FINAL

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SAMPLING AND ANALYSIS PLAN

3d Inf Div (Mech)

SOIL GAS SURVEY FOR BULK FUEL FACILITY (HAA-09) HUNTER ARMY AIRFIELD, GEORGIA

Prepared for

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract No. DACA21-95-D-0022
Delivery Order 0033

January 1999

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SAIC®

DOCUMENT 2

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FOR THE
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Prepared for

U.S. Army Corps of Engineers
Savannah District
Savannah, Georgia
Under Contract Number DACA21-95-D-0022
Delivery Order Number 0033

Prepared by

Science Applications International Corporation
P.O. Box 2502
800 Oak Ridge Turnpike
Oak Riodge, Tennessee 37831

January 1999

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

SAMPLING AND ANALYSIS PLAN

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List of Acronyms and Abbreviations

ACE	Anderson Columbia Environmental, Inc.
AST	aboveground storage tank
BFF	Bulk Fuel Facility
bgs	below ground surface
bls	below land surface
CCQC	Contractor Chemical Quality Control
CoC	chain of custody
CQC	Chemical Quality Control
CX	Center of Excellence
DCQCR	Daily Chemical Quality Control Report
DOT	U.S. Department of Transportation
DQO	data quality objective
DRO	diesel range organics
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
FY	fiscal year
GA EPD	Georgia Environmental Protection Division
GRO	gasoline range organics
HAAF	Hunter Army Airfield
IDW	investigation-derived wastes
LIMS	Laboratory Information Management System
NCR	Nonconformance Report
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
STL	Soil Threshold Level
TPH	Total Petroleum Hydrocarbons
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
VOC	volatile organic compound

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FIELD SAMPLING PLAN

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1.0 PROJECT DESCRIPTION

This Field Sampling Plan (FSP) was prepared for the Soil Gas Survey to be conducted at the Bulk Fuel Facility (HAA-09) (BFF) located on the northwest boundary of Hunter Army Airfield (HAAF), Chatham County, Georgia. Accidental releases of petroleum products are known to have occurred at the BFF; however, documentation of these incidences were not maintained. This Field Sampling Plan has been designed to identify areas at the BFF where significant petroleum concentrations exist. In addition, the nature and extent of petroleum contamination in Lamar Canal from the BFF downstream to the crossing of the canal and Perimeter Road will be determined by collecting surface water and sediment samples.

1.1 SITE LOCATION AND DESCRIPTION

HAAF is located in Chatham County, Georgia, within the southwest portion of Savannah (Figure 1-1). The Installation is bounded to the north by the city of Savannah, to the south and east by residential and light commercial areas, and to the west by the Little Ogeechee River. The Installation currently serves as an aircraft support base for Fort Stewart Army Reservation and the U.S. Coast Guard.

The HAAF BFF is located near the northwestern boundary of HAAF (Figure 1-2). The facility's dimensions are approximately 600 feet by 1200 feet and contains five aboveground storage tanks (ASTs) ranging in size from 500,000 gallons to 1,500,000 gallons; one underground storage tank (UST); and associated piping. The UST is a 2000-gallon emergency overflow tank. The BFF is scheduled for a Phase I rehabilitation of the entire site in fiscal year (FY) 99.

1.2 SITE HISTORY AND PREVIOUS INVESTIGATIONS

In the past, the BFF has been used to store JP-4, MOGAS, #2 Fuel Oil, Diesel, and Aviation Gas. The facility is currently used to store JP-8. A number of releases involving these fuel types have occurred at the facility since its construction in 1950. A few of the releases are known to have entered Lamar Canal.

Anderson Columbia Environmental, Inc. (ACE) closed in-place UST 117, which is located in the north–central portion of the BFF (Figure 1-2). The 550-gallon UST 117 was used to store JP-4 fuel. One soil sample, collected at the time of UST closure on September 30, 1996, contained an elevated concentration of benzene (0.013 mg/kg) that exceeded the Georgia Environmental Protection Division (GA EPD) applicable Soil Threshold Level (STL) of 0.008 mg/kg for sites located greater than 500 feet to a withdrawal point and within two miles of a public water supply (i.e., Table A, Column 2).

1.3 SITE GEOLOGY AND HYDROGEOLOGY

1.3.1 Regional Geology

Southeast Georgia is located within the Coastal Plain Physiographic Province of the Southeast United States (Clark and Zisa 1976). In this region, the thickness of southeastward dipping, subsurface strata ranges from zero feet at the fall line, located approximately 350 miles inland

Figure 1-1. Regional Location Map for Hunter Army Airfield, Georgia

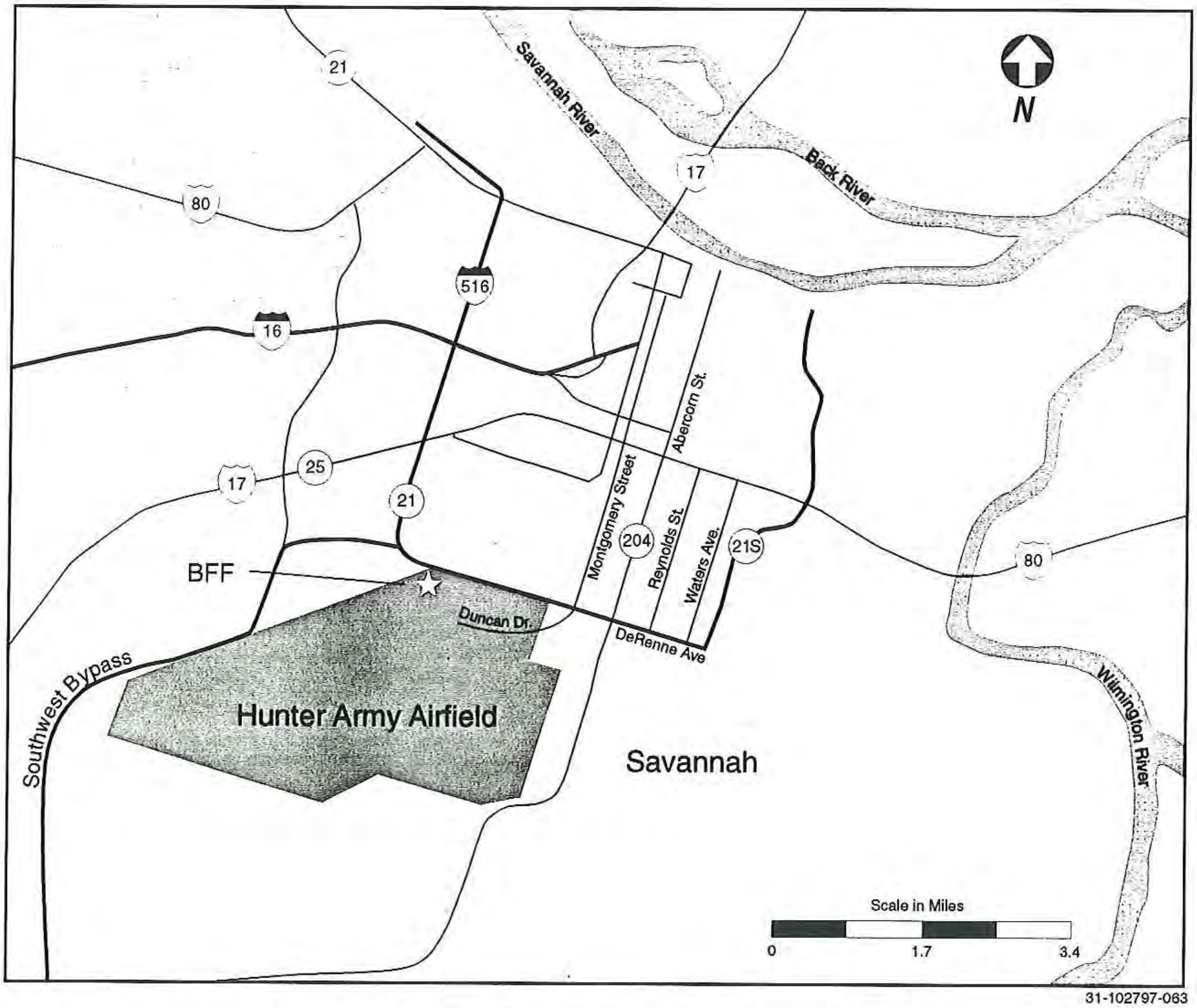

Figure 1.2. Location Map for the Hunter Army Airfield, Georgia

from the Atlantic coast, to approximately 4,200 feet below land surface (bls) at the coast. Huddleston (1961) provides detailed lithologic descriptions of the stratigraphic units encountered during the installation of water and petroleum exploration wells in Chatham County. The well log of GGS Well No. 125, located on White Bluff Road, 700 feet west and 0.3 mile north of Buckhalter Road, Savannah, provides one of the more complete lithologic descriptions of upper Eocene, Miocene, and Pliocene to Recent sedimentary strata in Chatham County.

The upper Eocene (Ocala Limestone) section of GGS Well No. 125 is approximately 225 feet thick and dominated by light-gray to white, fossiliferous limestone. The Miocene section is approximately 250 feet thick and consists of limestone with a 160-foot-thick cap of dark green phosphatic clay. This clay is regionally extensive and is known to occupy the Coosawatchie Formation of the Hawthorn Group (Furlow 1969; Arora 1984; Huddlestun 1988). The interval from approximately 80 feet to the surface is Plicoene to Recent in age and composed primarily of sand interbedded with clay and silt. This section is occupied by the Satilla and Cypresshead Formations (Huddlestun 1988).

1.3.2 Local Geology

The HAAF is located within the Barrier Island Sequence District of the Coastal Plain Physiographic Province of the Southeast United States (Clark and Zisa 1976). The Barrier Island Sequence District in Chatham and Bryan Counties is characterized by the existence of several marine terraces, step-like topographic surfaces that decrease in elevation toward the coast. These marine terraces, and their associated deposits, are the result of sea level fluctuations that occurred during the Pleistocene Epoch. The surficial (Quaternary) deposits in Chatham and Bryan Counties, in decreasing elevation and age, are part of the Okefenokee, Wicomico, Penholoway, Pamlico, and Silver Bluff terrace complexes (Wilkes et. al 1974; GA DNR 1976; Huddlestun 1988).

The HAAF, as well as most of Chatham County, is underlain by the Pleistocene Pamlico Terrace. The Pleistocene Satilla Formation (formerly known as the Pamlico Formation) consists of deposits of the Pamlico Terrace complex and other terrace complexes in the region (Huddlestun 1988). The Satilla Formation is a lithologically heterogeneous unit that consists of variably bedded to non-bedded sand and variably bedded silty to sandy clay. During the Pleistocene, these sand and clay deposits were formed in offshore and inner continental shelf, barrier island, and marsh/lagoonal-type environments (Huddlestun 1988). According to the Geologic Map of Georgia (GA DNR 1976), clay beds of marsh origin, which were deposited on the northwest side of the former Pamlico Barrier Island complex, exist in the western quarter of HAAF. Very fine- to coarse grained sand deposits of barrier island origin are more common throughout the remaining areas of HAAF.

1.3.3 Regional and Local Hydrogeology

The hydrogeology in the vicinity of HAAF is mostly influenced by two aquifer systems. These are referred to as the Principal (Floridan) Aquifer and the Surficial Aquifer (Miller 1990). The Principal Aquifer is the lowermost hydrologic unit and is regionally extensive from South Carolina through Georgia, Alabama and most of Florida. Known elsewhere as the Floridan, this aquifer, approximately 800 feet in total thickness, is composed primarily of Tertiary age limestone including the Bug Island Formation, the Ocala Group, and the Suwannee Limestone. Groundwater from the Floridan is used primarily for drinking water (Arora 1984). According to Miller (1990), one of the largest cones of depression produced in the Floridan exists directly beneath Savannah, Georgia. Net water-level decline in the Floridan system, between the predevelopment period and 1980, exceeded 80 feet beneath Savannah. In addition, according to 1980 estimates, more than 500,000,000 gallons of water per day were withdrawn from the Floridan for public and industrial use in southeast Georgia—more than any other region.

The confining layer for the Floridan aquifer is the phosphatic clay of the Hawthorn Group. There are minor occurrences of aquifer material within the Hawthorn Group, however, they have limited utilization (Miller 1990). The Surfical Aquifer overlies the Hawthorn.

The Surficial Aquifer consists of widely varying amounts of sand and clay ranging from 55 to 150 feet in thickness and is composed primarily of the Satilla and Cypresshead Formations in the Savannah vicinity (Arora 1984). This aquifer is primarily used for domestic lawn and agricultural irrigation. The top of the water table ranges from approximately 2 to 10 feet below ground surface (bgs) (Miller 1990). Groundwater in the Surficial Aquifer system is under unconfined, or water table, conditions. However, locally, thin clay beds create confined or semiconfined conditions, as is the case at HAAF where thin, surficial clay beds are present in the west quadrant (GA DNR 1979).

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2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This portion of the project FSP represents the Project Management Plan for project activities to be performed by Science Applications International Corporation (SAIC) at the HAA-09 Bulk Fuel Facility at HAAF. This plan designates the key SAIC and subcontractor personnel that will participate in the project and provides a summary of their responsibilities.

2.1 PROJECT ORGANIZATION

The organization chart illustrated in Figure 2-1 outlines the management structure that will be used to implement the project. The functional responsibilities of key personnel are described in the following parts of this plan. The assignment of personnel to each project position is based on a combination of (1) experience in the type of work to be performed, (2) experience working with government personnel and procedures, (3) a demonstrated commitment to high quality and timely job performance, and (4) staff availability. The key project personnel have been assigned based on the minimum education and qualification requirements for each assigned position, as shown in Table 2-1. In the event that personnel identified in Figure 2-1 and Table 2-1 must be replaced after issuance of these documents, SAIC will provide the names and resumes for the replacement individuals to the U.S. Army Corps of Engineers (USACE) ▯ Savannah District Project Manager for approval prior to mobilization for field work.

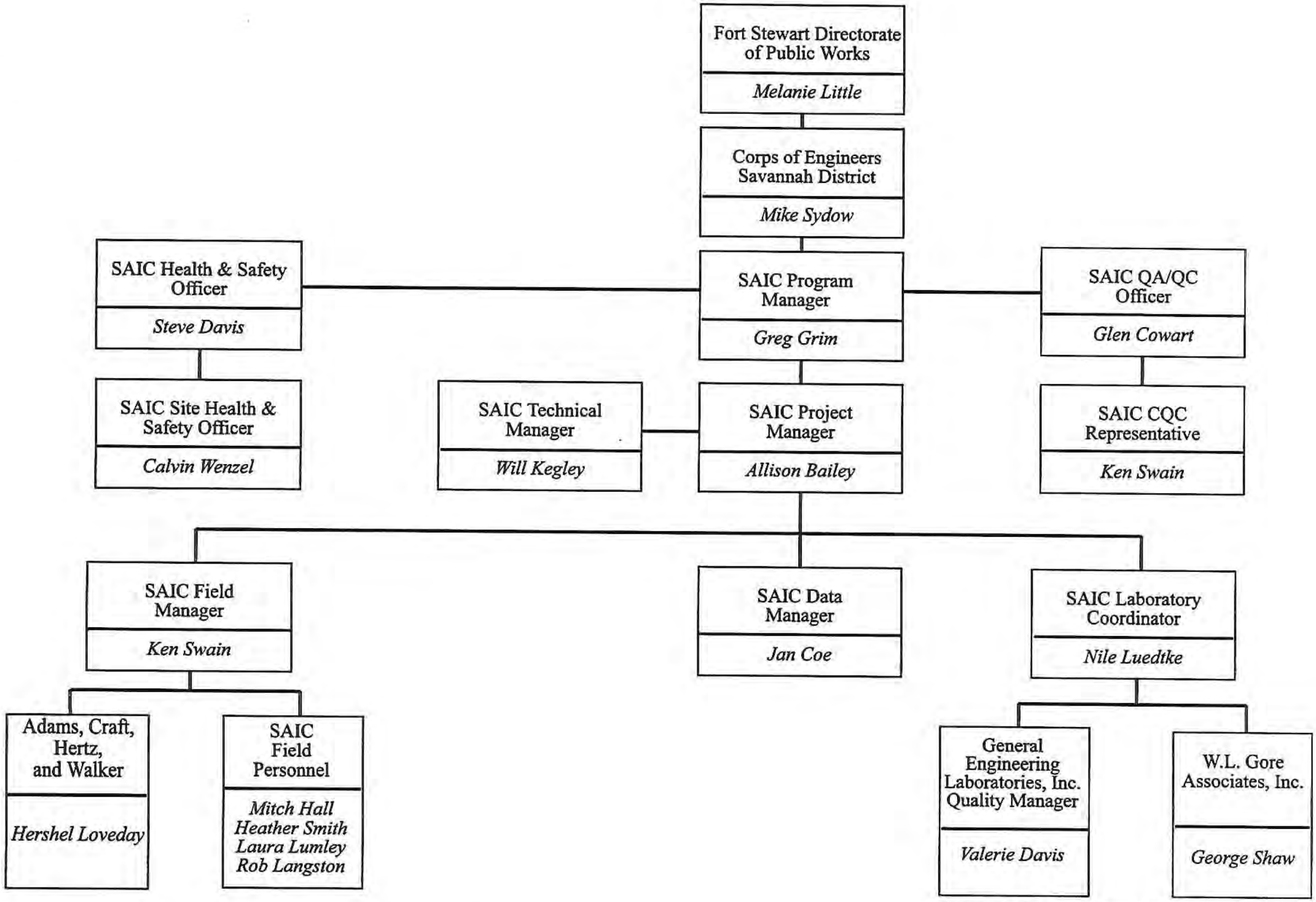
Identification of additional key personnel associated with the subcontracted laboratory activities for the project, and a summary of their responsibilities, is presented in Section 2.0 of the Quality Assurance Project Plan (QAPP). The subcontractors selected by SAIC to support the project, and the services to be performed by these companies, are as follows:

W.L. Gore and Associates, Inc.:	Passive gas survey module analysis
General Engineering Laboratories, Inc.:	Chemical analytical testing for sediment and surface water
Adams, Craft, Herz and Walker:	Topographic and location surveys for sampling points

2.2 KEY PERSONNEL RESPONSIBILITIES

2.2.1 SAIC Program Manager

The SAIC Program Manager manages the overall performance and quality of projects under USACE–Savannah District general contract DACA21-95-D-0022. This individual will oversee the SAIC Project Manager in meeting project goals and objectives in a high-quality and timely manner. Quality assurance issues will be addressed by this individual, in coordination with the SAIC Project Manager and Quality Assurance/Quality Control (QA/QC) Officer, including identification of nonconformances and verification of corrective action.



Refer to Section 3 of the project QAPP for lab organization breakdown.

Figure 2-1. Organizational Chart for the Bulk Fuel Facility (HAA-09) Soil Gas Survey at Hunter Army Airfield, Georgia.

Table 2-1. Key Field Personnel Assignments and Qualifications for the Bulk Fuel Facility (HAA-09) Soil Gas Survey at Hunter Army Airfield, Georgia

Project Assignment	Minimum Degree Requirements	Minimum Qualifications
Project Manager C. Allison Bailey	B.S. Civil Engineering, Geology, or related field	10+ years of experience in HTRW projects including site investigations and related environmental evaluations/studies.
Technical Manager William P. Kegley, P.G.	B.S. Civil Engineering, Geology, or related field	5+ years of experience in HTRW projects including management of field projects for site investigations, remedial investigations, and related environmental evaluations/studies.
Site Safety and Health Officer Calvin Wenzel	B.S. in Safety, Engineering or related field	5+ years of experience in HTRW projects including providing health and safety oversight for site investigations, remedial investigations, and related environmental evaluations/studies.
CQC Representative Ken Swain	A.S. in Science or Engineering Technology or related field or equivalent field work experience	3+ years of experience in HTRW projects including site investigations, remedial investigations, and related environmental evaluations/studies.
Field Manager Ken Swain	B.S., Engineering, Geology, or related field	5+ years of experience in HTRW projects including management of field projects for site investigations, remedial investigations, and related environmental evaluations/studies.
Laboratory Coordinator Nile Luedtke	B.S. Chemistry	7+ years of experience in HTRW projects including laboratory interface for site investigations, remedial investigations, and related environmental evaluations/studies.
Site Geologists Mitch Hall	B.S. Civil Engineering, Geology, or related field	3+ years of experience in HTRW projects including soil and rock logging, and monitoring well installation.
Sampling Technicians Heather Smith Laura Lumley Rob Langston	A.S. in Science or Engineering Technology or related field or equivalent field work experience	3+ years of experience HTRW projects including soil and groundwater sampling, and monitoring well installation.

HTRW = Hazardous, Toxic, and Radioactive Waste

2.2.2 SAIC Project Manager

The SAIC Project Manager has responsibility for oversight of all project activities, including work plan development, field activities, data management, and report preparation. This individual will also provide the overall financial management of the project, and serve as the point of contact with the USACE–Savannah District Project Manager (Mr. Michael Sydow) and USACE–Savannah District Technical Manager (Mr. Wes Smith). The SAIC Project Manager will also develop, monitor, and fill project staffing needs, delegate specific responsibilities to project team members, and coordinate with administrative staff to maintain a coordinated and timely flow of project activities. The SAIC Project Manager reports directly to the SAIC Program Manager.

2.2.3 SAIC Technical Manager

The SAIC Technical Manager is a Professional Geologist registered in the state of Georgia and will be responsible for the technical aspects of the project. The SAIC Technical Manager has responsibility for overall technical quality of project deliverables, in coordination with the SAIC Project Manager. The SAIC Technical Manager reports directly to the SAIC Project Manager.

2.2.4 SAIC Health and Safety Officer

The SAIC Health and Safety Officer is responsible for confirming that health and safety procedures designed to protect personnel are maintained throughout the field activities conducted for the project. This will be accomplished by strict adherence to the project Site Safety and Health Plan (SSHP), which is presented in Volume II of the project Sampling and Analysis Plan (SAP). This individual, in coordination with the SAIC Site Safety and Health Officer (SSHO), will have the authority to halt field work if health and/or safety issues arise that are not immediately resolvable in accordance with the project SSHP. The SAIC Health and Safety Manager and SSHO report directly to the SAIC Program Manager, but will inform the SAIC Project Manager of all information and decisions reported.

2.2.5 SAIC Quality Assurance/Quality Control Officer

The SAIC QA/QC Officer is responsible for the project QA/QC in accordance with the requirements of the project QAPP, other work plan documentation, and appropriate management guidance. This individual, in coordination with the SAIC Chemical Quality Control (CQC) Representative, will be responsible for participating in the project field activity readiness review; approving variances during field activities before work continues; approving, evaluating, and documenting the disposition of Nonconformance Reports (NCRs); overseeing and approving any required project training; and designing audit/surveillance plans followed by supervision of these activities. The SAIC QA/QC Officer and CQC Representative report directly to the SAIC Program Manager, but will inform the SAIC Project Manager of all information and decisions reported.

2.2.6 SAIC Laboratory Coordinator

The SAIC Laboratory Coordinator is responsible for coordination of sample collection, and subsequent chemical analysis and data reporting performed by the subcontract laboratories, in accordance with the requirements defined in the QAPP. This individual will also coordinate the shipment of QA samples to the USACE South Atlantic Savannah District Laboratory, which has been designated as the government QA laboratory for the project, and receipt of analytical results from this facility. This individual will be responsible for obtaining required sample containers from the laboratory for use during field sample collection, resolving questions the laboratory may have regarding QAPP requirements and deliverables, and coordination of reduction, validation, and documentation activities related to sample data package deliverables received from the laboratory. The SAIC Laboratory Coordinator reports directly to the SAIC Project Manager.

2.2.7 Subcontractor Laboratory Quality Manager

General Engineering Laboratories, Inc. will be subcontracted by SAIC to perform laboratory services regarding chemical analyses of sediment and surface water samples collected during the project. The Subcontractor Laboratory Quality Manager is responsible for the laboratory QA/QC in accordance with the requirements of the QAPP. In coordination with the SAIC Laboratory Coordinator, this individual will be responsible for documenting that samples received by the laboratory are analyzed in accordance with required and approved methodologies, that instrument calibration is performed properly and documented, that field and internal laboratory QC samples are analyzed and documented, and that all analytical results for both field and QC samples are reported to SAIC in the format required in the laboratory scope of work and/or QAPP. This individual is also responsible for processing laboratory NCRs in a timely manner and for implementing Corrective Action Report recommendations and/or requirements. The Subcontractor Laboratory Quality Manager reports directly to the SAIC Laboratory Coordinator.

W.L. Gore and Associates, Inc. will be subcontracted by SAIC to perform laboratory services regarding chemical analyses of soil gas receptor samples collected during the project. The Subcontractor Laboratory Quality Manager is responsible for the laboratory QA/QC in accordance with the requirements of the QAPP. In coordination with the SAIC Laboratory Coordinator, this individual will be responsible for documenting that samples received by the laboratory are analyzed in accordance with required and approved methodologies, that instrument calibration is performed properly and documented, that field and internal laboratory QC samples are analyzed and documented, and that all analytical results for both field and QC samples are reported to SAIC in the format required in the laboratory scope of work and/or QAPP. This individual is also responsible for processing laboratory NCRs in a timely manner and for implementing Corrective Action Report recommendations and/or requirements. The Subcontractor Laboratory Quality Manager reports directly to the SAIC Laboratory Coordinator.

2.2.8 SAIC Data Manager

The SAIC Data Manager, and data management personnel, will be responsible for managing the field and analytical data generated during the project. The data management team will be responsible for the accumulation, control, reduction, validation, documentation, and storage of project data in accordance with the Data Management Plan presented in Appendix B of the project QAPP. The SAIC Data Manager will also assist the SAIC QA/QC Officer in the review of laboratory procedures if required. The SAIC Data Manager reports directly to the SAIC Project Manager.

2.2.9 SAIC Field Manager

The SAIC Field Manager is responsible for implementing field activities conducted during the project in accordance with the project SAP. This individual is responsible for proper technical performance of field sampling activities, adherence to required sample custody and other related QA/QC field procedures, coordination of field personnel activities, management of investigation-derived wastes, field documentation, and preparation of Field Change Orders if required. The SAIC Field Manager reports directly to the SAIC Project Manager except with regard to significant QA/QC matters that are reported directly to the SAIC QA/QC Officer, and significant health and safety matters that are reported directly to the SAIC SSHO.

2.2.10 SAIC Field Personnel

In addition to the SAIC Field Manager, other SAIC field personnel participating in the implementation of field activities for the project will include geologists and sampling technicians. These individuals, in coordination with field subcontractor personnel, will be responsible for installation and collection of soil gas receptors, collection of sediment and surface water samples, and preparation of field logbooks and other required documentation. These individuals will perform all field activities in accordance with the project SAP and report directly to the SAIC Field Manager.

2.2.11 Subcontractor Field Personnel

Companies that will be subcontracted by SAIC to perform various field services during the project were previously identified at the beginning of this Project Management Plan. Subcontractor field personnel, under the supervision of the SAIC Field Manager, will be responsible for performing their specific scopes of work that have been incorporated into the project Work. These individuals will be required to review applicable sections of the project SAP and the SSHP prior to field mobilization. Subcontractor field personnel report directly to the SAIC Field Manager.

3.0 PROJECT SCOPE AND OBJECTIVES

3.1 SCOPE OF THE SOIL GAS SURVEY INVESTIGATION

The scope of this project includes three main components: (1) development of a workplan describing the field investigations, (2) performances of the field investigations, and (3) completion of the Soil Gas Survey Report. All project reporting will be performed according to the requirements as defined in the USACE guidance EM-200-1-3 (September 1, 1994). The specific scope for the Soil Gas Survey Investigation includes the following:

- describe the rationale for sampling and the data quality objectives (DQOs);
- list the samples that need to be taken including media to be samples, lists of analytes, sample locations, and sampling procedures;
- formulate a QAPP and list the specific QA/QC samples;
- specify how investigation-derived wastes (IDW) will be handled and disposed of;
- present a site-specific Health and Safety Plan; and
- present a schedule for completing the field investigation.

3.2. PROJECT OBJECTIVES

The objectives of the soil gas survey investigations for the BFF site at HAAF, Georgia are the following:

- analyze soil gas samples to provide data regarding the nature and extent of contamination at the BFF;
- determine the nature and extent of petroleum contamination of Lamar Canal; and
- determine the optimal locations for installation of permanent monitoring wells and confirmatory soil borings.

3.3 DATA QUALITY OBJECTIVES

The DQO process is useful in identifying data gaps and developing a SAP that describes the procedures for collecting sufficient data of known and defensible quality. These data will assist the decisiOn makers in arriving at appropriate and sound decisions concerning further action activities. The DQP process also assists in determining appropriate detection limits, analytical methods, and sampling and handling procedures /requirements. The seven-step process defined by the U.S. Environmental Protection Agency (EPA) (EPA 1993) is defined in the following sections.

3.3.1 Step 1 – Investigation Objectives

The technical objectives for the project are defined as follows:

1. Determine if VOC, SVOC, and/or Total Petroleum Hydrocarbons (TPH)-gasoline range organics (-GRO) and -diesel range organics (-DRO) contamination exists in the soil and/or groundwater in the vicinity of the BFF. Also determine if the constituents are present in detectible concentrations in sediment and surface water in Lamar Canal.

2. Determine the optimal locations to install permanent monitoring wells and confirmatory soil borings.

3.3.2 Step 2 – Identification of Decision Types

The primary decisions to be made during the course of the project include the following:

1. Are lateral trends in soil or groundwater VOC, SVOC, TPH-DRO and TPH-GRO concentrations definable?

2. Are sediment/surface water VOC and SVOC concentrations in Lamar Canal indicative of stream contamination?

3. Define optimal locations for the installation of permanent monitoring wells and confirmatory soil borings.

3.3.3 Step 3 – Key Environmental Variables

Key environmental variables for the project address information needed to support the decision types are presented in the second DQP step. The following supporting data will be required for the project:

1. Information regarding the quality matching of soil gas data against fluid mixes.

2. Information regarding the correlation of sediment/surface water data with soil gas data.

Step 4 – Temporal and Spatial Boundaries

The investigation conducted in support of the assessment is conducted as a "one time" event. Therefore, temporal boundaries are not applicable to the investigation to be conducted at the project site.

The spatial boundaries for this project are defined as the maximum number of soil gas sample locations and surface water/sediment sample locations defined in the scope of work developed by the USACE–Savannah District for the project.

3.3.5 Step 5 – Data Evaluation

Based on the output from the previous DQO steps, a soil gas survey report must be prepared presenting optimal locations for installation of permanent monitoring wells and confirmatory soil borings based upon the results of the soil gas survey.

3.3.6 Step 6 – Data Quality Requirements

DQOs are based on the concept that different data uses may require different data quality. The primary objective of the investigations to be conducted for the project is to determine if contamination is present in soil and groundwater at the BFF. In support of this objective, all data will be utilized for assessment of the site.

3.3.7 Step 7 – Sampling Characterization Plan

The final step in the DQO process is to develop a sampling characterization plan that takes into account all elements of the process defined to this point. A detailed discussion of the field activities to be implemented during this project is presented in Section 4.0 of this FSP and details regarding methods and procedures to be utilized for implementation of the plan are defined in Sections 5.0 through 12.0. For data quality, the QAAP contains details of the number and types of proposed QA/QC samples.

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4.0 FIELD ACTIVITIES

Field activities to be conducted for the BFF Soil Gas Survey include installation and collection of soil gas modules from 300 locations at the BFF site and the collection of 29 co-located surface water/sediment samples from Lamar Canal. The field activities are explained in detail in the following sections.

4.1 GEOPHYSICS

A geophysical investigation at the BFF is not within the scope of work for this project and will not be conducted as part of this investigation.

4.2 SOIL GAS SURVEY

4.2.1 Rationale

The rationale for conducting a soil gas survey at the BFF is to identify areas with high concentrations of contamination in the soil and/or groundwater at the site. These data will consequently be used for determining locations of soil boring and permanent monitoring wells.

4.2.1.1 Soil gas sample locations

Three hundred Gore-Sorber® passive soil gas sampling devices (sorbers) will be placed at the HAA-09 BFF. The survey shall extend from approximately 30 feet southeast of Perimeter Road downgradient to Lamar Canal. Lamar Canal, which constitutes the southeastern boundary of the BFF and flows southwest, is located 450 to 720 feet southeast of Perimeter Road. Proposed passive soil gas sampling locations are arranged in a grid with approximately 50-foot centers for the areas within and adjacent to the bermed area and on 75-foot centers in the southeastern, southwestern and northern sections of the site as shown in Figure 4-1. The proposed soil gas sampling locations are arranged so that the areas adjacent to the ASTs, underground storm sewer pipes, petroleum product lines, north bank of Lamar Canal, and the railroad tressel are monitored. The soil gas receptor locations will be horizontally surveyed and flagged prior to installation according to the grid outlined in Figure 4-1. The soil gas samples and associated QA/ QC samples are summarized in Table 4-1.

4.2.1.2 Sample collection and laboratory analysis

All of the 300 samples will be collected 10 to 14 days after module installation. The soil gas samples will be analyzed for GoreSorber® options A9B (TPH-GRO and TPH-DRO) and A4 (VOCs and SVOCs). After the exposure period, the sampling devices will be removed and shipped overnight to the W. L. Gore and Associates, Inc., Laboratory (Gore Laboratory) facility.

On the receipt of the coolers at the Gore Laboratory, the modules are transferred to a freezer, which is maintained at -15°C until analysis. Samples are prepared for analysis by cutting off the sorbent container (sorber) and transferring it to a thermal desorption tube.

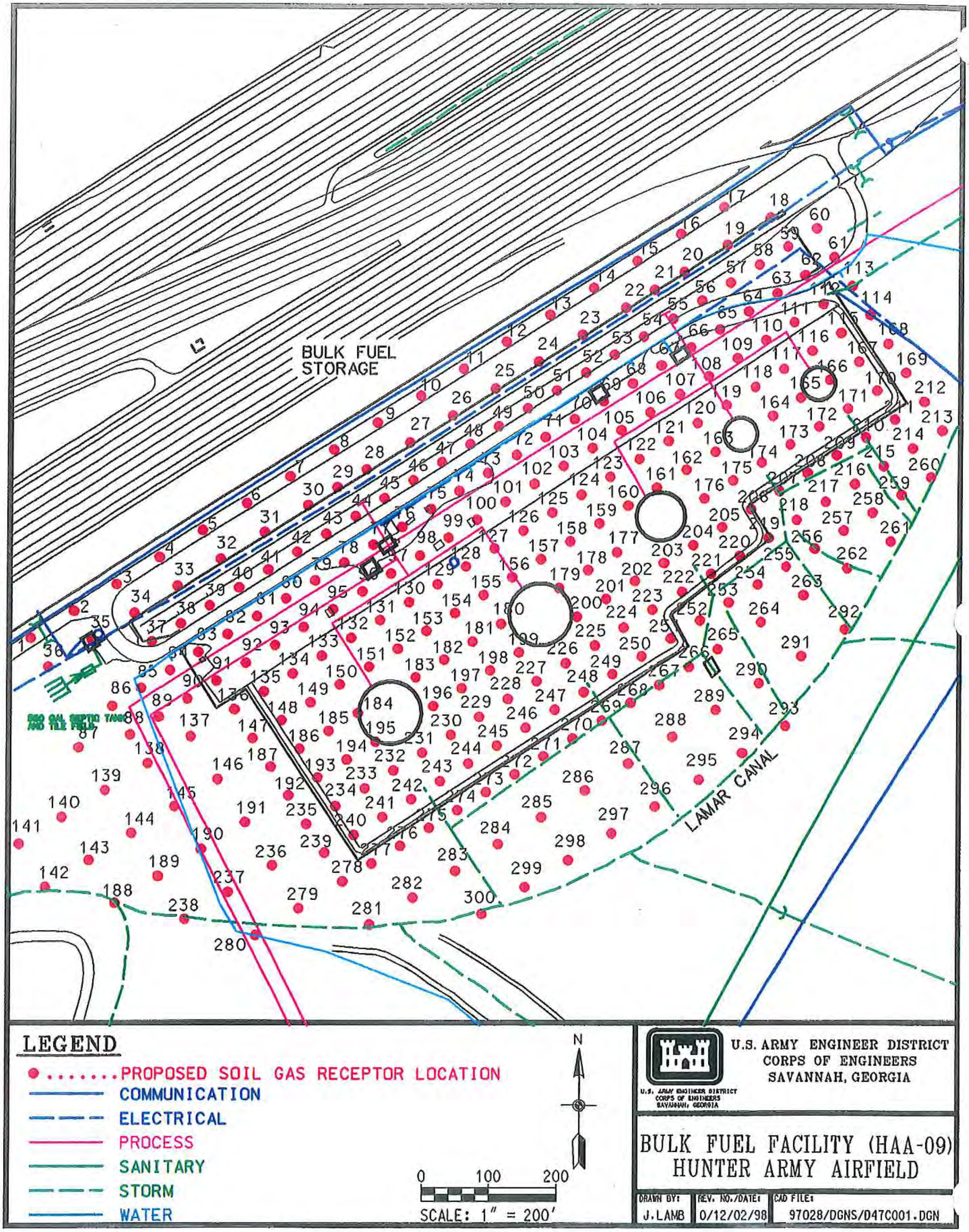

Figure 4-1. Proposed Passive Soil Gas Sampling Points at Bulk Fuel Facility (HAA-09), Hunter Army Airfield, Georgia

Table 4-1. Soil Gas Sample Table

Sample Location	Sample Number (Primary Lab)	QA/QC Sample[a] Number (Primary Lab)	EPA Method 8260A/8270B
SG-1 through SG-20	SG-1 through SG-20	QA/QC-1	X
SG-21 through SG-40	SG-21 through SG-40	QA/QC-2	X
SG-41 through SG-60	SG-41 through SG-60	QA/QC-3	X
SG-61 through SG-80	SG-61 through SG-80	QA/QC-4	X
SG-81 through SG-100	SG-81 through SG-100	QA/QC-5	X
SG-101 through SG-120	SG-101 through SG-120	QA/QC-6	X
SG-121 through SG-140	SG-121 through SG-140	QA/QC-7	X
SG-141 through SG-160	SG-141 through SG-160	QA/QC-8	X
SG-161 through SG-180	SG-161 through SG-180	QA/QC-9	X
SG-181 through SG-200	SG-181 through SG-200	QA/QC-10	X
SG-201 through SG-220	SG-201 through SG-220	QA/QC-11	X
SG-221 through SG-240	SG-221 through SG-240	QA/QC-12	X
SG-241 through SG-260	SG-241 through SG-260	QA/QC-13	X
SG-261 through SG-280	SG-261 through SG-280	QA/QC-14	X
SG-281 through SG-300	SG-281 through SG-300	QA/QC-15	X

[a] Duplicate samples are used as Trip Blanks.
EPA = U.S. Environmental Protection Agency
QA = quality assurance
QC = quality control

Analytical instrumentation consists of a Hewlett-Packard 5890 gas chromatograph, 5971A mass-selective detector, and a Perkin-Elmer ATD-400 automated thermal desorption unit. Positive identification of target compounds is determined by the presence of the target ion and at least two secondary ions and by retention time versus the reference standard. Either minimum surface curvature or kriging models (GEOSOFT Mapping Software) will be used to map contaminant concentrations and boundaries.

Quality matching of chemical data against fluid mixes shall be performed on a minimum of 20 percent of samples submitted for analysis. The quality matching technology is presented in Appendix A.

4.2.1.3 Quality assurance/quality control and blank sample frequency

QA/QC procedures for the soil gas survey will be in accordance with Gore Laboratory's QAPP. The soil gas survey will include, in addition to 300 field samples, 15 QA/QC samples (approximately one QA/QC sample per 20 field samples). Table 4-1 shows the QA/QC sample numbering sequence.

4.2.2 Procedures

4.2.2.1 Installation methods and equipment

Following the establishment of the soil gas sampling grid, Gore-Sorber® screening modules will be installed. At each survey point, a 1-inch-diameter hole will be advanced to a depth of 2 to 3 feet bgs using a slide hammer or hammer drill. This vertical positioning will ensure the receptor modules will be exposed to gases emanating from soil and groundwater. If the groundwater elevation is determined to be less than 3 feet bgs, the modules will be placed approximately 6 inches above the water table. If the water table is less than 2 feet bgs, the modules will be installed at 1½ feet bgs regardless of water table elevation. Modules will be inserted into the completed holes using a stainless steel insertion rod. Corks will be attached to each module to assist in the sample retrieval and to seal the annulus of each boring. The top of each soil gas module will be fastened to a cork, which will be placed into each hole. Each soil gas module will be placed at the bottom of each hole using an insertion rod.

4.2.2.2 Materials

The material needed for the soil gas collector installation includes a stainless steel slide hammer or hammer drill, Gore-Sorber® modules, corks, and survey flags or stakes.

4.2.2.3 Installation and retrieval

The procedures below will be followed for installation and retrieval.

1. One or more team members are designated "clean" and given exclusive responsibility for components that must be protected from contamination.

2. At each sample point the designated field team clears the sampling location, removes the module from its air-tight vial, and installs the sample module using methods outlined in Section 4.2.2.1. The team then records the sample point location code, module number, date and time of emplacement, and other pertinent information.

3. The team carries trip blanks to and from the site in air-tight vials, as part of the QA/QC program.

4. Once all soil gas sample modules are in place, the team sets the time for sample recovery (10 to 14 days) and leaves the area.

5. The team retrieves the soil gas modules when the 10- to 14-day exposure period has elapsed. All abandoned holes are sealed with a bentonite hole plug. Holes in concrete or asphalt will be completed with the original surface material. The "clean" person recovers the module at each sample point and returns it to an air-tight vial (after verification of module identification with the respective vial), while the other team member collects the rest of the field equipment (cork and nylon line) and replaces the sample point marker. Again, location codes, module numbers, dates, times, and other pertinent information such as weather conditions are recorded in the site logbooks.

6. The field team ships the resealed vials containing exposed modules to the Gore Laboratory following the chain-of-custody procedure presented in Section 5.0 of the QAPP at the following address:

   W. L. Gore and Associates, Inc.
   100 Chesapeake Blvd.
   P.O. Box 110
   Elkton, MD 21922-0010

4.2.2.4 Sampling methods

Module retrieval requires that field personnel locate the module, remove the cork, grasp the retrieval cord, and extract the module from each borehole. Corks are separated from the module and discarded. The exposed modules are resealed in their respective shipping vials and placed on ice in coolers along with trip blanks and water temperature control blanks. Coolers are returned to the Gore Laboratory in Elkton, Maryland via overnight carrier.

4.2.2.5 Documentation

All soil gas samples are documented by SAIC standard procedures. Information such as sample number, time when the sample is emplaced and retrieved, condition of module, field notes, weather conditions, and an ending equipment inventory is recorded in a logbook during the field effort. A chain of custody (COC) form is also completed and kept at all times, with the sample information noting target compounds, sample numbers, condition of sample, date, time, initials, relinquished-by signatures, and received-by signatures.

4.2.2.6 Decontamination procedures

Installation equipment will be decontaminated before use and after installation of each module to eliminate the potential for cross-contamination of samples. Equipment to be decontaminated will include the slide hammer or hammer drill bit, push points, and insertion rod. The decontamination procedure for sampling equipment that is in contact with the sample will include the steps listed below.

1. Scrub with a low-sudsing, nonphosphate detergent in approved water.
2. Rinse with potable water.
3. Rinse with deionized water.
4. Rinse twice with isopropyl alcohol.
5. Rinse with deionized water.

4.3 GROUNDWATER

The passive soil gas survey is designed to provide data regarding the nature and extent of contamination at the BFF for use in identifying the optimal locations for the installation of permanent monitoring wells and soil borings. This information will be used to determine optimal locations for permanent groundwater monitoring wells. Groundwater will not, however, be sampled as part of this investigation.

4.4 SUBSURFACE SOIL

The passive soil gas survey is designed to provide data regarding the nature and extent of contamination at the BFF for use in identifying the optimal locations for the installation of permanent monitoring wells and soil borings. Subsurface soil, however, will not be sampled as part of this investigation.

4.5 SURFACE SOIL AND SEDIMENT

Past releases of petroleum products from the BFF are known to have entered Lamar Canal. Surface soil will not be sampled as part of this investigation, however, sediment samples will be collected. The following sections present the proposed sampling of Lamar Canal in detail.

4.5.1 Rationale

The rationale for sampling sediment in Lamar Canal is to evaluate the nature and extent of petroleum contamination in the canal sediments.

4.5.1.1 Sediment sample locations

Sediments will be sampled in Lamar Canal from approximately 100 feet upgradient of the BFF to the intersection of the Canal with Perimeter Road near the 117th Air National Guard Facility (Figure 4-2) and analyzed for VOCs, SVOCs, TPH-DRO and TPH-GRO. Samples will be collected every 250 feet for the first 2500 feet of the portion of Lamar Canal in question and every 500 feet for the remaining section as presented in Figure 4-2.

An initial walkover of the Lamar Canal area will be conducted to develop an understanding of the erosional/depositional sections of the Canal, to accurately measure the section in question, to mark the prescribed sample locations, and to evaluate the physical restraints to sampling. After each prescribed sample location has been marked, the area within a 20-foot radius of each location will be assessed for an optimal sample environment, which is comprised of a quiescent area with accumulated fine- to medium-grained sediments. If an area of deposition does not exist within an approximate 20-foot radius of the prescribed sample location, the sample will be collected from the prescribed sample location. Careful documentation of depositional areas and areas with observable indication of contamination (i.e., sheen formed on water surface when sediment disturbed, areas of stressed vegetation, or observable staining) will be maintained. In the event that all prescribed samples (29) are not used to cover the section of Lamar Canal being investigated, the remaining samples will be collected in areas most likely to be contaminated based on field observations.

4.5.1.2 Sample collection and laboratory analysis

It is anticipated that all sediment samples will be collected over two days for comparability purposes. The sediment samples will be submitted to the off-site analytical laboratory for analysis of VOCs, SVOCs, TPH-GRO and TPH-DRO by standard methods presented in Table 1-1 of the QAPP. Samples for VOCs will be collected using Encore sampling devices. The samples will be labeled and custody of the samples will be maintained according to the procedure presented in Section 5.0 of the QAPP. Samples for VOCs will be collected using Encore sampling devices. The samples will be kept on ice at 4 degrees Celsius (+- 2 degrees) until delivery to the laboratory. Upon receipt by the laboratory, the samples will be logged in and the cooler receipt form (Figure 6-2) will be filled out. The samples will remain cooled to 4 degrees until analysis.

4.5.1.3 Quality assurance/quality control and blank sample frequency

QA/QC and blank samples will be collected as presented in the QAPP (Section 8.0 of the QAPP). Field duplicate, field split, and decontamination rinsate blank samples will be collected at a rate of 10 percent of normal field samples or one for each 10 normal analytical samples collected. For this investigation, three field duplicate, three field split, and three decontamination rinsate blank

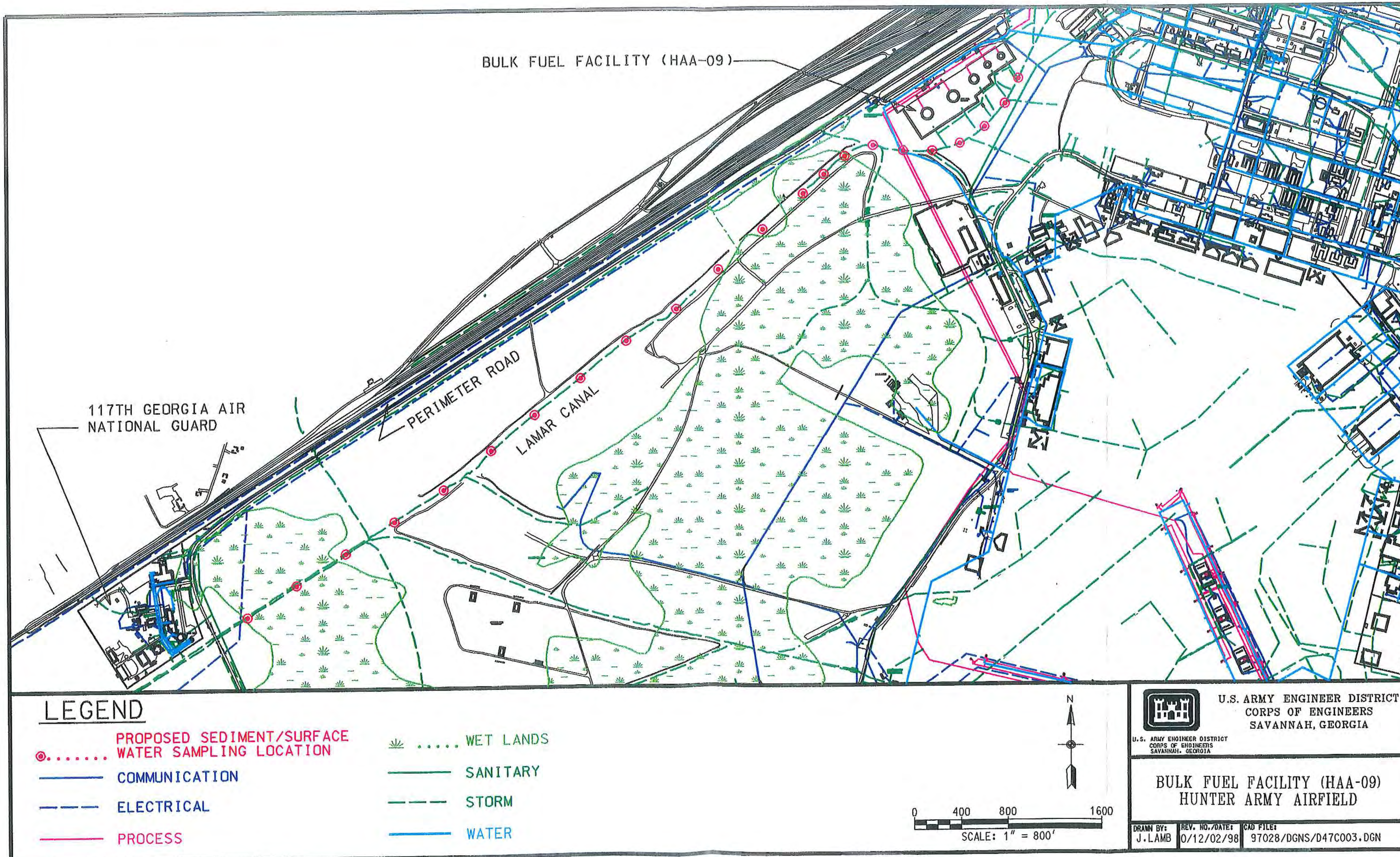

Figure 4-2. Proposed Stream Sediment/Surface Water Sampliing Locations along Lamar Canal

samples will be collected for the 29 sediment samples planned to be collected. The three duplicate samples and the three split samples will be collected from locations most likely to be contaminated. All lines of evidence will be used to determine these locations (PID readings, staining, stressed vegetation, etc.).

4.5.2 Procedures

All samples will be collected in accordance with EM 200-1-3. Collection of sediment samples will be achieved using either a hand-held trowel or scoop or a hand core sampler. The procedures for sample collection, sample labeling and documentation are presented in the following sections.

4.5.2.1. Sediment sample collection

It is anticipated that all sediment samples will be collected using a trowel in accordance with EM 200-1-3. This method will be used in situations where the water depth is less than 15.2 cm (6.0 inches) deep. Samples will be collected from the top 6 inches of sediment. Sediment samples collected for VOC analysis will be collected directly from the trowel into Encore samplers. The remaining samples will be collected from sediment and homogenized in a stainless-steel bowl or in the laboratory-provided sample containers when applicable. Sampling of sediment will commence at the sample location furthest downstream and progress upstream to prevent cross-contamination of samples from an upstream disturbance.

In the event a sample must be collected from a location with greater than 6 inches of water but less than 10 feet, the sediment will be collected using a hand core sampler. The core sampler will consist of a stainless-steel barrel with either an auger bit or core tip mounted on the leading edge of the device. Extension rods will be attached to the core sampler and used to lower the device through the water to the sample point. The core sampler will be pushed or augured 6 inches into the sediment and pulled out to collect the sample. Samples will be homogenized in a stainless-steel bowl before transferring to laboratory-provided sample jars. The core sampler will be decontaminated after completion of coring at each sampling location as described in Section 4.5.2.4.

4.5.2.2 Materials

The materials necessary to collect sediment samples, as described above, include a stainless-steel trowel or scoop, stainless-steel mixing bowl and spoon, hand core sampler, laboratory-supplied sample containers, sample management supplies, and a sample cooler with ice.

4.5.2.3 Documentation

All sediment sampling activities will be documented and all samples will be labeled and documented according to procedures presented in Section 5.0. At a minimum, a description of the sample location, date and time of sample collection, prescribed analysis, a brief description of sediment characteristics and any field observations that may affect sample integrity will be documented. In addition, a sample COC form will be completed after sample collection and maintained until delivery to the analytical laboratory. Detailed documentation requirements and forms are presented in Section 5.0.

4.5.2.4 Decontamination procedures

Sampling equipment will be decontaminated before use and after sample collection to prevent cross-contamination of samples. The decontamination procedure for sediment sampling equipment that comes in contact with the sample includes the following steps:

1. Scrub with a low-sudsing, nonphosphatic detergent in approved water.
2. Rinse with potable water.
3. Rinse with deionized water.
4. Rinse twice with isopropyl alcohol.
5. Rinse with deionized water.

4.6 SURFACE WATER

Past releases of petroleum products from the BFF are known to have entered Lamar Canal. The following sections present the proposed surface water sampling of Lamar Canal in detail.

4.6.1 Rationale

The rationale for sampling surface water in Lamar Canal is to evaluate the nature and extent of petroleum contamination being released from contaminated canal sediments or from the BFF area into the Lamar Canal surface water.

4.6.1.1 Soil gas sample locations

Surface water sample locations will be collocated with the proposed sediment sample locations described in Section 4.5.1.1 and presented in Figure 4-2.

4.6.1.2 Sample collection and laboratory analysis

It is anticipated that all surface water samples will be collected over a two-day period for comparability purposes. The surface water sample will be collected prior to the collection of the collocated sediment sample to prevent cross-contamination by suspended sediments. The surface water samples will be submitted to the off-site analytical laboratory for analysis of VOCs and SVOCs by standard methods presented in Table 1-1 of the QAPP. The samples will be labeled and custody of the samples will be maintained according to the procedure presented in Section 5.0 of the QAPP. The samples will be kept on ice at 4 degrees Celsius (+- 2 degrees) until delivery to the laboratory. Upon receipt by the laboratory, the samples will be logged in and the cooler receipt form (Figure 6-2) will be completed. The samples will remain cooled to 4 degrees until analysis.

4.6.1.3 Quality assurance/quality control and blank sample frequency

QA/QC and blank samples will be collected as presented in the QAPP (Section 8.0 of the QAPP). Duplicate field samples, QA field split samples, and decontamination rinsate blanks will be collected at a frequency of 10 percent of normal field samples or one for each 10 normal analytical samples collected. This corresponds to three field duplicate, three field split samples, and three decontamination rinsate samples to be collected for the 29 normal analytical surface water samples planned to be collected. The duplicate/split sample locations will be determined in the field and will correspond to samples most likely contaminated based on field observations. Rinsate samples will be collected randomly.

4.6.2 Procedures

All samples will be collected in accordance with EM 200-1-3. Collection of surface water samples will be achieved using the bottle submergence procedure or using a dipper. The procedures for sample collection, sample labeling and documentation are presented in the following sections.

4.6.2.1 Surface water collection

Prior to sample collection, water quality parameters will be measured with field equipment. This will be accomplished using a Horiba U-10 water quality instrument or equivalent that has been calibrated to a known standard as directed in the manufacturer's operator manual. Field equipment calibration procedures are presented in Section 7.0 of the QAPP. Water temperature, pH, specific conductance, turbidity, and dissolved oxygen will be measured and recorded at each sample location before samples are collected. The water quality meter probe will be lowered into the surface water upstream of the sampling personnel to prevent influence of the measurements from suspended particles disturbed by the sampling personnel.

All surface water will be collected using a dipper. The dipper will consist of a stainless-steel, glass, or Teflon container attached to the end of an appropriate-length extension rod. The dipper will be lowered into the water, filled, and the water transferred to laboratory-supplied sample containers. Care will be taken to not overfill sample containers that have been prepreserved. The dipper will be decontaminated after use at each sampling location as described in Section 4.5.2.4. Sampling of surface water will commence at the sample location farthest downstream and progress upstream to prevent cross-contamination of surface water from an upstream disturbance.

4.6.2.2 Materials

The materials needed to conduct surface water sampling include laboratory bottles, water quality meter, a dipper, and a sample cooler with ice.

4.6.2.3 Documentation

All surface water sampling activities will be documented and all samples will be labeled and documented according to procedures presented in Section 5.0. At a minimum, a description of the sample location, date and time of sample collection, prescribed analysis, and any field observations that may affect sample integrity will be documented. In addition, a COC form will be completed after sample collection and maintained until delivery to the analytical laboratory. Detailed documentation requirements and forms are presented in Section 5.0.

4.6.2.4 Decontamination procedures

Sampling equipment will be decontaminated before use and after sample collection to prevent cross-contamination of samples. The decontamination procedure for surface water sampling equipment that comes in contact with the sample includes the following steps:

1. Scrub with a low-sudsing, nonphosphatic detergent in approved water.
2. Rinse with potable water.
3. Rinse with deionized water.
4. Rinse twice with isopropyl alcohol.
5. Rinse with deionized water.

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5.0 SAMPLE CHAIN OF CUSTODY/DOCUMENTATION

5.1 FIELD LOGBOOKS

All information pertinent to soil gas, surface water, and sediment sampling activities, including field instrument calibration data, will be recorded in field logbooks on unbound Engineering Forms 5056R and 5056A-R. The logbooks will be bound, and the pages will be consecutively numbered. Entries in the logbooks will be made in black, waterproof ink and will include, at a minimum, a description of all activities, the individuals involved in sampling activities, the date and time of sampling, the weather conditions, any problems encountered, and all field measurements. Lot numbers, manufacturers' names, and expiration dates of standard solutions used for field instrument calibration will be recorded in the field logbooks. A summary of each day's activities also will be recorded in the logbooks. No erasures shall be made in the logbooks or field forms. Corrections, if needed, shall be made by drawing a single line through the incorrect information and writing the corrected information in black, waterproof ink. Logbook corrections must be initialed and dated by the person who made the correction.

Sufficient information will be recorded in the logbooks to permit reconstruction of all sampling activities conducted without reliance on memory. Information recorded on other project documents (e.g., boring logs, water quality records) will not be repeated in the logbooks except in summary form where determined necessary. All field logbooks will be kept in the possession of field personnel responsible for completing the logbooks or in a secure place when not being used during fieldwork. Upon completion of the field activities, all logbooks will become part of the final project evidence file. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

- logbook number,
- project name,
- project start date, and
- end date.

Entries recorded in logbooks will include, but not be limited to, the information listed below.

- Name and title of author, date, and times of arrival at and departure from the work site.

- Purpose of the sampling activity.

- Name and address of the field contact.

- Names and responsibilities of field crew members.

- Names and titles of any site visitors.

- Type, matrix, and containerization method for IDW generated.

- Sample collection method.

- Number and volume of sample(s) collected.
- Location, description, and log of photographs of the sampling points.
- References for all maps and photographs of the sampling site(s).
- Information regarding sampling changes, scheduling modifications, and change orders.
- Information regarding sampling decisions not recorded on the sampling log.
- Information regarding access agreements, if applicable.
- Details of the sampling location, including a sketch map illustrating the sampling location.
- Date and time of sample collection and name of collector.
- Field observations.
- Types of field instruments used and purpose of use, including calibration methods and results.
- Any field measurements made.
- Sample identification number(s).
- Information from containers, labels of reagents used, deionized and organic-free water used, etc.
- Sampling type and methodology, including distinction between discrete and composite samples.
- Sample preservation methods.
- Sample distribution and transportation (e.g., name and address of the laboratory and courier).
- Name and address of the government QA laboratory, and associated project Laboratory Information Management System (LIMS) number.
- Sample documentation information including:
  - — COC record numbers and
  - — description of the number of shipping containers packaged (including contained COC records) and the shipping method used (noting applicable tracking numbers).
- Decontamination procedures.
- Cross reference of QA/QC samples with corresponding field samples.

- IDW documentation information including:

  — types of containers/drums;
  — contents, type, and approximate volume of waste; and
  — type of contamination and predicted level of contamination based on available information.

- Summary of daily task (including costs where appropriate) and documentation on any cost or scope of work changes required by field conditions.

- Signature and date entered by personnel responsible for observations recorded.

The evidence files for analytical data shall be maintained at SAIC for the duration of the project, after which they will be forwarded to the USACE Savannah District Project Manager. The contents of the evidence file will include all relevant records, reports, correspondence, logs, field logbooks, laboratory sample preparation and analysis logbooks, data package, pictures, subcontractor's reports, COC records/forms, data review reports, etc. Any portions of the evidence used on site will be under the custody of the SAIC site manager in a locked, secured area.

5.2 PHOTOGRAPHS

Photographs of sampling locations and sampling activities will be taken during the Soil Gas Survey using 35-millimeter, color film. Photographs taken to document sampling points will include two or more reference points to facilitate relocation of each point at a later date. For each photograph taken, the following information will be recorded in the field logbook:

- date and time,
- photographer (name and signature),
- name of the site,
- general direction faced and description of the subject taken,
- sequential number of the photograph and the roll number, and
- site photograph map.

An example of the photograph map type to be recorded in the field logbook is illustrated in Figure 5-1.

5.3 SAMPLE NUMBERING SYSTEM

A unique sample numbering scheme will be used to identify each sample designated for laboratory analysis. The purpose of this numbering scheme is to provide a tracking system for the retrieval of analytical and field data on each sample. Sample identification numbers will be used on all sample labels or tags, field data sheets and/or logbooks, COC records, and all other applicable documentation used during the investigation. A listing of all sample identification numbers will be maintained in the field logbook.

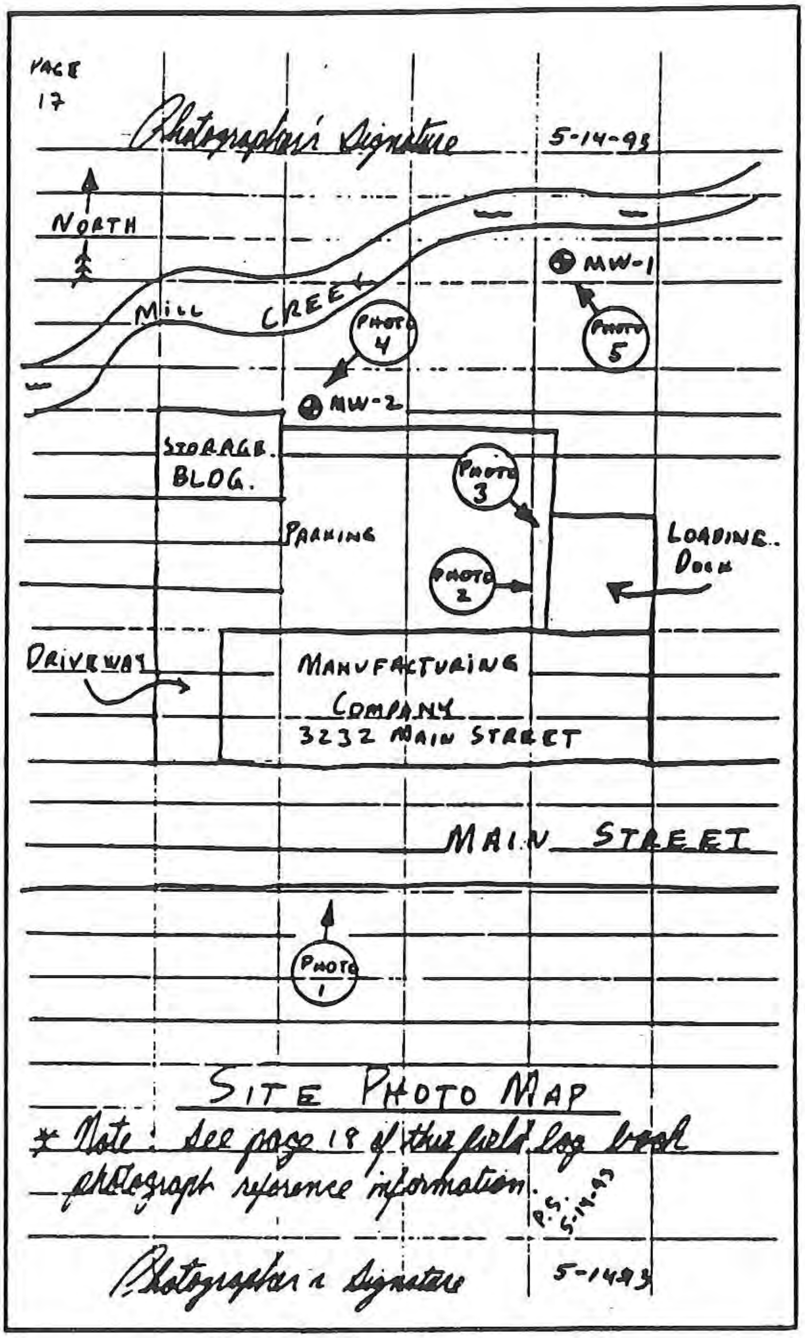

Figure 5-1. Example of the Photograph Map to be Recorded in the Field Logbook

The sample numbering scheme used for field samples also will be used for duplicate samples so that these sample types will not be discernible by the laboratory. However, field QC samples will be numbered so that they can be readily identified from other sample types. Each sample identification number will be limited to a six-character field due to the Contract Laboratory Program's analytical protocols, which will be followed by General Engineering Laboratories, Inc., for the project. The sample number scheme that will be used for the sampling along Lamar Canal is presented in Table 5-1.

Table 5-1. Lamar Canal Site Sample Identification System

Sample identifiers will be coded to indicate information about where the sample was collected. The coding system is described below. An "A" indicates the sample will contain an alphabetic character at the position, while an "N" indicates a numeric character will be at the position.

	1st Element	2nd Element	3rd Element	4th Element	5th Element
Sample Type	**Location Indicator**	**Station**	**Media**	**Sample Type**	**Sequence #**
Environmental Samples and Duplicates	A	NN	N	N	N
Field Quality Control	AAA				NNN

Sample Type: The field quality control samples are rinsate, field blank, and trip blank.

1st Element
Location Indicator
H = Hunter Army Airfield
QC Samples:
EQR = equipment rinsate
TBL = trip blank

2nd Element
Station
Formed by padding the station number with zeros on the left.

3rd Element
Medium
1 = surface water
2 = surface sediment

4th Element
Sample Type
Duplicates will be zero, environmental samples will be one, and split samples will be two.

5th Element
Sequence Number
Surface water and sediment samples will start with one. If multiple rounds of surface water/sediment sampling are to occur, each round of sampling will increment the digit by one.

Example
A sample collected at surface water location #1 would be H0111, and the duplicate would be H01101. Soil gas receptors will be provided with unique module numbers permanently attached. Field numbers will be assigned to each location and corresponding soil gas module. Field numbers will be sequentially assigned beginning with SG0001 and ending with SG0300.

5.4 SAMPLE DOCUMENTATION

5.4.1 Sample Labels and/or Tags

Sample containers for surface water and stream sediment analysis will be provided to SAIC from General Engineering Laboratories, Inc., for use during the sediment and surface water investigation. Information will be recorded on each sample container label at the time of sample collection. The information to be recorded on the labels will be as follows:

- contractor name,
- sample identification number,
- sample type (discrete or composite),
- site name and sampling station number,
- analysis to be performed,
- type of chemical preservative present in container,
- date and time of sample collection, and
- sampler's name and initials.

An example of the sample label to be used for the project is illustrated in Figure 5-2.

W.L. Gore and Associates will provide sample containers specific to each soil gas receptor. Each soil gas receptor will have a unique module number permanently affixed to it. A packaging vial with the same module number will be used for shipment of the modules to and from the site. The unique module number is sufficient labeling, and the number will be recorded for each of the receptors. The module number will be recorded on the COC form with the corresponding field number for traceability.

5.4.2 Sample Field Sheets and/or Logbook

Project-specific logbooks will be produced for this field effort and will include a site safety and health logbook, a material and testing logbook, a site logbook, and sampling logbooks. These logbooks will be created to include such things as Hazardous, Toxic, and Radioactive Waste forms, Daily Quality Chemical Control forms, and sampling specific information.

5.4.3 Chain-of-Custody Records

It is EPA and Region IV policy to follow the EPA Region IV sample custody or COC protocols as described in NEIC Policies and Procedures, EPA 330/9-78DDI-R (EPA 1985). This custody is in three parts: sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area. A sample or evidence file is under a worker's custody if it:

- is in his possession;
- is in his view, after being in his possession;
- is in his possession and he places it in a secured location; or
- is in a designated secure area.

Sample No.: ____________________ **Project No.: 04-4058**
Location: ____________________ **Station:** ____________________
Sample Media: ____
Sample Type: Grab
Analysis: ____
Preservative: ______________________________ **Volume:** __________
Rad Screen: ______________________________ **Units:** __________
Sample Date/Time: ______/______
Comments: ____
____________________ **Collector:** ____________________

Figure 5-2. Example of the Sample Container Label

Custody will be documented throughout the Soil Gas Survey sampling activities by the COC form initiated for each day during which samples are collected. This record will accompany the samples from the site to the laboratory and will be returned to the SAIC Laboratory Coordinator with the final analytical report. All personnel with sample custody responsibilities will be required to sign, date, and note the time on the COC form when relinquishing samples from their immediate custody (except in the case in which samples are placed into designated secure areas for temporary storage prior to shipment). Bills of lading will be used as custody documentation during times when the samples are being shipped from the site to the laboratory and will be retained as part of the permanent sample custody documentation. Field procedures for sample custody are outlined below.

1. The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

2. All bottles will be labeled with sample numbers and locations.

3. Sample labels are to be completed for each sample using waterproof ink.

4. The Project Manager will review all field activities to determine whether proper custody procedures were followed during the fieldwork and will decide if additional samples are required.

COC forms will be used to document the integrity of all samples collected. To maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory, COC forms will be filled out for sample sets as determined appropriate during the course of the fieldwork. An example of the COC form to be used is illustrated in Figure 5-3. The following information will be recorded on all COC forms:

- sample number (for each sample in shipment);
- collection date and time (for each sample in shipment);
- number of containers for each sample;
- sample description (i.e., environmental medium);
- sample type (discrete or composite);
- analyses required for each sample;
- sample preservation technique(s);
- COC or shipment number;
- USACE LIMS number (only on COC records for government QA sample shipments);
- shipping address of the laboratory;
- date, time, method of shipment, courier, and air bill number; and
- spaces to be signed as custody is transferred between individuals.

The individual responsible for shipping the samples from the field to the laboratory will be responsible for completing the COC form and noting the date and time of shipment. This individual will also inspect the form for completeness and accuracy. After the form has been inspected and determined to be satisfactorily complete, the responsible individual will sign, date, and note the time of transfer on the form. The COC form will then be placed in a sealable plastic bag and placed inside the cooler used for sample transport after the field copy of the form has been detached. The field copy of the form will be appropriately filed and kept at the site for the duration of the site activities.

In addition to the COC form, COC seals also will be placed on each cooler used for sample transport. These seals will consist of an adhesive material placed across the lid and body of the coolers in such

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CHAIN-OF-CUSTODY RECORD

NO:

PROJECT NAME:	#	REQUESTED PARAMETERS	SAMPLING/INFO	REMARKS
PROJECT NUMBER:	No. of Bottles/ Vials:	MATRIX: S - Solid / L - Liquid; *PH: C - Correct / I - Incorrect	DATE / TIME	
SAMPLERS (SIGNATURE)				
PRINTED NAME				
CLIENT ID (6 CHARACTERS): 1 2 3 4 5 6				

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:	
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:	

Other Remarks:
*To be completed by laboratory upon receipt of samples.

SHIPPING INFORMATION

Number of Shipping Containers:		*Cooler Temperature:
Method of Shipment:	Special Handling Requirements:	Cooler ID:

Figure 5-3. Example of the Chain of Custody Form

a manner that if the cooler is opened, the seals will be broken. The COC seals will be used to ensure that no sample tampering occurs between the time the samples are placed into the coolers, and the time the coolers are opened for analysis at the laboratory. Cooler COC seals will be signed and dated by the individual responsible for completing the COC form contained within the cooler. The signature and date will be written on both the cooler lid and cooler body portions of the seals.

5.5 DOCUMENTATION PROCEDURES

The tracking procedure to be used for documentation of all samples collected during the investigation will include the steps listed below.

1. Collection and placement of sample into laboratory sample containers as defined in Sections 4.3 and 4.4 of this FSP.

2. Completion of sample container label information as defined in Section 5.4.1 of this FSP.

3. Placement of sample containers into an ice-filled cooler.

4. Completion of sample documentation information in the field logbook as defined in Section 5.1 of this FSP.

5. Completion of project and sampling information sections of the COC form(s) as defined in Section 5.4.3 of this FSP for all samples to be transported in a single cooler.

6. Completion of the air bill for the cooler to be shipped.

7. Performance of a completeness and accuracy check of the COC form(s).

8. Completion of the sample relinquishment section of the COC form(s) as defined in Section 5.4.3 of this FSP, and placement of the form(s) into the cooler.

9. Placement of COC seals on the exterior of the cooler as defined in Section 5.4.3 of this FSP.

10. Packaging and shipment of the cooler to the laboratory as defined in Section 6.0 of this FSP.

11. Receipt of cooler at the laboratory, inspection of contents, and transmittal via fax of contained COC form(s) and cooler receipt form(s) as defined in Sections 5.4.4 and 6.0, respectively, of this FSP.

12. Transmittal of original COC form(s) with final analytical results from laboratory.

5.6 CORRECTIONS TO DOCUMENTATION

All original information and data in field logbooks, on sample labels, on COC forms, and on any other project-related documentation will be recorded in black, waterproof ink and in a completely legible manner. Errors made on any accountable document will be corrected by crossing out the error and entering the correct information or data. Any error discovered on a document will be corrected by the individual responsible for the entry. Erroneous information or data will be corrected in a manner that will not obliterate the original entry, and all corrections will be initialed and dated by the individual responsible for the entry.

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6.0 SAMPLE PACKAGING AND SHIPPING

Stream sediment and surface water sample containers will be packaged in thermally insulated, rigid body coolers that will be sealed and used for shipment. Sample packaging and shipping will be conducted in accordance with applicable U.S. Department of Transportation (DOT) specifications. Packaging and shipping procedures to be used for environmental samples collected during the Bulk Fuel Facility investigation will include those listed below.

- Sample containers will be adequately identified with sample labels placed onto each container.
- All bottles, except those containing samples designated for VOA, will be taped shut with electrical tape.
- All glass sample bottles will be placed in bubble wrap sleeves and sealed.
- Each sample bottle will be placed into a separate plastic bag, which will then be sealed. For surface water samples, each volatile organic vial will be wrapped in paper towels, and the vials will be placed into one plastic bag. Trip blank containers will be wrapped and placed in the bag with the volatile organic vials. As much air as possible will be squeezed from the sample container bags before sealing.
- All of the sample containers will be placed upright in the coolers, along with wet ice in double plastic bags that will be placed around, among, and on top of the sample containers. Prior to initial placement of the samples into the cooler, the cooler drain plug will be taped shut from both the inside and outside, and the cooler will be lined with a large plastic bag.
- Additional inert packing material will be placed into the cooler, if required, to prevent shifting of the sample containers during transport.
- All required laboratory paperwork, including the COC form(s), will be placed inside a plastic bag and taped to the inside of the cooler lid.
- Upon completion of the packing process, the cooler lid will be closed and two signed/dated custody seals will be placed on the cooler, one across the front and one across the side.
- The cooler will be sealed with strapping tape.
- The air bill for the shipment will be completed and attached to the top of the cooler, which will then be transferred to the courier for delivery to the laboratory.

The checklist presented in Figure 6-1 will be used by the individual responsible for packaging samples to verify completeness of sample shipment preparations. In addition, the laboratory will document the condition of the environmental samples upon receipt at the laboratory. This documentation will be accomplished using the cooler receipt checklist presented in Figure 6-2. Soil gas modules will be shipped to the site in packaging specifically designed for transportation of the modules. Modules will be returned to W.L. Gore and Associates in the same packaging.

SAMPLE PACKAGING CHECKLIST

ATTN: Failure to properly handle or document the project samples could jeopardize the usability of the sample results and ultimately the project objectives. Prior to sending this cooler to Quanterra, Inc. at the address indicated on the chain-of-custody form, please check the following items:

- Is the project clearly identified on the chain-of-custody form (including the USACE delivery order number)?
- Are all enclosed sample containers clearly labeled with waterproof (permanent) ink?
- Are the required analyses indicated on the bottle labels and chain-of-custody form, and are the metals to be analyzed individually noted on the chain-of-custody form?
- Does the information on the chain-of-custody form match the information on the sample container labels?
- Has the chain-of-custody form been placed into a plastic bag and attached to the inside of the cooler lid?
- Have the samples been properly preserved (acid or base and cooling to 4°C)?
- Is the client information, including point of contact and telephone number, complete on the chain-of-custody form?
- Is there sufficient ice (double bagged in sealable plastic bags) in the cooler to ensure preservation of the samples during shipment?

Figure 6-1. Checklist of Sample Packaging

COOLER RECEIPT CHECKLIST

LIMS number ______________ Number of coolers ______________

Project: ______________________________ Date received: ______________________________

A. Preliminary Examination Phase Date cooler(s) opened: ______________

by (print) ______________________________ (signature) ______________________________

Circle response below as appropriate

1. Did cooler(s) come with a shipping slip (airbill, etc.)?........................ Yes No NA

If YES, enter courier name & airbill number here: ______________________________

2. Were custody seals on outside of cooler(s)?........................ Yes No NA

How many & where: ______________ Seal date: ______________ Seal name: ______________

3. Were custody seals unbroken and intact at the date and time of arrival?........................ Yes No NA
4. Did you screen samples for radioactivity using a Geiger Counter?........................ Yes No NA
5. Were custody papers sealed in a plastic bag & taped inside the cooler lid?........................ Yes No NA
6. Were custody papers filled out properly (ink, signed, etc.)?........................ Yes No NA
7. Did you sign custody papers in the appropriate place for acceptance of custody?........................ Yes No NA
8. Was project identifiable from custody papers?........................ Yes No NA
9. If required, was enough ice present in the cooler(s)?........................ Yes No NA

Identify type of ice used in cooler(s): ______________

10. Initial and date this form to acknowledge receipt of cooler(s): (initial) ______________ (date) ______________

B. Log-In Phase Date samples were logged-in: ______________

by (print) ______________________________ (signature) ______________________________

11. Describe type of packing in cooler(s): ______________________________
12. Were all bottles sealed in separate plastic bags?........................ Yes No NA
13. Did all bottles arrive unbroken & were labels in good condition?........................ Yes No NA
14. Was all required bottle label information complete?........................ Yes No NA
15. Did all bottle labels agree with custody papers?........................ Yes No NA
16. Were correct containers used for the analyses indicated?........................ Yes No NA
17. Were correct preservatives placed into the sample containers?........................ Yes No NA
18. Was a sufficient amount of sample sent for the analyses required?........................ Yes No NA
19. Were bubbles absent in VOA vials?........................ Yes No NA

If no, list by sample number: ______________________________

20. Has a copy of this Cooler Receipt Checklist be faxed to the SAIC Laboratory Coordinator?........ Yes No NA

Figure 6-2. Cooler Receipt Checklist

The contractor laboratory to be used by SAIC for the soil gas survey at the Bulk Fuel Facility will be W.L. Gore and Associates, Inc., 100 Chesapeake Boulevard, Elkton, Maryland 21922-0010, (410) 392-7600. The Point of Contact at the laboratory for the project will be George Shaw. The contractor laboratory to be used by SAIC for the surface water and sediment sampling along Lamar Canal will be General Engineering Laboratories, Inc., 2040 Savage Road, Charleston, South Carolina 29417, (803) 556-8171. The Point of Contact at the laboratory will be Valerie Davis.

7.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

The IDW includes all materials generated during performance of an investigation that cannot be effectively reused, recycled, decontaminated, or disposed of. The types of IDW expected to be generated during this investigation include miscellaneous solid waste (e.g., PPE, paper towels, packaging materials) and decontamination solutions.

The miscellaneous solid waste will be disposed of in a HAAF trash receptor. Decontamination fluid from surface water and sediment and soil gas module insertion and collection will be containerized in DOT-approved 55-gallon drums, labeled, and stored on site at the place of generation until an IDW evaluation can determine its status. The drums will be placed on 6-millimeter plastic bermed with landscape timbers and covered with plastic. The staging area floors will have built-up sides so as to prevent the release of any drum contents to the environment in the event of drum failure or spillage.

A sample will be collected from each drum of liquid waste and analyzed for full HAAF Acceptance Criteria (VOCs, oil and grease, and phenols). The results of this evaluation will be summarized in a letter to the contracting officer that will include a cost estimate for appropriate disposal. If these results indicate that further evaluation of IDW is necessary, modifications shall be made to the Statement of Work for the further evaluation and subsequent disposal of the IDW. At such time, SAIC shall develop a procedure for the sampling of the drummed material and make recommendations as to the necessary analyses.

If the samples are determined to be hazardous based upon the analytical results, then SAIC will immediately inform the USACE Project Manager of this situation. SAIC will implement additional sampling and analysis and arrange for transportation and disposal of this hazardous waste only upon receiving a modification to this delivery order or a new delivery order to address this issue.

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8.0 CONTRACTOR CHEMICAL QUALITY CONTROL

The Contractor Chemical Quality Control (CCQC) program to be used by SAIC for the BFF Soil Gas Survey will consist of three phases. The three CCQC phases will be the preparatory phase, the initial phase, and the follow-up phase, all of which will be performed by SAIC, whether or not a USACE Savannah District representative is present. The SAIC CQC representative responsible for implementation and documentation of the CCQC program will be the Field Site Coordinator. Four definable features of work will comprise the CCQC program and are identified as follows:

1. soil gas survey,
2. sediment sampling,
3. surface water sampling, and
4. evaluation of IDW.

The preparatory phase of the CCQC program will be conducted by the SAIC CQC representative, in conjunction with SAIC and subcontractor field personnel, prior to beginning each definable feature of work. A summary of all activities performed during each preparatory phase meeting will be documented by the CQC representative in a meeting minutes record. Each preparatory phase meeting will address the following:

- review of all pertinent sections of the SAP to ensure that all field personnel are cognizant of the overall project DQOs, specific project activities to be accomplished, and specific sampling and analysis requirements and

- actual calibration of all instruments to be used for measurement of field parameters using certified calibration standards, gases, etc.

Physical examination of all materials and equipment is required to accomplish the specific project activities, including those listed below.

- Demonstration of equipment decontamination procedures in accordance with SAP requirements.

- Demonstration of how each sample type is to be collected, containerized, documented, and packaged.

- Demonstration of proper IDW management and documentation.

- Demonstration of the procedure for completing all required information to be recorded on sample custody forms, and discussion of the project sample numbering system. Completed examples of a COC form, sample container label, and IDW drum label will be provided to the field personnel for reference.

- Demonstration/discussion of any other activities to be performed as deemed necessary by the CQC representative.

- Examination of the work area(s) to ascertain if all preliminary work is complete.

- Review of preparatory-phase field equipment and support materials.

In addition to the activities noted above, the CQC representative will ensure that the USACE QA laboratory has been contacted to schedule receipt and analysis of the government QA samples by reviewing the telephone log used to document the laboratory contact.

The initial phase of the CCQC program will be conducted by the CQC representative and will include the following:

- oversight of sampling/testing activities and review of this work to ensure compliance with delivery order requirements;
- inspection of individual sample labels and COC forms for accuracy, completeness, and consistency;
- inspection of sample packaging and shipping activities;
- observation, verification, and documentation of initial and ongoing field instrument calibration;
- inspection of field logbooks and other field records/sketches to assure that all pertinent data are recorded in accordance with delivery order requirements; and
- inspection of the QA sample match-up table to ensure that all samples collected during each day are documented properly.

The follow-up phase of the CCQC program will be conducted by the CQC representative and will involve performance of the various activities noted for the initial phase on a daily basis until completion of the particular definable feature of work.

9.0 DAILY CHEMICAL QUALITY CONTROL REPORTS

During the field investigation activities performed at the project site, SAIC will prepare Daily Chemical Quality Control Reports (DCQCRs), which will be signed and dated by the SAIC CQC representative. An example of the DCQCR format to be used by SAIC is illustrated in Figure 9-1. These reports will be submitted to the USACE Savannah District Project Manager on a weekly basis. The contents of each DCQCR will include a summary of activities performed at the project site, weather information at the time of sampling, results of measurements made with field instruments, results of CCQC activities performed including field instrument calibrations, departures from the approved SAP, problems encountered during field activities, and any instructions received from government personnel. Any deviations that may affect the project data quality objectives will be immediately conveyed to the USACE Savannah District Project Manager. The following will be attached to each DCQCR, as appropriate:

- the QA sample table that matches up primary and QA/QC samples collected,
- a copy of the COC form(s),
- a summary of field-generated analytical results,
- any other project-related forms utilized, and
- a copy of the CCQC preparatory-phase meeting minutes.

DATE ____________________

DAY	S	M	T	W	TH	F	S

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moder.	High	Report No.	
HUMIDITY	Dry	Moder.	Humid		

COE PROJECT MANAGER ____________________

PROJECT ____________________

JOB NO. ____________________

CONTRACT NO. ____________________

SUB-CONTRACTORS ON SITE:

EQUIPMENT ON SITE.

WORK PERFORMED (INCLUDING SAMPLING):

SHEET _____ OF _____

Figure 9-1. Example of the Daily Chemical Quality Control Report

(Continuation Sheet)

PROJECT. ______________________________ REPORT NO. ______________

JOB NO. ______________________________ DATE ______________

QUALITY CONTROL ACTIVITIES (INCLUDING FIELD CALIBRATIONS)
HEALTH AND SAFETY LEVELS AND ACTIVITIES.
PROBLEMS ENCOUNTERED/CORRECTION ACTION TAKEN:
SPECIAL NOTES.
TOMORROW'S EXPECTATIONS:

BY ______________________ TITLE ______________

Figure 9-1 (continued)

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10.0 CORRECTIVE ACTIONS

Corrective actions may be required for two classes of problems: analytical and equipment problems and noncompliance problems. Analytical and equipment problems may occur during sampling and sample handling, sample preparation, laboratory instrumental analysis, and data review.

Noncompliance with specified criteria and analytical/equipment problems will be documented through a formal corrective action program at the time the problem is identified. The person identifying the problem is responsible for notifying the SAIC Project Manager and the USACE Project Manager. When the problem is analytical in nature, information on these problems will be promptly communicated to the SAIC Analytical Laboratory Coordinator. Implementation of corrective action will be confirmed in writing.

If the problem is analytical in nature, information on the problem will be promptly communicated to the USACE Savannah District. Implementation of corrective action will be confirmed in writing through the same channels.

Any nonconformance with QC procedures established in the QAPP or FSP will be identified and corrected in accordance with this section. The SAIC Project Manager or his designee will issue an NCR for each nonconformance condition.

Corrective actions will be implemented and documented in the field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by stop-work order by the USACE, SAIC Project Manager, or CQC.

10.1 SAMPLE COLLECTION/FIELD MEASUREMENTS

Technical staff and project personnel will be responsible for reporting all suspected technical or QA nonconformances or suspected deficiencies of any activity or issued document by reporting the situation to the CQC or his designee. This manager will be responsible for assessing the suspected problems in consultation with the CQC and making a decision based on the potential for the situation to impact the quality of the data. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, then a Nonconformance Report (NCR) will be initiated by the CQC. An example of a NCR is presented in Figure 10-1.

The SAIC Project Manager will be responsible for ensuring that corrective action for nonconformances is initiated by

- evaluating all reported nonconformances,
- controlling additional work on nonconforming items,
- determining the disposition or action to be taken,
- maintaining a log of nonconformances,
- reviewing nonconformance reports and corrective actions taken, and
- ensuring nonconformance reports are included in the final site documentation in project files.

NONCONFORMANCE REPORT	DATE OF NCR	NCR NUMBER
	LOCATION OF NONCONFORMING ITEM	PAGE ____ OF____

INITIATOR (Name/Organization/Phone)	FOUND BY	DATE FOUND

RESPONSIBLE ORGANIZATION/INDIVIDUAL

DESCRIPTION OF NONCONFORMANCE

A INITIATOR ____ Date ____ QA/QC OFFICER ____ Date ____ CAR REQ'D YES ☐ NO ☐

DISPOSITION, PROBABLE CAUSE AND ACTIONS TAKEN TO PREVENT RECURRENCE

PROPOSED BY:

B NAME ____ Date ____ INITIATOR ____ Date ____

VERIFICATION OF DISPOSITION AND CLOSURE APPROVAL

REINSPECT/RETEST REQUIRED YES ☐ NO ☐

☐ ACCEPTABLE ☐ NOT ACCEPTABLE

IF YES: ____ Date ____ Result

QUALITY ASSURANCE:

C NAME ____ Date ____

Figure 10-1. Example of Nonconformance Report

If appropriate, the CQC or the SAIC Project Manager will ensure that no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed.

Corrective action for field measurements may include:

- repeating the measurement to check the error,
- checking for all proper adjustments for ambient conditions such as temperature,
- checking the batteries,
- recalibrating,
- checking the calibration,
- replacing the instrument or measurement devices, and
- stopping work (if necessary).

If it is determined that a procedure or protocol change is required to prevent recurrence of any problem, a Field Change Request will be completed. An example of a field change request is presented in Figure 10-2.

10.2 LABORATORY ANALYSES

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The investigative action taken is somewhat dependent upon the analysis and the event.

Laboratory personnel will be alerted that corrective actions may be necessary if

- QC data are outside the warning or acceptable windows for precision and accuracy,

- blanks contain target analytes above acceptable levels,

- undesirable trends are detected in spike recoveries or relative percent differences between duplicates,

- there are unusual changes in detection limits,

- deficiencies are detected during internal or external audits or from the results of performance evaluation samples, and

- inquiries concerning data quality are received.

In the event that a laboratory problem occurs that might jeopardize the integrity of the project, cause a QA objective not to be met, or affect data quality, the first action taken will be an assessment of the severity of the problem by the SAIC Laboratory Coordinator. If the problem is determined to be minor, the Laboratory Coordinator will initiate an appropriate corrective action that will be recorded in a memorandum submitted to the SAIC Project Manager. The Project Manager will then relate the corrective action to be implemented to the CQC representative, if the problem is associated with activities being performed in the field. If the problem is determined to be significant, the Laboratory Coordinator will initiate a NCR that will be submitted to the SAIC QA/QC Officer and addressed in the same manner as described above. Analytical NCRs will be copied to the USACE Project Manager.

Field Change Request (FCR)

FCR NO.__________ DATE INITIATED____________

PROJECT_________________________________

CONTRACT NO.____________________________

REQUESTOR IDENTIFICATION

NAME_______________ ORGANIZATION__________ PHONE__________
TITLE_______________ SIGNATURE______________________________

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED O Cost O Scope O Milestone O Method of Accomplishment
AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION)____________________
DESCRIPTION OF CHANGE:

JUSTIFICATION:

IMPACT OF NOT IMPLEMENTING REQUEST:

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

COST ESTIMATE ($)_______ ESTIMATOR SIGNATURE_________________________
PHONE________________ DATE________________

PREVIOUS FCR AFFECTED O YES O NO; IF YES, FCR NO. ________________

CLIENT PROJECT MANAGER ___________________________ DATE___________
CLIENT QA SPECIALIST ___________________________ DATE ___________
SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)________________ DATE __________

Figure 10-2. Example of a Field Change Request Form

11.0 DETAILED PROJECT SCHEDULE

A detailed project schedule is presented in Figure 11-1.

ACTIVITY ID	EARLY START	EARLY FINISH	1998 NOV – DEC / 1999 JAN – AUG
			NOTICE TO PROCEED
AB000-000	16NOV98A		Notice to Proceed
			WORK PLAN
AB001-000	17NOV98A	16JAN99	Workplan
AB001-010	17NOV98A	25NOV98A	Gantt Chart
AB001-015	17NOV98A	8JAN99	Draft Workplan
AB001-016		8JAN99	Submit Draft Workplan
AB001-020	9JAN99	12JAN99	Review by FSGA, COE of Draft WP
AB001-035	13JAN99	16JAN99	Final Workplan
AB001-036		16JAN99	Submit Final Workplan
AB001-040	13JAN99	16JAN99	Approve by FSGA, COE of Work Plan
AB001-041		16JAN99	Approval of Final Work Plan
			FIELD WORK
AB002-000	16JAN99		Initiate Field Work
AB002-010	16JAN99	8FEB99	Field Work
			IDW
AB002-011	8FEB99	18MAR99	IDW
			REPORTS
AB003-000	8FEB99	1JUN99	Reports
AB003-010	8FEB99	15APR99	Draft Report
AB003-011		15APR99	Submit Draft Report
AB003-015	16APR99	1MAY99	Review by FSGA, COE of Draft Report
AB003-030	2MAY99	21MAY99	Final Report
AB003-031		21MAY99	Submit Final Report
AB003-032	21MAY99	1JUN99	Approve by FSGA, COE of Final Report

Plot Date 5JAN99
Data Date 1JAN99
Project Start 1OCT96
Project Finish 1JUN99

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

SCOE DO33 Sheet 1 of 2

SAIC
SOIL GAS SURVEY, HAA-09 BULK FUEL
DO 33: Soil Gas Survey at HAA-009

Date	Revision	Checked	Approved

Figure 11-1. Estimated Project Schedule

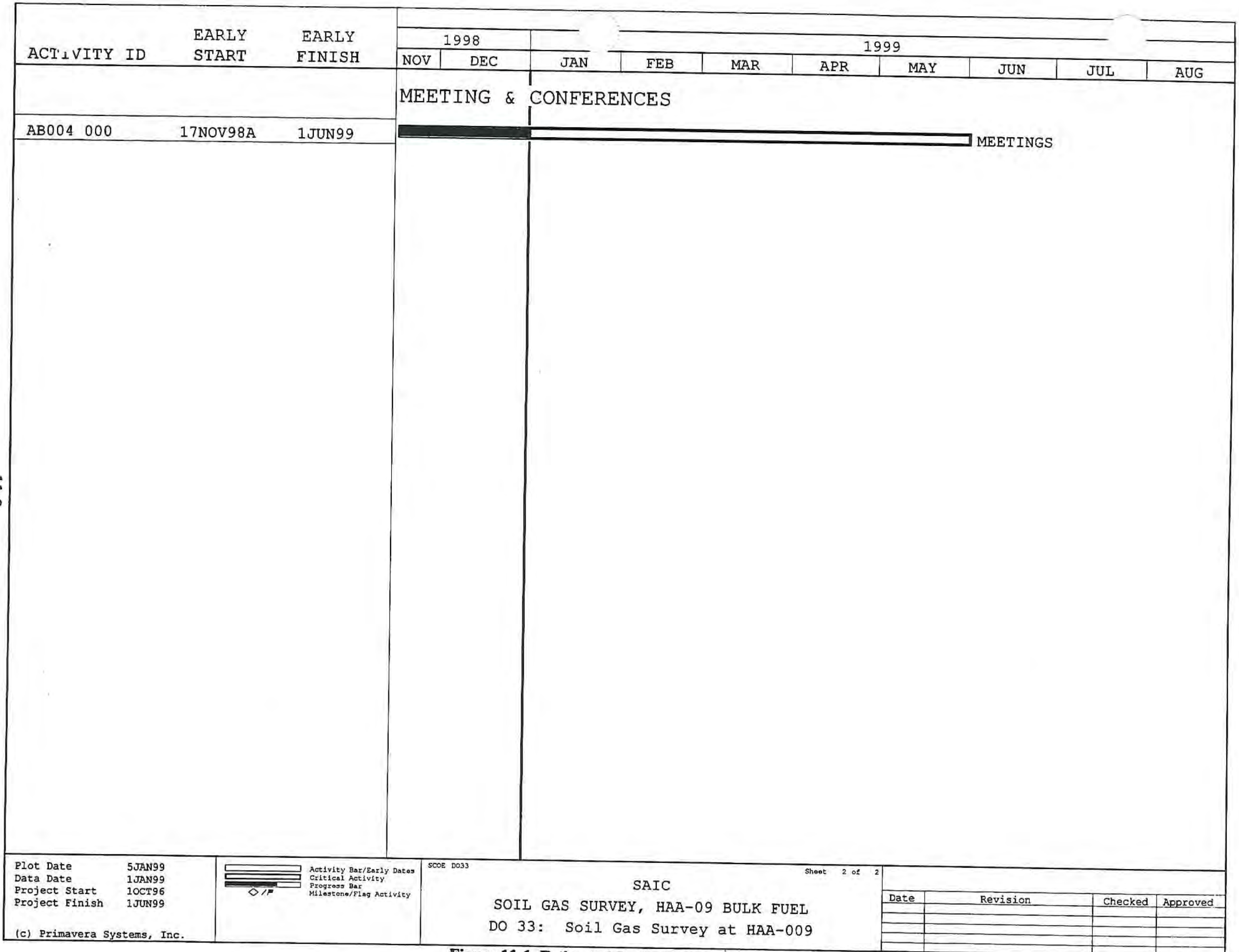

Figure 11-1. Estimated Project Schedule (continued)

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12.0 SAMPLING APPARATUS AND FIELD INSTRUMENTATION

Information regarding sampling apparatus and field instrumentation to be used for the Soil Gas Survey at Bulk Fuel Facility was previously discussed in Section 4.0 of this FSP.

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13.0 REFERENCES

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APPENDIX A

GORESORBER® QUALITY MODELING TECHNOLOGY

GORE
Creative Technologies Worldwide

W.L. GORE & ASSOCIATES, INC.

100 Chesapeake Blvd., P.O. Box 10
Elkton, Maryland 21922-0010
PHONE: 410/392-7600 FAX: 410/506-4780

ENVIRONMENTAL PRODUCTS GROUP

Date:	**December 18, 1998**	
Attention:	**Ken Swain**	**SAIC**
	Phone:	423-481-4712
	Fax:	423-481-8797
From:	**George Shaw**	**W.L. Gore & Associates Inc.**
	Phone:	410-506-4776
	Fax:	410-506-4780

Total Number of Pages: **(including this cover page)**
If you do not receive all of the pages specified above, please call (410) 392-3300 as soon as possible. Thank You
Subject: Fluids Matching

Modules exhibiting unresolved peak envelopes (UPEs) may be tentatively identified by matching the UPE to fluids in Gore's fluids library.

The aviation gasoline standard in Gore's fluids library consists primarily of early eluting compounds with a relatively simple chromatographic peak pattern. Other aviation fuel products (Jet Fuel) have chromatographic fingerprints which are more complex and cover a broader range of elution times. Due to the complexity of some chromatograms, computer matching may not be very helpful. Therefore visual matching will be performed using general categories to classify the chromatographic signal. JP4 and JP8 have very similar chromatographic peak patterns and are difficult to differentiate.

W. L. Gore has success with this process, but unfortunately the data is not available due to the confidential nature of these projects.

Please let me know if this statement is OK?

Thanks
George Shaw

QUALITY ASSURANCE PROJECT PLAN
FOR
SOIL GAS SURVEY AT BULK FUEL FACILITY (HAA-09)
HUNTER ARMY AIRFIELD, GEORGIA

January 1999

98-219PS(QAP)/WPD-4si/011499

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