Well Materials Decontamination

Monitoring well casing and screens will be decontaminated by the procedures described in Subsection 2.2.1 immediately before installation. The screen and casing will be wrapped in polyethylene plastic following decontamination, and transported from the designated decontamination area to the well location. If the PVC well casings and screens are in factory sealed plastic sleeves, field decontamination will not be necessary.

2.2.3 Sampling Equipment Decontamination

Sample equipment decontamination will be conducted in a decontamination pad when one is readily available, otherwise decontamination will be conducted in buckets on plastic sheeting. Prior to sampling, all bowls, spoons, augers, bailers, and filtering equipment will be washed in potable water and phosphate-free detergent (e.g. Alconox). The sampling equipment will then be rinsed with potable water followed by a distilled water rinse. Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. Sample equipment may also be steam cleaned, if appropriate. Sampling equipment will be wrapped in aluminum foil for storage or transportation from the designated decontamination area to the sample locations. Decontaminated equipment will not be placed directly on the ground surface. In order to minimize the time spent in the field and reduce the opportunity for cross contamination, the sampling team will have sufficient clean equipment available to complete a sampling round without excessive delays.

2.3 MANAGEMENT OF INVESTIGATION DERIVED WASTE

2.3.1 Decontamination Fluids

All steam cleaning and decontamination fluids will be collected in 55-gallon drums or a plastic temporary holding tank and temporarily stored in the onsite storage building. At the end of the field activities, a composite water sample will be collected and analyzed for parameters as required by the disposal facility. The water will then be transported offsite for proper treatment and disposal.

2.3.2 Drill Cuttings

Soil borings will be backfilled with drill cuttings mixed with dry bentonite.

2.3.3 Development Purge and Pumping Water

All development and purge water will be collected in 55-gallon drums or a plastic, temporary holding tank and temporarily stored in the onsite storage building. At the end of the field activities, a composite water sample will be collected and analyzed for parameters as required by the disposal facility. The water will then be transported offsite for proper treatment and disposal.

2.3.4 Personal Protective Equipment

All personal protective equipment (PPE) will be placed in 55-gallon drums and staged for proper disposal.

2.4 FIELD INSTRUMENT CALIBRATION

All field screening and sampling instruments (e.g., temperature-conductivity-pH probes) that require calibration prior to operation will be calibrated daily in accordance with the manufacturer's instructions, and Section 4.3.3, page 4-7 of the AFCEE QAPP. All instrument calibrations will be documented in the project field book and in an instrument calibration log. Instrument operating manuals will be maintained on-site by the field team.

2.5 MAINTENANCE PROCEDURES

2.5.1 Non-Routine Maintenance Procedures

Field equipment will be inspected prior to initiation of fieldwork to determine whether or not it is operational. If it is not operational, it will be serviced or replaced. Batteries will be fully charged or fresh, as applicable.

2.5.2 Routine Maintenance Procedures and Schedules

Field equipment requiring preventive maintenance will be serviced in accordance with written procedures based on the manufacturer's instructions or recommendations. Maintenance will be performed in accordance with the schedule specified by the manufacturer, to minimize the downtime of the measurement system. Qualified personnel will perform maintenance work.

2.5.3 Spare Parts

A list of critical spare parts will be developed prior to the initiation of fieldwork. Field personnel will have ready access to critical spare parts in order to minimize downtime while fieldwork is in progress. In lieu of maintaining an inventory of spare parts, access to critical spare parts may be provided by firms capable of rapid repair or replacement. These firms must be identified prior to initiation of fieldwork.

2.5.4 Maintenance Records

Equipment maintenance logs will be maintained to document maintenance activities and schedules. All maintenance logs will be traceable to a specific piece of equipment. These records may be audited by the QAO to verify compliance.

SECTION 3

SAMPLING EQUIPMENT AND PROCEDURES FOR FIELD MEASUREMENTS AND MONITORING

3.1 AIR MONITORING

Air monitoring will be conducted during all field activities with a Photovac MicroTip HL-2000 (or equivalent) PID equipped with a 10.6 electron volts (eV) lamp. The Photovac MicroTip is capable of ionizing and detecting compounds with an ionization potential of less than 10.6 eV. This accounts for roughly 54 percent to 73 percent of the VOCs on the New York State Department of Environmental Conservation (NYSDEC) ASP Target Compound List and for most of the VOCs detected onsite. The compounds with ionization potentials above 10.6 eV have correspondingly high allowable limits, for example 100 ppm for 1,1-DCA and 350 ppm for 1,1,1-TCA. The PID will be used to monitor for VOCs in the breathing zone and in boreholes, and to screen samples for analysis. PID sampling will be conducted in locations where petroleum contamination is suspected or known to exist.

Method

- The PID will be calibrated at the beginning and end of each day of use with a standard calibration gas of a concentration within the expected range of use. The calibration gas, which is most often used, has an approximate concentration of 100 ppm of isobutylene.
- If abnormal or erratic readings are observed, additional calibration will be required.
- All calibration data will be recorded in field notebooks and on calibration log sheets to be maintained on-site.
- The PID will be used to monitor the breathing zone and the borehole during drilling. Action levels are specified in Table 1 of the Health and Safety Plan (HASP).
- The PID will also be used to screen samples and sample headspace.
- PID readings will be recorded in the field book and on the drilling record during drilling activities.
- A battery check will be completed at the beginning and end of each working day, and the battery will be checked for proper voltage.
- Detailed procedures for operation of the PID are included in Table 1 of the HASP.

Monitoring for organic vapors in the breathing zone will be conducted with a PID. A Draeger bellows equipped with the appropriate tubes will be used to monitor for benzene. Additionally, at those sites where there is a potential for inhalation of PCBs and Lead in dust, a MINI-RAM dust monitor will be used to monitor for particulates in the air. Readings with the PID and/or the MINI-RAM will be taken under the following circumstances.

- Upon initial entry onto the site, and repeated approximately every four hours during continuous exposure.
- When weather conditions change.
- When work begins on another portion of the site.
- Every five feet during drilling.

Because of the grinding involved with drilling, there is a potential for sparks to be generated. Since some of the compounds potentially present at the site are combustible, it will be necessary to monitor for combustible gasses. A combustible gas meter will be used to monitor during all drilling activities. Guidelines have been established by the National Institute for Occupational Safety and Health (NIOSH) concerning the action levels for work in a potentially explosive environment. These guidelines are as follows:

- 10% LEL - Cease all activities in order to allow time for the combustible gases to vent. If the combustible gases in the well/bore hole are not diminished after allowing adequate time to vent, then the following steps should be taken:
- Obtain an air compressor (minimum 1.5 horsepower)
- Place the compressor a safe distance from the well (at least 20 ft.). This precaution is necessary since the compressor itself is an ignition source.
- Place hose into the well/hole until it reaches bottom.
- Run compressor for 15 minutes.
- Measure the percent LEL in the well/hole. If the reading continues above 10% LEL, continue to run the compressor. If levels are below 10% LEL, continue to monitor the well/hole for 5 minutes; if readings remain below 10% LEL, resume work, and continue to monitor.

Although a risk analysis has been performed for airborne lead exposure at the Hardfill 49a site, personal monitoring will be performed for certain employees who have the highest potential for exposure to airborne lead. Personal monitoring for airborne lead at the Hardfill 49a site will be completed as follows:

- Personal air sampling pumps (SKC-Aircheck 52 model vacuum pump rated for 1-2 l/min of airflow through self enclosed canisters containing filter media or equivalent) will be placed on two employees who have the highest potential for

exposure to airborne lead for a period of two consecutive days (two 8-10 hour shifts) at the start of intrusive excavation activities.

- Samples will be sent to a certified laboratory for a total lead analysis. An 8-hour Time Weighted Average (TWA) will be determined based on the total airflow recorded during the shift monitoring and total lead results. Air monitoring results will be determined within 5 days of receipt of analytical results.
- PPE levels will be based on this exposure assessment.
- Personal air sampling will be employed when other activities at the site are initiated that may result in an additional risk to employees to airborne lead.

3.2 WATER LEVEL MEASUREMENT

The following procedures will be used to measure static groundwater levels in monitoring and observation wells:

- The cap on the monitoring well will be opened and the breathing zone above the opening of the casing will be screened for organic vapors with a PID.
- The total depth of the well will be measured with a decontaminated tape measure.
- The static water level in each monitoring or observation well will then be measured with a decontaminated electronic water level indicator.
- The water level will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the casing.
- The well depth and water level measurement will be recorded in the field book.

SECTION 4

SAMPLING EQUIPMENT AND PROCEDURES FOR FIELD SAMPLE COLLECTION

4.1 INTRODUCTION

Procedures for obtaining samples of various environmental media are described in this section. Sample handling and procedures are described in Section 7.

4.2 CONFIRMATORY SOIL SAMPLES

The following procedure will be used to collect confirmatory samples.

Sampling Method

- Composite samples will be collected from designated areas from a depth of 0 to 6 inches and with a decontaminated stainless-steel trowel or if underwater, with a decontaminated hand auger.
- A piece of polyethylene sheeting will be cut to a size sufficient to place the stainless steel bowl, spoon, and sediment from one hand-auger bucket.
- Soil samples will be visually described for: 1) soil type, 2) color, 3) moisture content, 4) texture, 5) grain size and shape, 6) consistency, 7) visible evidence of staining, and 8) any other observations.
- Each sediment sample will be screened with a PID for organic vapors.
- Samples will be collected directly from the sampling device, placed into a stainless steel bowl, composited, homogenized, and placed in an appropriate container for onsite analysis or shipment to the laboratory.
- Samples collected for VOC analysis will be placed in "zero headspace" jars immediately.
- Chain-of-custody procedures will be followed as outlined in Section 5.3 of this Plan.
- The trowel or hand auger will be decontaminated between samples in accordance with procedures described in Section 2
- Soil remaining after sampling will be used to backfill the hole.
- Sample locations will be staked and labeled with the location number.
- Sample description, depth, and location will be recorded on the Soil Sampling Record (Figure 4.1) and in the field book.

4.3 SUBSURFACE GEOTECHNICAL SOIL SAMPLES FROM SPLIT-SPOONS

Subsurface soil samples will be collected during drilling of the soil borings. Drilling and logging methods for soil borings are described in Section 5. Subsurface soil samples for laboratory analyses will be collected using the following techniques:

Sampling Method

- Each split spoon sample will be placed in a 16-ounce driller's jar and staged for possible geotechnical analysis. The geotechnical analyses require as much soil as possible so the entire contents of each split spoon will be placed in the driller's jars.
- Chain-of-custody procedures will be followed.
- The sampling equipment will be decontaminated between samples in accordance with procedures described in Section 2.
- Sample description, depth, and location will be recorded in the field book and on the drilling record.
- Soil sampling data will be recorded in the Soil Sampling Record (Figure 4.1) as well as in the field-sampling book.

4.4 GROUNDWATER SAMPLES

The following procedure will be used to collect groundwater samples from selected wells:

Sampling Method

- The electric water level probe will be decontaminated with a detergent solution, tap water rinse, and distilled water rinse.
- The static water level will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the casing. The measurement will be recorded in the field book.
- The well will be purged by removing a minimum of three well volumes of water. Purging will be conducted with either a dedicated teflon bailer, a Waterra™ positive displacement pump equipped with dedicated tubing or a decontaminated submersible pump depending on the well yield. If a well goes dry before the required volumes are removed, it will be allowed to recover, purged a second time, and sampled when it recovers sufficiently.
- The turbidity of the water will be measured with a portable nephelometer. If the turbidity increases during purging, a different purging technique, such as low flow pumping, will be utilized.

- Samples will be collected with a bottom loaded bailer. Temperature, pH, and conductivity will be recorded in the field book.
- Well sampling data will be recorded on the Groundwater Sampling Record shown in Figure 4.3.

4.5 SOIL VAPOR SAMPLES

The following procedure will be used to collect soil vapor from selected vapor monitoring points:

Sampling Method

- Samples will be collected with a 1 cubic foot per minute (cfm) vacuum pump and 5-liter Tedlar® bags.
- The VMP will be purged of stagnant soil gas using the vacuum pump immediately prior to sampling. A PID will be used to continuously sample the purge stream in order to monitor the total volatile hydrocarbon (TVH) levels during each sampling event.
- Once TVH levels have stabilized, samples will be taken for laboratory analysis in the Tedlar® bag using a vacuum chamber.
- Soil Vapor sampling data will be recorded in the Soil Vapor Sampling Record shown in Figure 4.4.

4.6 AIR SAMPLES

The following procedure will be used to collect air samples for dust from selected collection points:

Sampling Method

- Samples will be collected with a SKC-Aircheck 52 model vacuum pump or equivalent rated for 1-2 l/min of airflow, and 37 mm diameter self-enclosed canisters containing filter media.
- Pumps will run and samples will be collected during work hours at locations specified by the Site Health and Safety Officer (SHSO). Canisters will be collected following sampling and sent to the laboratory for analysis. Sampling duration will range from 2 to 8 hours depending on dust levels.
- Sampling frequency and locations are discussed in the site-specific Work Plan.
- Air sampling data will be recorded in the Air Sampling Record shown in Figure 4.5.
- Calibration of sampling equipment will be recorded in the Industrial Hygiene Sampling Worksheet in Figure 4.6.

4.7 FIELD QUALITY CONTROL SAMPLES

4.7.1 Ambient Blank

The ambient blank consists of ASTM Type II Reagent-Grade water poured into a VOC sample vial at the sampling site. It is handled like an environmental sample and transported to the laboratory for analysis. Ambient blanks are prepared only when VOC samples are taken and are analyzed only for VOC analytes.

Ambient blanks are used to assess the potential introduction of contaminants from ambient sources (e.g., active runways, engine test cells, gasoline motors in operation, etc.) to the samples during sample collection. Ambient blanks shall be collected downwind of possible VOC sources. Ambient blanks will be collected if requested by the NYSDEC.

4.7.2 Equipment Blank

An equipment blank is a sample of ASTM Type II Reagent-Grade water poured into or over or pumped through the sampling device, collected in a sample container, and transported to the laboratory for analysis. Equipment blanks are used to assess the effectiveness of equipment decontamination procedures. The frequency of collection for equipment blanks shall be one for every set of 20 field samples. Equipment blanks shall be collected immediately after the equipment has been decontaminated. The blank shall be analyzed for all laboratory analyses requested for the environmental samples collected at the site.

4.7.3 Trip Blank

The trip blank consists of a VOC sample vial filled in the laboratory with ASTM Type II Reagent-Grade water, transported to the sampling site, handled like an environmental sample and returned to the laboratory for analysis. Trip blanks are not opened in the field. Trip blanks are prepared only when VOC samples are taken and are analyzed only for VOC analytes. Trip blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. One trip blank shall accompany each cooler of samples sent to the laboratory for analysis of VOCs.

4.7.4 Field Duplicates

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned an identification number in the field such that they cannot be identified (blind duplicate) as duplicate samples by laboratory personnel performing the analysis. Specific locations are designated for collection of field duplicate samples prior to the beginning of sample collection.

Duplicate sample results are used to assess precision of the sample collection process. Precision of soil samples to be analyzed for VOCs is assessed from collocated samples because the compositing process required to obtain uniform samples could result in loss of the

compounds of interest. The frequency of collection for field duplicates shall be one for every set of 20 field samples.

4.7.5 Field Replicates

A field replicate sample, also called a split, is a single sample divided into two equal parts for analysis. The sample containers are assigned an identification number in the field such that they cannot be identified as replicate samples by laboratory personnel performing the analysis. Specific locations are designated for collection of field replicate samples prior to the beginning of sample collection. Replicate sample results are used to assess precision. Field replicates will be collected if requested by the NYSDEC.

4.7.6 Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) is an aliquot of samples spiked with known concentrations of specific analytes. The spiking occurs prior to sample preparation and analysis. Each analyte in the MS and MSD shall be spiked at a level less than or equal to the midpoint of the calibration curve for each analyte. The MS/MSD shall be designated on the chain of custody.

The MS/MSD is used to document the bias of a method due to sample matrix. Thus, for soil samples, laboratories may use the same container for the parent, the MS sample and the MSD sample (except for VOAs), if there is enough sample. The sample replicates will be generated in the field, to be used by the laboratory to prepare the appropriate MS/MSDs. A minimum of one MS and one MSD shall be collected for every 20 field samples collected.

FIGURE 4.1

PARSONS
SOIL SAMPLING RECORD

SITE NAME: Griffiss Air Force Base

PROJECT NUMBER: 740881

SAMPLE NUMBER: _____ _____

DATE: _____ _____

SAMPLERS: _____ of Parsons

_____ of Parsons

DESCRIPTION OF SAMPLING POINT

Sample Location: _____

Water Depth: _____

Sample Depth: _____

Sampling Method: _____

SAMPLE DESCRIPTION

Color: _____

Odor: _____

Other: _____

Sample Analyzed for: _____

QC Samples at this Location: _____

QC Samples Analyzed for: _____

FIELD MEASUREMENTS

Temperature (C/F): _____ VOCs (PID ppm) _____

pH: _____

SAMPLE CUSTODY

Chain of Custody Number: _____ Laboratory: _____

Shipped Via: _____ Airbill Number: _____

COMMENTS _____

_____

FIGURE 4.2

Contractor:					**PARSONS** DRILLING RECORD	BORING/ WELL NO.	Sheet of
Driller:						Location Description:	
Inspector:					PROJECT NAME:		
Rig Type:					PROJECT NUMBER:		
GROUNDWATER OBSERVATIONS					Weather:	Location Plan	
Water Level					Date/Time Start:		
Date							
Time					Date/Time Finish:		
Meas. From							

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
GP = GEOPROBE - DIRECT PUSH

COMMENTS:

FIGURE 4.3

PARSONS
GROUNDWATER SAMPLING RECORD

SITE NAME: Griffiss Air Force Base
PROJECT NUMBER: 740881

SAMPLE NUMBER: _____ WEATHER: _____
DATE: _____ TIME: _____

SAMPLERS: _____ of _____
_____ of _____

DESCRIPTION OF SAMPLING POINT

Sample Location: Monitoring well MW-
Screen/Sample Depth: _____
Sampling Method: _____

GROUNDWATER PURGING

Initial Static Water Level: _____

One Well Volume:					3 Volumes
2-Inch Casing:	____	Feet of Water x 0.16 Gallons/Foot =	____	Gallons	____
3-Inch Casing:	____	Feet of Water x 0.36 Gallons/Foot =	____	Gallons	____
4-Inch Casing:	____	Feet of Water x 0.65 Gallons/Foot =	____	Gallons	____

Volume of groundwater purged: _____ Gallons
Purging Device: _____
Purge Water Disposition (e.g., contained): _____

SAMPLE DESCRIPTION

Color: _____
Odor: _____
Other: _____
Sample Analyzed for: _____
QC Samples at this Location: _____
QC Samples Analyzed for: _____

FIELD MEASUREMENTS

Temperature (C/F): _____ Dissolved Oxygen: _____
pH: _____ Eh (Redox Potential): _____
Conductivity (µohms/cm): _____
Turbidity (NTU): _____

SAMPLE CUSTODY

Chain of Custody Number: _____ Laboratory: _____
Shipped Via: _____ Airbill Number: _____

COMMENTS _____

FIGURE 4.4
SOIL VAPOR SAMPLING RECORD
PARSONS

Inspector:	_____	**Weather:**	_____
Date:	_____	**Temperature:**	_____
Time:	_____	**Barometric Pressure:**	_____

Blower Inspection and Maintenance:

BLOWER FUNCTIONING UPON ARRIVAL (YES OR NO)	BLOWER TEMP. (DEG F)	BLOWER PRESSURE (PSI)	AIR INTAKE FILTER CLEANED/ CHANGED ?	PRESSURE SENSOR/ AUTODIALER CHECKED?		COMMENTS

Injection Well Air Flow Inspection and Monitoring:

WELL LOCATION	VALVE POSITION (% OPENED)	DIFFERENTIAL PRESSURE (" H20)	AIR FLOW RATE (SCFM)			COMMENTS
Total System Flow Rate:						

System Performance Monitoring:

VAPOR MONITORING POINT LOCATION	OXYGEN (%)	CARBON DIOXIDE (%)	TOTAL VOLATILE HYDROCARBON (PPM)	PRESSURE ("H_20)	TEMPERATURE ($^{\circ}F$)	COMMENTS

Sample Custody:

Chain of Custody Number: _____
Shipped Via: _____
Laboratory: _____
Airbill Number: _____

Comments: _____
_____

FIGURE 4.5

PARSONS

Air Sampling Data Sheet

Client: Griffiss AFB

Location: Rome, NY

Date: _____

Job # 740881

Sampled By:

Activity	Location	PID/Dust Reading	Time	Comments, Corrective Action Taken:

Comments: Weather, Wind direction

Figure 4.6

PARSONS

Industrial Hygiene Sampling Worksheet

Client: Griffiss AFB

Job #740881

Location: Rome, NY

Sampled By:

Date:

Analyte(s):

Sample ID	Location/Person	Pump ID	Flow Before ( )	Flow After ( )	Avg. Flow ( )	Time On	Time Off	Elapsed Time	Volume ( )	Sample Type*	Pump Clock

*P = personal sample
WA = Work Area sample
PST = Personal Short Term
B = Sample Blank
R = Respirable

Comments: Weather outside,

SECTION 5

SAMPLE HANDLING AND ANALYSIS

5.1 SAMPLE DESIGNATION

Each sample will be given a unique alphanumeric identifier in accordance with the classification system shown in Table 5.1. Duplicate samples will be assigned identifiers that do not allow the laboratory to distinguish them as duplicates. Each sample container will be labeled prior to packing for shipment. The sample identifier, site name, date and time of sampling, and analytical parameters will be written on the label in waterproof ink and recorded in the field book.

5.2 SAMPLE CONTAINERIZATION, PRESERVATION AND ANALYSIS

Sample containerization, holding time requirements, and preservation requirements are listed in Table 5.1.2-1 of the AFCEE QAPP. Field handling and storage of samples and sample containers is described in Section 5.2 of the AFCEE QAPP. Analytical methods for sample analyses are listed in Section 6.0 of the QAPP.

5.3 CHAIN OF CUSTODY

A Chain-of-Custody (COC) record (Figure 5.1) will accompany the sample containers during selection and preparation at the laboratory, during shipment to the field, and during return shipment to the laboratory. The COC will identify each sample container and the analytical parameters for each, and will list the field personnel that collected the samples, the project name and number, the name of the analytical laboratory that will receive the samples, and the method of sample shipment. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample shipment.

Method

- Field personnel will complete the COC as samples are collected and packed for shipment.
- Erroneous markings will be crossed-out with a single line and initialed by the author.
- The REMARKS space will be used to indicate if the sample is a matrix spike, matrix spike duplicate, or matrix duplicate.
- Trip and field blanks will be listed on separate rows.
- The blind duplicate will not indicate sample location.

- After the samples have been collected and sample information has been listed on the COC form, the method of shipment, the shipping cooler identification number(s), and the shipper air bill number will be entered on the COC.
- Finally, a member of the sampling team will write his/her signature, the date, and time on the first RELINQUISHED BY space. Duplicate copies of each COC must be completed.
- Sampling personnel will retain one copy of the COC. The other copy and the original will be sealed in a plastic bag and taped inside the lid of the shipping cooler.
- Sample shipments going to chemical analytical laboratories will be refrigerated at 4°C, typically by packing with ice, to preserve the samples during shipment. Samples going to geotechnical labs for geotechnical analyses will not require refrigeration.
- After the shipping cooler is closed, custody seals provided by the laboratory will be affixed to the latch and across the front and back of the cooler lid, and signed by the person relinquishing the samples to the shipper.
- The seal will be covered with clear tape, and the cooler lid will be secured by wrapping with packing tape.
- Then the cooler will be relinquished to the shipper, typically an overnight carrier.
- The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Parsons Project Manager, and the samples will not be analyzed.
- The chemical analytical samples must be delivered to the laboratory within 48 hours of collection.

5.4 SAMPLE DOCUMENTATION

The field team leader will retain a copy of the COC, and, in addition, the field team leader will ensure that the following information about each sample is recorded in the field book:

- Sample identifier;
- Identification of sampled media (e.g., soil, sediment, groundwater);
- Sample location with respect to known reference point;
- Physical description of sample location;
- Field measurements, (e.g., pH, temperature, conductivity, and water levels);
- Date and time of collection;
- Sample collection method;

- Volume of groundwater purged before sampling;
- Number of sample containers;
- Analytical parameters;
- Preservatives used; and
- Shipping information:
  - Dates and method of sample shipments,
  - Chain-of-Custody Record numbers,
  - Shippers Air Bill numbers, and
  - Sample recipient (e.g., laboratory name).

5.5 SAMPLE TRACKING

Parsons will use an in-house tracking system to monitor sampling schedules, and the progress of laboratory analytical work and reporting, and to assist in performing contract compliance screening and data validation. The system tracks the following information for each sample: sample identifier, sample medium, sampling date, analytical parameters, sample delivery group (SDG) designations for samples, and laboratory report due date.

The sample tracking system consists of the following procedures:

1. A Data Tracker (DT) will be assigned to each sampling event. The DT will provide sequentially numbered COC forms to the field sampling team (FT), and maintain a COC log. The FT will sign-out the COC forms prior to sampling.
2. The FT will ship the white (original) and yellow copy of the completed COCs to the laboratory with the field samples. The serial numbers of all the COCs that were either sent to the laboratory or voided will be recorded in the field book.
3. The FT will return: (1) pink copies of the COC forms that were sent to the lab; (2) voided COCs; and (3) any unused COCs to the DT. The DT will maintain a file of the completed COCs for each project, and will keep an inventory of all the numbered COCs.
4. The DT will enter the following information into the COC log: (1) all COC numbers (including voided or unused numbers); (2) names of FT members; (3) site name; (4) project number; (5) sampling date; (6) shipping date; (7) number of samples per matrix; (8) analytical parameters requested; and (9) the laboratory name, address, and phone number.
5. The DT will call the laboratory on the work day following receipt of the COCs to confirm the time, date, and condition of the samples shipped; to determine laboratory SDG identifiers; and to confirm the contract-required due-date for receipt of analytical results.

6. The DT will use an electronic spreadsheet and database program to generate a Sample Tracking Report monthly, or more frequently if necessary. The database allows sampling data to be sorted by site name, project number, sampling dates, laboratory, and laboratory name.
7. The Project Manager or a designated representative will maintain day-to-day contact with the laboratory to monitor the progress of analytical work.
8. The DT will contact the Parsons Project Manager every Friday to determine the status of analytical work, and to confirm the dates for contract compliance screening and data validation.
9. The Project Manager will deliver sample analytical results received from the laboratory to the DT for contract compliance screening, and to the data validator for validation as specified elsewhere in this document. The Project Manager will retain the shipping receipt to document the date of receipt, and forward the shipping receipt to the data validator with the analytical package.

TABLE 5.1
TYPICAL SAMPLE DESIGNATIONS

SAMPLE IDENTIFIER:

Sample Type	Sample Number	Depth Code	QC Identifier
LL	NN	L	LL

L = Letter
N = Number

SAMPLE TYPES:

Solid	Water
SD – Sediment	GW – Groundwater
SS - Surface soil	SW - Surface Water
SB - Subsurface soil from soil boring	DW - Drill Water/Decon Water

SAMPLE NUMBER: Number referenced to a sample location map. Samples are numbered consecutively beginning with the next number following any previous samples.

DEPTH CODE: Depth in feet of sample interval:

A=0 to 2 feet; B=2 to 4 feet, etc.

a=0 to 12 inches, b = 12 to 24 inches, etc.

QC IDENTIFIER:
FB - Field Blank
TB - Trip Blank
WB - Wash Blank
MS - Matrix Spike
MD - Matrix Spike Duplicate
MB - Matrix Blank

5.6 TRADITIONAL GRIFFISS SAMPLE DESIGNATIONS

The site identification numbering system for samples collected at GAFB is summarized below. Individual samples will be identified by a unique alphanumeric code. Normal field samples (non-quality control) will be numbered according to the following convention:

T10 = the Petroleum Spill Site number or abbreviation (three-digit alphanumeric)
M = the sample type, monitoring well groundwater sample (one character)
02 = the sample location number, 2 (two-digit number)
20 = the sample depth, 20 feet (two-digit number)
A = sampling round, A (one number)
B = QA/QC, primary sample (one character)

The partial list of abbreviations for the remaining open Petroleum Spill Sites at GAFB are as follows:

TF1/3 = Tank Farms 1 and 3
ND1/2 = Nosedocks 1 and 2
779 = Building 779 (Pumphouse 2)
781 = Building 781 (Pump House 1)
LE, HE, 782 = Apron 1
AP2 = Apron 2

The sample type codes for this project include:

M = groundwater sample from monitoring well

T = groundwater sample from temporary well point such as Geoprobe®

The QA/QC characters include:

A = Primary Sample

B = Primary Sample

C = Field Duplicate sample

D = Matrix Spike Duplicate (MSD)

E = Equipment blank

F = Ambient blank

P = Performance evaluation sample

R = Trip blank

S = Matrix Spike (MS)

X = Resample of confirmation

e.g.: T10M0220AB represents a primary groundwater sample obtained at a depth of 20 feet from MW-02 at the T-10 Petroleum Spill Site during the first sampling round.

CHAIN OF CUSTODY RECORD

COC#:_____ SDG#:_____ Cooler ID:_____

Ship to: ATTN: Bud Gibson ECC Laboratories 6954 Cornell Road, Suite 300 Cincinnati, OH 45242	Project Name: Griffiss AFB Petroleum Spill Sites Sampler Name:	Send Results to: Matt Millias Parsons 290 Elwood Davis Road Suite 312 Liverpool, NY 13090 Phone: (315) 336-7721
Carrier: FED Ex Airbill #:	Sampler Signature:	

Analyses Requested

Field Sample ID	Location ID (LOCID)	Date 2001	Time	MATRIX	SMCODE	SBD/SED	SACODE	Preservative	Filt./UnFilt.	No. of Containers	SW 8021 VOCs (HCl preserv.)	Sw 8270 SVOCs	Comments
		/				0/0			Unf.				
		/				0/0			Unf.				
		/				0/0			Unf.				
		/				0/0			Unf.				
		/				0/0			Unf.				
		/				0/0			Unf.				
		/				0/0			Unf.				
		/				0/0			Unf.				

Sample Condition Upon Receipt at Laboratory: Cooler temperature:

Special Instructions/Comments: Analyses to be conducted in compliance with AFCEE QAPP 3.1
SW 8021: VOC analysis including Naphthalene
SW 8270: SVOC analysis

#1 Released by: (Sig)	Date:	#2 Released by: (Sig)	Date:	#3 Released by: (Sig)	Date:
Company Name:	Time	Company Name: FPM	Time	Company Name:	Time
#1 Received by: (Sig)	Date	#2 Received by: (Sig)	Date	#3 Received by: (Sig)	Date
Company Name:	Time:	Company Name:	Time:	Company Name:	Time:

SACODE
N = Normal Sample
AB = Ambient Blank
TB = Trip Blank
EB = Equipment Blank
FR = Field Replicate
MS = Matrix Spike
SD = Matrix Spike Duplicate

MATRIX
WG = Ground water
WQ= Water Quality Control Matrix
SO = Soil

SMCODE
B = Bailer
G = Grab (only for EB).
NA = Not Applicable (only for AB/TB).

SECTION 6

SAMPLING QA AUDITS

6.1 SAMPLING QA AUDITS

Sampling quality assurance (QA) audits may be conducted to verify that fieldwork is conducted in accordance with the procedures specified in this document. The QA audits will be performed by the approved quality assurance officer (QAO) or a qualified designee under the direction of the QAO. The designee will not have responsibility for the project work associated with the audit.

Sampling QA audits will include, but will not be limited by, review of the following items:

- Decontamination procedures;
- Sampling procedures;
- Sampling container cleanliness, size, and material;
- Sample identification (labels and COC);
- Sample handling, preservation, and shipping;
- Sample tracking;
- Maintenance and calibration of sampling equipment; and
- Corrective action.

An audit report must be submitted to the Parsons Project Manager within 15 days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. This may be accomplished by issuing a Corrective Action Request (CAR) (Figure 6.1). The CAR identifies the out-of-compliance condition, reference documents, and recommended corrective action. The CAR will be issued to the individual(s) responsible for the noncompliance and to the Project Manager. The individual to whom the CAR is addressed will respond by writing a brief description of the cause and corrective action required in the appropriate area on the CAR, sign and date the response, and return the CAR to the QAO.

The Project Manager will be responsible for ensuring that all required corrective actions identified during an audit are acted upon promptly and satisfactorily. The QAO or a qualified designee will verify and document that satisfactory corrective action has been taken. All audit checklists, audit reports, audit findings, and acceptable resolutions will be approved by the QAO. Then the QAO will close the audit. The QAO will maintain a status log for CARs, and the CARs will be retained in the project file.

6.2 RECORD MAINTENANCE

A project file will be established to retain the documents and records generated during the project. Field records will be stored in the project file when not in use. At the conclusion of the work assignment the project file will be archived.

Field records that must be retained in the project files include:

- Field books,
- Chain-of-Custody forms,
- Site photographs, and
- QA audit reports.

A designated Parsons equipment manager will retain equipment calibration and maintenance records for at least as long as the project files are retained.

FIGURE 6.1

PARSONS

Log Number_____

CORRECTIVE ACTION REQUEST

☐ Corrective Action Request

☐ "I Could Do My Job Better If"

Part "A" to Part "C" to be Completed by Originator

PART A – Statement of problem and impact – identify and work processes or measurable items:

PART B – Suggested solution:

PART C – How I can participate in the suggested solution:

Originator: _____ Ext.: _____ Location: _____

Please print or type this CAR Form. Submit the completed form to your Project/Department/Division Quality Coordinator.