NIAGARA FALLS STORAGE SITE REMEDIAL INVESTIGATION REPORT ADDENDUM

SAMPLING AND ANALYSIS PLAN REVISION 0

Contract Number: W912QR-08-D-0008

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Prepared for:

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Prepared by:

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From Science to Solutions

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ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
ASTM	American Society for Testing and Materials
AVESI	American Veteran Environmental Services, Incorporated
bgs	Below Ground Surface
BRA	Baseline Risk Assessment
CCQC	Contractor Chemical Quality Control
CDD	Central Drainage Ditch
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGI	Combustible Gas Indicator
COC	Chain of Custody
CWM	Chemical Waste Management
DO	Dissolved Oxygen
DoD	Department of Defense
DOT	Department of Transportation
DQCR	Data Quality Control Report
DQO	Data Quality Objective
E2I	Energy, Environment & Infrastructure
EDD	Electronic Data Deliverable
EM	Engineer Manual
EU	Exposure Unit
FOM	Field Operations Manager
FSP	Field Sampling Plan
FTP	Field Technical Procedure
GEL	General Engineering Laboratories, Inc.
GLC	Glacio-Lacustrine Clay
ID	Inside Diameter
IDW	Investigation-Derived Waste
IWCS	Interim Waste Containment Structure
LCS	Laboratory Control Sample
LOR	Letter of Receipt
M&TE	Measuring and Testing Equipment
MDA	Minimum Detectable Activity
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NCR	Non-Conformance Report
NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NFSS	Niagara Falls Storage Site
NTU	Nephelometric Turbidity Units
NYSDEC	New York State Department of Environmental Conservation
OD	Outside Diameter
ORP	Oxidation-Reduction Potential
OVA	Organic Vapor Analyzer
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photoionization Detector
PPE	Personal Protective Equipment
PT	Performance Testing
PVC	Polyvinyl Chloride
QA	Quality Assurance

ACRONYMS AND ABBREVIATIONS (CONTINUED)

QAAP	Quality Assurance Administrative Procedures
QAPP	Quality Assurance Project Plan
QC	Quality Control
QSM	Quality Systems Manual
RAGS	Risk Assessment Guidance for Superfund
RI	Remedial Investigation
RL	Reporting Limit
RPD	Relative Percent Difference
RPP	Radiation Protection Plan
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SOP	Standard Operating Procedure
SOW	Statement of Work
SSHP	Site Safety and Health Plan
SVOC	Semi-Volatile Organic Compound
TAT	Turn Around Time
TCLP	Toxicity Characteristic Leaching Procedure
TWP	Temporary Well Point
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WDD	West Drainage Ditch
WWTP	Waste Water Treatment Plant

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1. INTRODUCTION

Science Applications International Corporation (SAIC) has been contracted by the United States Army Corps of Engineers (USACE) Buffalo District to develop project plans for the Remedial Investigation (RI) Report Addendum field activities at the Niagara Falls Storage Site (NFSS) located in Lewiston, New York. This work is being conducted by SAIC under contract W912QR-04-D-0008 with the USACE. The general site location is shown in Figure 1-1.

1.1 PROJECT DESCRIPTION

This Sampling and Analysis Plan (SAP) describes the planned fieldwork to address data gaps for the preparation of the RI Report Addendum to supplement work previously completed at the NFSS. As part of planned fieldwork activities, 23 temporary well points (TWPs) will be installed and sampled for soil and groundwater to further delineate the groundwater plumes at the NFSS. Ten of the 23 TWPs will be converted to permanent monitoring wells in the upper groundwater bearing unit in the brown clay unit, which underlies the Interim Waste Containment Structure (IWCS).

The TWPs will be installed in the brown clay unit to screen encountered sand lenses above the confining glacio-lacustrine clay (GLC) unit [average depth of 16 ft below ground surface (bgs)] at locations identified by SAIC with concurrence from USACE – Buffalo District. Completion depths of the TWPs will vary based on the depth of the sand lenses encountered, but will not penetrate the GLC confining unit. Figure 1-2 identifies the Exposure Units (EUs) where the investigation will be conducted. The TWP locations are shown on an individual level for each EU in Section 3.0. Final drilling locations may change slightly based on the results of utility clearances and site conditions upon mobilization to the field.

1.2 PROJECT GOALS AND OBJECTIVES

The primary objectives applicable to the project include:

- The preparation of a SAP to be submitted for USACE Buffalo District review and approval that addresses the necessary technical procedures and requirements for the installation of groundwater monitoring wells to further delineate the plumes at NFSS. A separate Site Safety and Health Plan (SSHP) and Radiation Protection Plan (RPP) will also be developed to support the on-site activities identified in this SAP.

- The completion of on-site and off-site activities described in the final approved SAP to support the preparation of the RI Report Addendum. Specifically, this project will investigate sand lens occurrence, minimize the areas of uncertain data coverage, determine inhalation risk to future construction workers, and further delineate the off-site extent of the RI groundwater plumes.

1.3 ORGANIZATION OF PROJECT PLANS

This SAP presents the technical objectives, rationale, procedures, and requirements associated with the completion of the RI Addendum sampling activities, including field sample collection and subcontracted laboratory analyses.

The SSHP addresses planned on-site activities identified in this SAP, and includes an Activity Hazard Analysis (AHA) for each significant field task. The RPP, included as Attachment I to the SSHP, presents procedures and requirements associated with radiological protection, monitoring, and the release of equipment and materials from the site.

1.4 PROJECT SCHEDULE

The NFSS RI Addendum field activities schedule is presented in Figure 1-3.

Under the project schedule, the estimated timeframe to complete the RI SAP and obtain USACE approval is 56 calendars days following notice-to-proceed. Field activities to install the TWPs and complete installation and sampling of the permanent monitoring wells is estimated to require 40 calendar days.

2. PROJECT MANAGEMENT AND ORGANIZATION

SAIC is the prime contractor for all project activities and will utilize a team of subcontractors for on-site field activities and off-site laboratory sample analyses. The on-site field team will include management personnel from SAIC and subcontractor personnel to support health physics, drilling and well installation, and site survey activities. The following subcontractors will be utilized during the project:

<u>On-Site Subcontractors</u>

Name: American Veteran Environmental Services, Incorporated (AVESI)
Address: 1246 Illini Drive
O'Fallon, IL 62269
Project Role: Health Physics Support

Name: Frontz Drilling
Address: 2031 Millersburg Rd
Wooster, OH 44691-9460
Project Role: Drilling and installation of TWPs and permanent monitoring wells

Name: Niagara Boundary and Mapping Services
Address: 2475 Military Road,
Niagara Falls, NY 14304
Project Role: Monitoring Well and Temporary Well Point Survey

<u>Off-Site Subcontractors</u>

Name: General Engineering Laboratories, LLC (GEL)
Address: 2040 Savage Road
Charleston, SC 29407
Project Role: Analytical Laboratory

2.1 PROJECT ORGANIZATION

Table 2-1 identifies key SAIC and on-site subcontractor personnel, their project role, and contact information.

Management organization for the project is summarized in Figure 2-1. The field team for on-site activities will include personnel from SAIC, AVESI, Frontz Drilling, Niagara Boundary, and USACE - Buffalo District.

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3. PROJECT SCOPE AND OBJECTIVES

This section describes the methodology and rationale for the field sampling-related activities outlined in the USACE Statement of Work (SOW), and summarizes the project objectives stated in the SOW and the NFSS RI.

3.1 SCOPE OF WORK ACTIVITIES

The scope of this investigation includes: installing 23 TWPs and sampling for soil and groundwater; converting 10 TWPs to permanent monitoring wells; and conducting groundwater sampling of the newly completed permanent monitoring wells. This investigation will provide data necessary to further delineate the extent of groundwater plumes in the upper groundwater bearing zone at different EUs at NFSS. The TWPs will initially be installed and sampled using modified low-flow groundwater sampling methods with an accelerated laboratory turnaround time (TAT). These analytical results and field observations will be used to determine which TWPs will be converted to a total of 10 permanent monitoring wells. The permanent monitoring wells will be sampled for groundwater using low-flow sampling methods. The 13 TWPs that are not converted to permanent monitoring wells will be abandoned in accordance with all State of New York applicable laws and regulations.

Additionally, three of the TWPs will be installed to collect soil gas parameters, which will be collected, analyzed, and evaluated in accordance with the Department of Defense (DoD) Vapor Intrusion Handbook (DoD 2009).

3.2 GOALS AND OBJECTIVES

The goals and objectives for this NFSS RI Report Addendum fieldwork effort are to obtain necessary data to address data gaps. The specific areas being addressed by this field effort are to:

- Define potential off-site extent of total/dissolved uranium plume in groundwater west of the IWCS and east of the West Drainage Ditch (WDD) (i.e., EU 9/10);
- Define potential off-site extent of total/dissolved uranium plume in EU 1/Town of Lewiston wastewater treatment plant (WWTP);
- Define potential off-site extent of total/dissolved uranium/volatile organic compound (VOC) plume in EU4/Chemical Waste Management (CWM);
- Define potential off-site extent of total/dissolved boron in EU 4/CWM;
- Investigate the presence of dense nonaqueous phase liquid (DNAPL) associated with well 415A in E U4;
- Investigate sand lens occurrence near the IWCS to determine if there is a preferential pathway from the IWCS area off-site and delineate the extent of uranium contamination in groundwater to the north, west, and south sides of the IWCS;
- Install groundwater monitoring wells that will allow USACE to monitor the extent of potential off-site plumes and determine the potential for a cell breach; and
- Collect soil gas samples in the acidification area (EU 4) to evaluate the potential inhalation risk to a future construction worker.

These goals and objectives were used in the planning of this SAP to determine the locations of the TWPs as discussed in Section 3.2.2.

3.2.1 Data Quality Objectives

To avoid any uncertainty, the following list restates the RI Data Quality Objectives (DQOs) originally presented in the Phase I FSP (USACE 1999). These are the fundamental objectives of the RI and will work in conjunction with the DQOs and goals developed for this RI Report Addendum investigation:

- Obtain information of sufficient quantity and quality to meet the requirement of a site inspection as described in *Guidance for Performing Site Inspections Under CERCLA: USEPA Directives 93.151-05*, (USEPA 1992b);
- Obtain information of sufficient quantity and quality to meet the requirement for use in a risk assessment as described in *Guidance for Data Usability in Risk Assessment* (USEPA 1992a);
- Obtain information of sufficient quantity and quality to meet the requirements for development of a Baseline Risk Assessment (BRA) based on *USEPA Risk Assessment Guidance for Superfund (RAGS)*, (USEPA) 1989 and subsequent guidance documents;
- Obtain information of sufficient quantity and quality to identify sources of contamination and migration pathways to adequately characterize potential contamination at areas included in this investigation; and
- Install TWPs and monitoring wells, and use the existing monitoring well network to collect groundwater samples and collect soil, sediment and surface water samples to obtain information of sufficient quantity and quality for determining if contaminants are migrating off-site or migrating on-site from off-site sources.

3.2.2 RI Report Addendum DQOs

RI Report Addendum activities have been designed to address comments, concerns and data gaps identified by federal, state, and local regulatory agencies and the public following release of the RI Report in 2007. Tasks to be completed for the RI Report Addendum have been defined based on review of written comments from federal, state, and local oversight agencies and the public, as well as from discussions held between USACE and the public during public information workshops.

The main focus of the RI Report Addendum sampling effort is to define the extent of possible off-site migration of groundwater plumes in EUs 1, 4, and 10. To complete this objective, this SAP has been developed to be consistent with DQOs used during the initial three phases of the NFSS RI. These DQOs are listed in Section 3.2.1. Also included in this SAP is a clear and definitive rationale for the proposed soil boring/TWP locations developed to meet the goals and objectives outlined in Section 3.2 and 3.2.1. The boring/TWP locations, hereafter referred to as the TWP locations, are listed in Tables 3-1 through 3-3. The tables also present a general description of each sampling location, approximate sample depths, and analyses to be collected for each TWP within each EU. Figures 3-1 through 3-3 present the proposed TWP locations for EUs 1, 4 and 10, respectively.

4. WELL INSTALLATION AND SAMPLING

This section outlines the procedures and requirements associated with the RI Addendum activities.

4.1 GENERAL FIELD PROCEDURES

General field procedures are described in SAIC Field Technical Procedures (FTPs). The FTPs that will be used during this investigation include:

- FTP-370 Groundwater Sampling Procedures: Water Level Measurements
- FTP-400 Equipment Decontamination
- FTP-405 Cleaning and Decontaminating Sample Containers and Sampling Equipment
- FTP-525 Soil Sampling Using an Auger
- FTP-550 Soil Sampling Using a Spade or a Scoop
- FTP-600 Groundwater Sampling Procedures: Using a Bailer
- FTP-625 Chain of Custody (COC)
- FTP-650 Labeling, Packaging, and Shipping of Environmental Field samples
- FTP-651 Hazardous Materials/Dangerous Goods Shipping for Field Work
- FTP-750 Field Measurement Procedures: Organic Vapor Detection
- FTP-752 Field Measurement Procedures: Combustible Gas Detection
- FTP-880 Field Measurement Procedures: pH, Temperature and Conductivity
- FTP-910 Field Measurement Procedures: Turbidity
- FTP-955 Field Measurement Procedures: Dissolved Oxygen
- FTP-1215 Field Logbooks and Field Forms
- FTP-1220 Documenting and Controlling Field Changes to Approved Work Plans
- FTP-1225 Field Demobilization Checklist for Project-Generated Waste

The above FTPs are included in Appendix A. The FTPs reference NRC Regulatory Guide 1.86; however, the activities at NFSS are not subject to NRC requirements, but will be conducted in accordance with all USACE policies and procedures. The NRC Regulatory Guide 1.86 values are identical to Table 6-4 of the USACE Radiation Protection Manual (EM-385-1-80).

4.2 TEMPORARY WELL POINT INSTALLATION

Twenty-three TWPs will be installed to an approximate depth of 16 ft bgs in sand lenses encountered in the brown clay overlying the gray confining clay layer to characterize and determine the extent of the plumes in the vicinity of the IWCS and other EUs. Completion depths of the wells will vary based on the depth of encountered sand lenses and confining gray clay layer; the TWPs will not extend into the confining gray clay layer. The soil cores will be continuously logged by the field geologist and screened for volatile organic compounds (VOCs) using a photoionization detector (PID) and for radionuclides using a gamma scan. Surface and subsurface soil samples will be collected from each TWP boring. Information obtained during drilling activities will be described and recorded in the field logbook as stated in Section 5.2.2.

4.2.1 Drilling Methods and Equipment

The conventional drilling technique using a hollow stem auger will be used to install all wells. Drilling procedures will be consistent with EM 1110 -1-4000 (USACE 1998). A hollow stem auger drill rig using 8.3 cm (3.25 inches) inside diameter (ID) hollow stem augers will complete the borings. Soil samples will be collected continuously from the ground surface to the GLC interface using a 5.1 cm (2.0 inches) outside diameter (OD)/ 0.6 m (2.0 ft) length stainless steel split spoon for the drill rig,. Once the GLC layer is encountered, drilling will terminate, and the TWP will be installed.

All drilling equipment will be cleaned with steam or pressurized hot water before arriving to the site. After arrival, but before commencement of drilling activities, all drilling equipment will be cleaned with steam or pressurized hot water using approved water at a decontamination pad.

Similar decontamination of drilling and sampling equipment will be conducted upon completion of each monitoring well borehole. However, only the equipment used or soiled during the drilling and sampling activities at each borehole location will undergo decontamination.

A temporary drilling equipment decontamination pad will be constructed to allow for containment and collection of decontamination solid and liquid wastes and to minimize loss of over-spray water during decontamination activities. Solid and liquid wastes generated from the decontamination process will be managed in accordance with the procedures defined in Section 4.15 of this SAP.

4.2.2 Temporary Well Point Materials

4.2.2.1 Casing/Screen

The casing and screen materials for monitoring wells will be schedule 40 polyvinyl chloride (PVC). Casing and screen materials will be 5 cm (2.0 in) diameter and the screen will be 10-slot. Default screen lengths will be 10 ft, unless subsurface conditions warrant the use of a screen of a different length (e.g., 5 ft). Two feet of the well screen will be installed above the interval where the upper most sand lens is encountered and the screen may encompass multiple sand lenses over the screened length.

All well screens and casing used for TWP construction will be free of foreign matter (e.g., adhesive tape, labels, soil, grease) and will be washed with approved water before use. However, for materials with intact manufacturer packaging, no prewashing will be conducted. Washed screens and casings used for construction will be free of unsecured couplings, ruptures, and other physical breakage and/or defects.

4.2.2.2 Filter Pack and Bentonite Seal

The granular filter pack to be used for this investigation will be No. 00N. Bentonite will be compressed powered pellets or chips generally measuring 0.63 cm (0.25 inch) in size for the annular sealing applications. During the initial installation of the TWPs, the seal will be extended to the ground surface. If the TWP is selected to be a permanent monitoring well, see Section 4.5 of this SAP. Due to the expected shallow depths of the TWPs, the filter pack and bentonite may be placed by gravity feed through the augers.

4.2.3 Temporary Well Point Surface Completions

TWPs will not have a protective casing or well pad installed during the initial field effort. A locking well cap will be placed on the TWP to secure it during breaks in the field effort schedule.

4.2.4 Temporary Well Point Development

As with previous field activities for the NFSS RI [Section 4.4.1 of the Phase I FSP (USACE 1999)], TWPs will not be developed prior to sampling.

4.2.5 Temporary Well Point Abandonment

TWPs that will not be converted to permanent monitoring wells will be abandoned following guidance from the New York State Department of Environmental Conservation (NYSDEC) *Groundwater Monitoring Well Decommissioning Procedure* (NYSDEC 2009). The TWP casing will be removed from each borehole. If the formation does not collapse, the bottom of the TWP casing will be punctured to allow grout to be added as it is removed. If it is a collapsible formation, the TWP will be overdrilled to ensure the well casing is removed entirely and the grout is placed properly within the entire length of the borehole. Grout will be placed from the bottom of the borehole to within 0.3 m (1 ft) of the ground surface, and the surface will be graded using adjacent soil and leveled to match the site conditions.

4.3 GROUNDWATER SAMPLING FROM TEMPORARY WELL POINTS

The following groundwater sampling procedures were developed to be consistent with previous NFSS RI sampling activities. Samples will be collected for isotopic uranium, both filtered and unfiltered, from up to 20 of the TWP locations, and for VOCs from up to five of the TWP locations. A Horiba® U-22 will be used to collect pH, specific conductivity, temperature, turbidity, dissolved oxygen and oxidation-reduction potential. Results will be documented as presented in Section 5.0 of this SAP.

4.3.1 Water Level Measurement

Static water level measurements will be taken using an electronic water level indicator following FTP-370 and as summarized below.

The indicator probe will be lowered into each TWP without touching the probe to the well casing until the alarm sounds and/or the indicator light illuminates. The probe will then be withdrawn several feet and slowly lowered again until the groundwater surface is contacted as noted by the alarm and/or indicator light. All probe cords used for measurement will be incrementally marked at 0.006 m (0.02 ft) intervals. Water levels will be estimated to the nearest 0.003 m (0.01 ft) based on the difference between the nearest probe cord mark to the top of the well casing.

The distance between the top of casing and the groundwater surface will be recorded to within 0.3 cm (0.01 ft). The static water level measurement procedure will be repeated two or three times to ensure that the water level measurements are consistent (± 0.3 cm or 0.01 ft). If this is the case, then the first measured level will be recorded as the depth to groundwater. If this not the case, the procedure will be repeated until consistent readings are obtained from three consecutive measurements.

4.3.2 Sampling Methods

A modified low-flow sampling technique will be used to collect grab samples from the TWPs. A peristaltic pump will be used for sample collection. The pumping rate should not exceed 100 mL/min unless it can be shown that higher rates will not disturb the static water column above the well screen (i.e., will not result in water level drawdown). Tubing will be placed above the accumulated sediment in the TWP to avoid as much as possible drawing it into the sample tubing. An initial reading of water quality parameters (e.g., pH, temperature, specific conductance, dissolved oxygen, oxidation-reduction potential) will be collected using a Horiba® U-22 prior to sample collection with the first water removed from the TWP. Due to the very slow recharge in some areas of the site, the purged water volume will be enough to collect the initial readings only and then the samples will be collected. After sampling is completed, a round of water quality parameters will be recorded. New sample tubing will be used between TWP locations.

Where modified low-flow sampling with a pump cannot be accomplished, sampling of the TWPs will be conducted with a Teflon® bailer in accordance with FTP-600.

4.3.3 Filtration

The method used for collection of field-filtered groundwater samples for metals and radiological analysis from monitoring wells will depend on whether a bailer, bladder, or peristaltic pump is used for the sample collection.

Filtered groundwater samples will use an in-line pre-sterilized, disposable 0.45-µm pore size barrel filter affixed to the pump discharge line. Samples will be collected directly into the sample containers from the discharge port of the filter.

In the event bailers are required for sampling, samples collected for dissolved metals will be filtered using a pre-sterilized, disposable 0.45-µm pore size filter assembly. Before collecting the water sample, the pump and filter apparatus will be assembled. A bailer will then be lowered into the monitoring well, filled with groundwater, and raised to the surface. The groundwater will be transferred from the bailer to a decontaminated collection flask and poured into the filter funnel portion of the filter assembly. Care will be taken to avoid transferring solids that may have settled to the bottom of the collection flask. A hand-operated pump will be used to create a vacuum to start filtration. Sample bottles will be filled with the filtered water. Filters will be replaced as they become restricted by solid buildup as well as between sample collection sites.

Both metals and radiological parameters will be collected for filtered and unfiltered analysis during this investigation.

4.4 SOIL GAS SAMPLING FROM TEMPORARY WELL POINTS

Soil gas samples will be collected from the three TWPs where the geotechnical samples are collected (Figure 3-2) after the expedited groundwater sampling is completed. The following sampling procedure will be followed:

1.) An air-tight PVC cap with a sample port and valve will be placed over the top of the well casing and allowed to sit for a minimum of 24 hours.
2.) After the 24-hour period, sampling will begin by attaching new, flexible PVC tubing to the sample port. The port will be opened and a reading will be collected with a PID.
3.) The port will be closed and a pump will be attached to the tubing. Two air volumes will be purged at a maximum purge rate of 200 mL/min.
4.) After purging is complete, a PID reading will be recorded.
5.) The tubing will then be attached from the sample port to a 6-Liter suma canister with a dedicated regulator.
6.) The valve will be opened, and the suma canister will collect the sample for 8 hours.
7.) At the conclusion of 8 hours, the valve will be closed and the tubing will be removed from the suma canister.
8.) A final PID reading will be collected at the time the suma canister is disconnected from the tubing.

New flexible PVC tubing will be used for each sample collected. Each suma canister will be labeled with the start and end date, time of the sampling event, and the sampling location. The sample will be packaged for shipment to the analytical laboratory for normal TAT and shipped via overnight carrier to the contracted analytical laboratory.

4.5 PERMANENT MONITORING WELL INSTALLATION

Monitoring well installation will be conducted in accordance with EM 1110-1-4000 *Monitoring Well Design, Installation, and Documentation at Hazardous Toxic, and Radioactive Waste Site* (USACE 1998). A discussion of the monitoring well installation process to be used is presented below. The actual monitoring well design may be modified due to location-specific requirements, well completion depths, or subsurface conditions.

4.5.1 Surface Completions

TWPs converted to permanent monitoring wells will be constructed as above-grade installations. The well protection assembly to be used for construction of monitoring wells will be composed of new iron/steel protective casing. Protective casings will be equipped with locking iron/steel covers. Covers on the protective casings will be such that the possibility of water leakage is minimized. Protective casings installed above grade will be surrounded by four new iron/steel guard posts to protect the casings and to assist in future identification and avoidance. Each guard post and the protective casing shall be brush painted with two coats of high-traffic yellow paint suitable for industrial use exterior metal application. All locks on protective casings installed during the investigation will be opened by a single key and will match the existing locks at NFSS.

The diameter of all protective casings will be 15.2 cm (6 inches). The length of protective casing used for above-grade well installations will be a 1.8 m (6.0 ft), approximately 0.9 m (3.0 ft) of which will extend below the ground surface. The guard posts installed around the above-grade protective casings will be at least 7.6 cm (3.0 inches) in diameter, and the top of each post will be modified to preclude the entry of water. The guard post length will be 1.8 m (6.0 ft), with approximately 0.6 m (2.0 ft) extending below the ground surface.

All protective casing materials will be steam cleaned before placement; free of extraneous openings; and devoid of any asphaltic, bituminous, encrusting, and/or coating materials (with exception of black paint or primer applied by the manufacturer). Washed protective casing materials will be stored in plastic sheeting until immediately before placement around monitoring well casings.

A sloping concrete pad measuring 36 x 36 square inches shall be poured around the exterior of the protective casing. The thickness of the pad shall be no less than 4-inches. Brass survey markers will be provided by the selected subcontractor and mounted in each of the concrete pads. Following placement and curing of the concrete pad, a drainage port measuring approximately 0.25-inches in diameter shall be drilled into the protective casing 0.12 feet above the top of mortar collar and the well identification number stamped into the brass survey marker.

4.5.2 Grout

Grout used during the investigation will be composed of Type I Portland cement, approximately 6 pounds dry weight bentonite per 42.6-kilogram (94-pound) sack of dry cement, and a maximum of 0.02 to 0.03 m^3 (6 to 7 gallons) of approved water per sack of cement. The amount of water used to prepare grout mixtures will be minimized to the greatest extent possible.

All grout materials will be combined in an above-ground rigid container or mixer, and mechanically blended on-site to produce a thick, lump-free mixture throughout the mixing vessel. The grout may be placed using a tremie pipe of rigid construction for vertical control of pipe placement. The tremie pipe will be equipped with side discharge holes rather than an open end to help maintain the integrity of the underlying material onto which the grout is placed. Grout may be placed by gravity feed for permanent wells where the seal is within 3 ft of the ground surface.

4.5.3 Well Development

Monitoring well development will be conducted in accordance with EM 1110-1-4000 *Monitoring Well Design, Installation, and Documentation at Hazardous Toxic, and Radioactive Waste Site* (USACE 1998). The development of monitoring wells will be initiated between 48 hours and seven days from internal mortar collar placement or final grouting of the wells.

Well development will be conducted using a submersible pump and PVC surge block (capped, weighted PVC pipe section filled with clean filter sand) to aid in the removal of sediment from the well and filter pack.

Development will proceed until the four following criteria are met:

- Turbidity is less than or equal to 20 Nephelometric Turbidity Units (NTUs);
- Sediment thickness in the well is less than 30mm (0.1 ft);
- A minimum of five times the standing water volume in the well (to include the well screen and casing plus saturated annulus, assuming 30% porosity); and
- Indicator parameters measured using a Horiba® U-22 (e.g., pH, temperature, and specific conductance) have stabilized to ±0.2 pH units, ±0.5 °C, and less than 10% variation in the conductivity for three successive well volumes.

For each monitoring well developed during the field investigation, a record will be prepared to include information specified in Section 5.2.2.4

During the course of well development, the USACE Project Manager will be contacted for guidance if well recharge is so slow that the required volume of water cannot be removed during 48 consecutive hours of development, if persistent water discoloration is observed after completion of the required volume removal, or if excessive sediment remains after completion of the required volume removal.

4.6 GROUNDWATER SAMPLING FROM PERMANENT MONITORING WELLS

The following groundwater sampling procedures were developed to be consistent with previous NFSS RI sampling activities. Samples will be collected for VOCs, semi-volatile organic compounds (SVOCs), Pesticides/polychlorinated biphenyls (PCBs), and filtered and unfiltered metals and radiological parameters with the complete list of parameters, presented in Table 4-1. A Horiba® U-22 will be used to collect pH, specific conductivity, temperature, turbidity, dissolved oxygen, and oxidation-reduction potential. The results will be documented as presented in Section 5.0 of this SAP during well purging prior to sample collection.

Due to the different objectives for the sampling in the EUs, identified in Section 3.2, if minimum volume is encountered the parameters collected will be prioritized based on the EU. If the wells are producing minimal water in EUs 7, 9, and 10 and EU1 collecting the radiological samples will be collected first. In contrast, VOC parameters will be collected first rather than the radiological parameters in EU4.

4.6.1 Water Level Measurement

Static water level measurements will be performed using an electronic water level indicator following the same procedure presented for the TWPs in Section 4.3.1.

4.6.2 Purging and Sampling Methods

Groundwater sampling activities will follow the requirements of *EM 200-1-3 C.2 Groundwater Sampling* (USACE 2001d). It is anticipated that groundwater sampling will begin no sooner than 7 days after the completion of well development. Purging and sampling of monitoring wells will be accomplished using either a disposable bailer or a low-flow micro-purge pump. The use of a peristaltic pump will be the preferred method. A bailer will be used only if attempts to use a peristaltic pump are unsuccessful (i.e., insufficient recharge). Water quality parameters will be measured using a flow-through cell designed specifically for micro-purge sampling.

To minimize the quantity of liquid investigation-derived waste (IDW) generated as a result of well purging, wells will be micro-purged where conditions permit, as follows:

- A peristaltic pump will be used for purging and sample collection;
- The purge rate should not exceed 100 mL/min unless it can be shown that higher rates will not disturb the static water column above the well screen (i.e., will not result in water level drawdown);
- The volume purged is either two pump and tubing volumes, or a volume established through in-line monitoring, and stabilization of water quality parameters such as pH, temperature and specific conductance. Water quality parameters of pH, temperature, and specific conductance will be recorded every 5 minutes during purging using a Horiba® U-22. Stabilization will be complete when two successive readings have stabilized to ±0.2 pH units, ±0.5 °C, and less than 10% variation in the specific conductivity; and
- Sample collection should occur immediately after purging.

Where modified low-flow micro-purging and sampling cannot be accomplished, purging and sampling will be conducted with a Teflon® bailer in accordance with FTP-600.

4.6.3 Filtration

The method used for collection of field-filtered groundwater samples for metals and radiological analysis will depend on whether a bailer, bladder or peristaltic pump is used for the sample collection.

Filtered groundwater samples collected using a bladder or peristaltic pump will use an in-line pre-sterilized, disposable 0.45-μm pore size barrel filter affixed to the pump discharge line. Samples will be collected directly into the sample containers from the discharge port from the filter.

In the event bailers are required for sampling, samples collected for filtered parameters will use a pre-sterilized, disposable 0.45-μm pore size filter assembly. Before collecting the water sample, the pump and filter apparatus will be assembled. A bailer will then be lowered into the monitoring well, filled with groundwater, and raised to the surface. The groundwater will be transferred from the bailer to a decontaminated collection flask, and poured into the filter funnel portion of the filter assembly. Care will be taken to avoid transferring solids that may have settled to the bottom of the collection flask. The hand-operated pump will be used to create a vacuum to start filtration. Sample bottles will be filled with the filtered water. Filters will be replaced as they become restricted by solids buildup as well as between sample collection sites.

4.7 SOIL SAMPLING OF TEMPORARY WELL POINTS

Surface and subsurface soil samples will be collected to be consistent with previous NFSS RI activities, and in accordance with EM *200-1-3 C.6 Soil Sampling*. Logging information is presented in Section 5.2.

Two soil samples will be collected from each of the 23 TWPs, a surface soil and a subsurface soil sample. Samples will be analyzed for VOCs, SVOCs, pesticides/PCBs, PAHs, metals, and radiological parameters for 20 of the TWPs. Three TWPs will be installed for soil gas sampling purposes, and soil samples will be analyzed for VOCs, metals (including boron), and isotropic uranium only. Geotechnical samples will be collected for soil moisture, bulk density, and porosity from those same three locations.

4.7.1 Surface Soil Samples

Surface soil sampling methods will be consistent with previous NFSS RI sampling and will follow the procedure presented below.

1.) Collect sample from the ground surface to 6 in bgs with a stainless steel shovel, bucket auger, or spoon;
2.) Remove vegetation matter, rock, and other debris from sample (the top 5 cm that contains only organic debris will not be included);
3.) Collect VOC sample and place in appropriate sample jar;
4.) Place remaining sample material in stainless steel bowl and homogenize; and
5.) Place samples in appropriate sample jars.

Soil samples will remain chilled until shipped to the analytical laboratory. Excess soil will be managed as IDW per Section 4.15.

4.7.1.1 Non-Soil Gas TWPs

Twenty TWPs will be analyzed for VOCs, SVOCs, pesticides/PCBs, PAHs, metals, and radiological parameters as presented in Table 4-1. Samples will be submitted for seven day TAT for analysis so that the laboratory data will be available to finalize the location of TWPs to be converted to permanent monitoring wells.

4.7.1.2 Soil Gas TWPs

Three TWPs will be installed to collect soil gas samples. The analytical parameter list is different from the other 20 TWPs and is presented in Table 4-1. These three TWPs will only be analyzed for VOCs, metals (including boron), and isotropic uranium. The samples analysis schedule will be a normal TAT.

4.7.2 Subsurface Soil Samples

Subsurface soil samples will be collected from 6 in bgs to the termination depth with a hollow stem auger. Samples will be collected in 2 ft intervals until the GLC layer is encountered. Soil cores will be field screened prior to placing soil in sample containers for radiological activities and VOCs. This field screening will determine where the subsurface soil sample will be collected.

VOCs will be measured in the field using the headspace method. Upon removing the soil core it will be screened with a PID. If the PID reading is above background, a portion of the sample will be field screened by PID using the headspace method and the other portion will be placed in the sample jar and retained for potential laboratory analysis. The objective of VOC field screening is to categorize the soil by the quantity of organic vapors present. A portion of the sample will be transferred to a plastic re-sealable storage bag so that the bag is approximately half full and sealed. Headspace will be allowed to develop for a minimum of 10 minutes at a minimum temperature of 70°F. Bags are permitted to be shaken for 15 seconds at the beginning and end of the headspace development period. In the event ambient temperatures are below that specified, all samples will be warmed in a vehicle or building prior to headspace analysis. After headspace development, the PID sampling probe will be inserted into a small opening in the bag and the highest meter response will be recorded as the headspace reading.

Radiological field screening will be performed using the method a Ludlum 43-10 NaI 2x2. The 2x2 will be used prior to opening the split spoon and once it is open to identify any areas of activity (i.e. areas to be sampled),

.

If field screening, for both screening methods, is below background, a soil sample near the top of the saturated zone (if encountered) in each borehole will be submitted to the laboratory for analysis. If no saturated zone is encountered, the sample immediately above the GLC interface will be submitted to the laboratory for analysis.

If field observations or field screening above background indicates potential radiological or chemical contaminants, the sample with the highest reading will be submitted to the laboratory for analysis.

Due to the different objectives for the sampling in the EUs, identified in Section 3.2, the field screening results will be prioritized based on the EU. If radiological field screening indicates above background activity in EUs 7, 9, and 10 and EU1 the location with the highest above background radiological activity will be sampled rather than highest above background VOC readings. In contrast, VOC readings above background will be prioritized rather than above background radiological readings in EU4.

Only one subsurface sample from each boring will be submitted for laboratory analysis.

4.7.2.1 Non-Soil Gas TWPs

The subsurface soil collected from the 20 TWPs (that soil gas samples will not be collected from) will be analyzed for the same parameters as the samples presented in Section 4.7.1.1. Samples will be submitted for an expedited seven day TAT analysis. This data will be used to finalize which TWPs will be converted to permanent monitoring wells.

4.7.2.2 Soil Gas TWPs

The subsurface soil analytical parameters for the three soil gas TWPs are the same as the surface sample parameters presented in 4.7.1.2. The samples do not require an accelerated TAT, and will be analyzed for a normal TAT.

4.7.3 Geotechnical Samples

Six geotechnical samples will be collected during this investigation. The geotechnical samples will be collected from the three soil gas TWPs. Soil Gas TWPs will be installed after the other 20 TWPs are complete, so that the depths of the geotechnical samples to be collected can be determined prior to drilling activities.

The following geotechnical samples will be collected:

- Soil Moisture by ASTM D-2216;
- Bulk Density by ASTM D-5057; and
- Porosity by USACE EM 1110-2-1906 App II.

It is anticipated that one geotechnical sample will come from the unsaturated brown clay layer and the other will come from the saturated zone of the brown clay layer. If no saturated zones are encountered, then a geotechnical sample just above the GLC interface will be collected and submitted for analysis for soil moisture, bulk density and porosity.

4.8 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

All investigation materials will be delivered to the NFSS by the contractor or subcontractor. Upon delivery to the site, the Field Operations Manager (FOM) will inspect all materials to ensure the required types of materials have been delivered and that materials have not been damaged or contaminated during transport to the site. During this inspection, the FOM will collect and file any material certification documentation attached to or accompanying the materials. All material certification documentation will be maintained on-site until completion of the project, at which time the documentation will be transferred to the project evidence file. All materials will be stored in a dry and secure location until the investigation activities.

4.9 WATER SOURCE

The potable water source used during this investigation for field activities and decontamination purposes will be identified by USACE NFSS personnel and approved by USACE before use. The water source will be used during the investigation for preparation of grout and cement mixtures used in the installation of the TWPs and well pad installation for permanent wells, the hydration of the bentonite seal for the TWP and the decontamination of drilling and sampling equipment. If an approved water source is available and analytical data document its suitability, this water source may be used without additional analyses.

If a water source has not been approved, a sample for the potable source will be collected before starting field activities. Procedures for the collection, preservation, shipping, and documentation of this sample and other related requirements, are defined in the subsequent sections of this SAP and in Appendix C, Section C-4, of USACE Procedure EM 200-1-3. One quality control (QC) trip blank will be placed into the cooler used for transport of the sample from the field to the contracted laboratory. The water sample will be submitted to the contracted laboratory for analysis of the contaminants to be evaluated during the investigation. The water source will only be used if analytical results indicate that the source is free of contaminants.

Water used for the project will also comply with the requirements defined in Section 3-9, Subsection b, item #1f of the USACE Procedure EM 1110-1-4000 (USACE 1998), and will be approved by the USACE project manager before use. Field personnel will be responsible for transporting and storing approved water to avoid its chemical contamination or degradation.

4.10 FIELD SCREENING PROCEDURES AND CRITERIA

Field screening for VOCs using a PID or organic vapor analyzer (OVA) will be done during drilling activities, soil gas sampling and groundwater sample collection. Screening will be accomplished by monitoring the headspace vapors at the top of the riser pipe and the breathing zone during drilling and sampling activities. Monitoring requirements will follow Section 9.14.6 of the RI Report Addendum SSHP.

A Horiba® U-22 portable water quality meter will be used to monitor pH, conductivity, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity during groundwater sampling activities for both the TWPs and permanent monitoring wells. A description of each field instrument and its associated calibration requirements and performance checks is presented in Table 4-2.

Field screening for radionuclides will be done using a Ludlum 43-10 NaI 2x2. Screening will be conducted of the work areas and soil cores recovered during sampling activities. Monitoring requirements and a description of calibration requirements are further addressed in the Radiation Protection Plan for the project.

4.11 WELL SURVEYS

Following the completion of TWP abandonment and permanent monitoring well surface completions, the locations will be surveyed in accordance with EM 1110-1-4000 (USACE 1998). All locations will be surveyed with reference to the previously established site benchmark. SAIC will provide the site benchmark location prior to mobilization.

TWP will be surveyed at the ground surface immediately adjacent to the location. Monitoring well locations will be surveyed at the grounds surface immediately adjacent to the well and at the top of the casing.

The horizontal coordinates of all monitoring wells and TWPs will be determined to within 0.3 m (1 ft). Coordinates will be referenced to New York State Plane NAD 83. The vertical coordinates of all monitoring wells and TWPs will be determined to within 0.3 cm (0.01 ft). The survey will be connected by third-order leveling to the National Geodetic Vertical Datum of 1929 in accordance with the Standards and Specifications for the Geodetic Control Networks.

4.12 LABORATORY ANALYSIS

Subcontracted laboratory sample analyses will be performed by GEL in Charleston, South Carolina. Project contact information for GEL is shown below:

GEL
2040 Savage Road
Charleston, SC 29407

Telephone: (843) 556-8171
Fax: (843) 766-1178

As part of the subcontracting process, GEL has acknowledged compliance with the following requirements identified in the USACE Candidate Environmental Laboratory Self-Declaration Form:

- GEL laboratory operations to be utilized for testing in support of this project are in full compliance with DOD Quality Systems Manual (QSM), Version 3 (DOD 2006) - including National Environmental Laboratory Accreditation Conference (NELAC) Chapter 5 and Appendix requirements.
- GEL will notify SAIC immediately of any change in status that may affect compliance with the requirements listed above.
- GEL acknowledges that SAIC and/or USACE may audit the laboratory relative to policy compliance at any time.

In addition, GEL declares the following documents to be current and available for review by SAIC and/or USACE to verify compliance with the requirements noted above:

- Current laboratory Quality Assurance Plan (QAP).
- Sample preparation and determinative method Standard Operating Procedures (SOPs) for all project parameters.
- Method performance data: Performance Testing (PT) samples, Method Detection Limit (MDL) studies, and Laboratory Control Sample (LCS) control ranges. National Environmental Laboratory Accreditation Program (NELAP) certification may be used to demonstrate successful PT sample results.

A USACE Candidate Environmental Laboratory Self-Declaration Form signed by an authorized representative of GEL will be obtained prior to the start of analytical services.

4.12.1 Laboratory Analytical Methods

The analytical methods to be utilized for sample testing on the project were selected to be consistent with the NFSS RI. The analytical parameters for all media are presented in Table 4-3.

Groundwater samples collected will be consistent with the current groundwater monitoring requirements at NFSS, will meet all quality control (QC) parameters stated in the specific U.S. Environmental Protection Agency (USEPA) SW-846 methods, and will be adhered to for each chemical listed. Table 4-4 and Table 4-5 present the MDLs for the analytical methods in Table 4-3.

4.13 SAMPLE MANAGEMENT

The following sections document procedures for all aspects of field sample management including shipping to the analytical laboratory.

4.13.1 Sample Containerization, Preservation, and Holding Times

Tables 4-6 and 4-7 summarize sample container, preservation, and holding time requirements for soil, and water samples, respectively. The number of samples that will be collected for this investigation is presented in Table 4-1. Additional sample volumes will be provided to the laboratory for the purpose of performing laboratory QC matrix spike/matrix spike duplicates (MS/MSDs). These QC samples will be designated by the field team and identified for the laboratory on the COC. Field duplicate samples will be labeled and numbered in such a manner that does not allow the analytical facility to compare information with primary sample data.

4.13.2 Sample Identification Numbers

Samples collected will be identified sequentially by following the numbering system identified in this section. If a sample is not collected, or is reassigned to another location, a specific reason and notation will be written in the project field books. The sample identification system is presented in Figure 4-1 and shows examples of sample ID structure.

4.13.3 Sample Labels and Chain of Custody

Labels will be affixed to all sample containers during sampling collection activities. Some information may be pre-printed on each sample container label. Information that is not pre-printed 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;
- Site name and sample station number;
- Analysis to be performed;
- Type of chemical preservative present in container;
- Date and time of sample collection; and
- Sampler's initials.

Sample labels will be completed with permanent black ink and covered with clear tape.

COC documentation will be maintained to ensure sample integrity from collection through final disposal by the analytical laboratory. The following COC approach is consistent with EM 200-1-3 Appendix F.1

(USACE 2001d). Field COC will be documented using COC forms and COC seals. Samples are considered to be under custody when one or more of the following apply:

- In sampler's possession;
- In sampler's view (after being in possession);
- In sampler's possession and stored in a secured location; or
- In a designated secure area.

A COC form will be used to document the following information for each sample collected:

- Sample number;
- Sample matrix;
- Sample collection date;
- Sample collection time;
- Analytical method(s) requested;
- Sample preservation;
- Number of sample containers; and
- Other special notes/requests as applicable.

A copy of the COC will remain with the associated samples at all times. The COC form will also include a signature trail to document the transfer of sample custody from one party to another. Each transfer of custody will include the printed name, signature, organization, time, and date by the party relinquishing custody and by the party receiving custody. For samples shipped from the field site to the analytical laboratory via a commercial courier (e.g., FedEx or UPS), the shipping airbill serves as COC documentation between sample relinquishing in the field and sample receipt by the laboratory.

The COC seal is an adhesive seal used to document the integrity of sample storage containers/areas (e.g. cooler, refrigerator, secure room) such that if the container/area is accessed the seal will be broken. The COC seal ensures that no sample tampering occurred between the field collection and the laboratory analysis. COC seals will be used when the sample storage containers/areas are not occupied by the sampler (e.g., overnight/weekend storage, during work breaks). COC seals will be signed and dated to ensure authenticity.

4.13.4 Sample Shipping

Samples will be shipped from the field site to the analytical laboratory using a commercial courier such as FedEx or UPS. Sample packaging will be compliant with Department of Transportation (DOT), International Air Transport Association (IATA), and EM 200-1-3 Appendix F.2 (USACE 2001d) requirements.

Prior to preparation for shipping, all sample containers will be radiologically surveyed and monitored to ensure compliance with project-specific release and DOT shipping limits. A summary of SAIC administrative and DOT radiation dose and removable contamination limits for sample shipping packages is provided in Table 4-8.

Additional details regarding radiological release surveys, instrumentation, and procedures are presented in the project Radiation Protection Plan (RPP).

4.13.4.1 Sample and Documentation Shipping Procedures

An example of the Chain-of-Custody (COC) is presented as Figure 4-2. Documentation and tracking of samples and field information will follow the series of steps presented below:

1.) Collection and placement of samples into laboratory sample containers.
2.) Completion of sample container label information.
3.) Placement of sample containers into an ice-filled cooler.
4.) Completion of sample documentation information in the field logbook.
5.) Completion of project and sampling information sections of the COC form(s) for all samples to be transported in a single cooler.
6.) Completion of the airbill for the cooler to be shipped (if necessary).
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) and placement of the form(s) into the cooler.
9.) Placement of COC seals on the exterior of the cooler.
10.) Packaging and shipment of the cooler to the laboratory.
11.) Receipt of the cooler at the laboratory, inspection of contents and transmittal via fax of contained COC form(s) and cooler receipt form(s). Each cooler must have a separate cooler receipt form.
12.) Transmittal of original COC form(s) with the final analytical results from laboratory.

4.14 EQUIPMENT DECONTAMINATION

Non-disposable equipment and sample collection tools used during sampling activities will be decontaminated prior to use for each unique sample to prevent chemical or radioactive cross-contamination. The methods used for the decontamination of field sampling tools and other equipment will be consistent with procedures contained in EM 200-1-3 (USACE 2001d).

Decontamination is anticipated for three types of equipment and tools: drill rig equipment, general use tools (no analytical sample contact), and stainless steel tools utilized during sample collection and homogenization.

Decontamination of drill rig equipment will be conducted within a temporary decontamination pad constructed at the site. The decontamination pad will be designed so that all decontamination liquids are contained from the surrounding environment and can be recovered for disposal as IDW. Drilling equipment will be decontaminated after completion of each borehole. The procedure for decontamination of drilling equipment will be as follows:

1.) Remove caked soil material from the exterior of augers and cutting heads using a rod and/or brush.
2.) Steam clean interior and exterior of equipment using approved water, using a brush where steam cleaning is not sufficient to remove all soil material.
3.) Allow equipment to air dry as long as possible.
4.) Place equipment on clean plastic if immediate use is anticipated, or wrap in plastic to prevent contamination if longer-term storage is required.

Decontamination of general use tools and equipment that do not contact sample materials will be conducted as follows:

1.) Remove visible material from tools/equipment.

2.) Wash with potable water and phosphate-free detergent (Liquinox or similar) to remove all visible particulate matter.
3.) Thorough rinse with potable water.
4.) Allow equipment to air dry as long as possible.

Chemical decontamination of stainless-steel tools and equipment used during sampling activities will be conducted as follows:

1.) Remove gross accumulations of soil or sediment at the drum of origin.
2.) Wash with potable water and phosphate-free detergent (Liquinox or similar) to remove all visible particulate matter.
3.) Thoroughly rinse with potable water.
4.) Thoroughly rinse with a 5% solution of nitric acid and water.
5.) Thoroughly rinse with potable water.
6.) Thoroughly rinse with isopropyl alcohol.
7.) Thoroughly rinse with de-ionized water.
8.) Air dry.

Upon completion of the above chemical decontamination procedures, each item will be wrapped in plastic or aluminum foil to prevent subsequent contamination prior to use. Equipment decontamination will be conducted in a manner that will allow for the containment and control of all waste decontamination fluids. Every effort will be made to minimize the quantity of waste fluids generated during decontamination activities. All waste decontamination fluids and materials will be containerized, labeled, and stored as described in Section 4.15 of this document.

4.15 INVESTIGATION-DERIVED WASTE MANAGEMENT

The *NFSS Waste Characterization and Demobilization Plan* (USACE 2009b) will be used as guidance where applicable for the management of IDW for this investigation.

4.15.1 Waste Minimization

During project activities, waste generation will be minimized at all times to the greatest extent practical. Waste will be minimized by limiting access to restricted areas, reuse and decontamination of equipment, and use of non-hazardous materials.

4.15.2 Waste Streams

The types of IDW anticipated includes:

- Soil (i.e., drill cuttings and excess soil from sampling activities);
- TWP abandonment materials;
- Development and purge water from TWPs and monitoring wells;
- Decontamination fluids, including those derived from decontamination of sampling equipment and drilling equipment; and
- Expendables/solid wastes, including PPE, disposable sampling equipment, and sanitary trash.

Characterization and classification of the different types of waste streams will be managed as described in the RI Waste WCP.

Analytical parameters and sampling procedures for the IDW will follow the RI IDW WCP. Up to two liquid waste water samples will be collected for unfiltered and filtered analyses, using a 5 µm bag filter, for the parameters presented in Table 4-1.
Containerized IDW will be transported to a centralized location at NFSS as directed by USACE personnel.

Final disposition of the IDW will be determined by USACE, and all IDW will be transferred to USACE at the conclusion of field activities. A log will be maintained of IDW generated during the field investigation which will be transferred to USACE at the completion of field activities.

4.15.3 Waste Container Labeling

All waste storage containers will be labeled immediately before and continuously during their use to ensure proper management of the contained wastes. The following procedure will be used for waste container labeling:

Weather-resistant, commercially available "Empty, Pending Analysis" labels will be affixed and located on two sides of the upper one-third of each storage container. Additional label information may be recorded directly on a clean, dry drum surface using an indelible paint marker. All containers, including those that are empty, must be labeled appropriately.

Information to be recorded on each label will include the following:

- Container number;
- Contents;
- Source of waste;
- Source location;
- Project name and site identification;
- Emergency contact information;
- Physical characteristic of the waste; and
- Generation date(s).

Each label will be placed on a smooth part of the container and will not be affixed across drum bungs, seams, ridges, or dents. All information documented on container labels will be recorded with a permanent marker or paint pen and recorded in the field logbook.

All container labels will be protected in a manner to prevent damage or degradation of the recorded information.

5. QUALITY ASSURANCE/QUALITY CONTROL

5.1 CONTRACTOR CHEMICAL QUALITY CONTROL

Contractor Chemical Quality Control (CCQC) will be conducted to ensure the correct procedures, equipment, and materials are being utilized during field activities and to ensure all activities are conducted in compliance with applicable procedures for each definable work task. The CCQC approach will consist of the following three primary phases:

- Preparatory;
- Initial; and
- Follow-up.

Specific definable work tasks identified in Section 4 of this document include:

- TWP and monitoring well installation;
- Sample collection;
- Sample management;
- Measuring and testing equipment (M&TE); and
- Field documentation.

The SAIC Field Manager will serve as the CCQC representative for the duration of field activities, and will be responsible for the implementation of the requirements presented below.

The Preparatory Phase will consist of a Pre-Activity Briefing conducted prior to the initiation of each defined feature of work listed above, and will include a review of the following task-specific items:

- Pertinent sections of applicable project plans in order to ensure that all field personnel are cognizant of the overall project objectives, specific project activities to be accomplished, and specific sampling and analysis requirements.
- Health and safety and radiation protection requirements.
- M&TE required for measurement of field parameters (and proper calibration/maintenance procedures).
- Physical examination of all materials and equipment required to accomplish the specific project activities.
- Equipment decontamination procedures and requirements.
- Sample management requirements.
- Waste management requirements.
- Field documentation requirements (e.g., field forms, logbooks, COC forms).
- Examination of the work area(s) to ascertain if all preliminary work is complete.

The Initial Phase will be conducted during the initial performance of field activities for each defined feature of work and will consist of the following:

- Direct oversight of field activities to ensure compliance with project plans and associated procedures and requirements;
- Verification of proper health and safety/radiation protection measures (including monitoring and PPE);
- Observation, verification, and documentation of initial and ongoing M&TE use and calibration;
- Verification of use of proper materials and equipment;
- Inspection of field documentation for accuracy, completeness, and consistency;
- Inspection of sample collection, containerization, labeling, packaging and shipping activities; and

- Verification of proper waste management activities.

The Follow-Up Phase will involve the continued performance of the various activities noted for the Initial Phase on a daily basis until completion of the particular defined feature of work.

5.2 FIELD OPERATIONS DOCUMENTATION

Documentation associated with field operations will be reviewed for accuracy during the Initial Phase and Follow-Up Phase, and will be and maintained as records within the project file. The following sections describe the primary types of field operations documentation.

5.2.1 Daily Quality Control Report

A Daily Quality Control Report (DQCR) will be prepared by the SAIC Field Manager each day during on-site field activities. The contents of each DQCR will include a summary of activities performed at the project site, weather information, Quality Assurance (QA)/Quality Control (QC) activities performed, departures from the approved project plans, and any problems encountered during field activities. DQCRs will be supplied to the USACE Project Manager daily unless otherwise specified by USACE. Any deviations that may affect the project data quality will be immediately conveyed to the USACE Project Manager.

5.2.2 Field Logbooks

Bound field logbooks will be used to document field activities and any notable observations or conditions encountered during the completion of a task. Information recorded in field logbooks will include the date/time/location of field team activities, sample collection information including date/time/sample number/sample station, results of M&TE monitoring for technical/health and safety purposes, descriptions of field photographs collected, and any other notable observations associated with the specific work task. One field logbook will be issued to each field team or associated with each primary field task. Field logbooks will remain in the project building during non-working hours, and will be maintained as part of the project file when on-site activities are not in progress.

Field logbook documentation will be conducted in accordance with SAIC FTP-1215 *Field Logbooks and Field Forms*.

The following sections present requirements for field forms to be completed during field activities.

5.2.2.1 Boring Logs

Each borehole log generated during the investigation will fully describe the subsurface environment and the procedures used to gain that description. All borehole data will be recorded in the field by the field geologist on Engineer Form 5056-R and 5056A-R (Figures 5-1 and 5-2). A scale of 2.5 cm (1.0 in) on the log equaling 0.3 m (1.0 ft) of borehole will be used during borehole log preparation. Each original borehole log will be submitted to the USACE project manager, along with the corresponding original well construction diagram, as soon as the field effort has been completed. Original borehole logs and well construction diagrams will be of sufficient legibility and contrast so as to provide comparable quality in reproduction, and will be recorded directly in the field without transcribing from a field book or other document.

All borehole logs generated during the investigation will routinely contain the following information:

- Unique TWP number and location denoted on a sketch map as part of the log.
- Depths or heights recorded in feet and decimal fractions thereof (tenths of feet).

- Field estimates of soil classification (USCS) in accordance with the Annual Book of ASTM Standards, Volume 04.08, D 2488 (ASTM 1995) prepared in the field at the time of sampling by the field geologist.
- Full description of each soil sample collected, including the parameters noted in Table 5-1.
- Visual numeric estimates of secondary soil constituents and quantitative definitions of description terms (e.g., trace, some, several) recorded on the log.
- Full description, to the greatest extent practical, of bedrock material encountered, including the parameters noted in Table 5-1.
- Description of disturbed samples (if used to supplement subsurface description) in terms of the appropriate soil/rock parameter, to the extent practical. At a minimum, classification along with description of drill action for the corresponding depth will be recorded. Notations will be made on the log that these descriptions are based on observations of disturbed material rather than intact samples.
- Description of drilling equipment, including such information as auger size (inner and outer diameter), bit types, compressor type, rig manufacturer, and model.
- Sequence of drilling activities.
- Any special problems encountered during drilling and their resolution.
- The depth of first-encountered free water along with the method of determination and any distinct water level(s) encountered thereafter. Before proceeding, the first encountered water will be allowed to partially stabilize (from 5 to 10 minutes) and the time between measurements will be recorded.
- Interval by depth for each sample collected, including the length of sampled interval, length or sample recovery, and the sampler type and size (diameter and length).
- Total depth of drilling and sampling.
- Results of soil core organic vapor scan and radiological readings, and soil sample organic vapor headspace readings. Notation will include interval sampled, corresponding vapor readings, and key to specific instrument used to obtain readings. A general note will be made on the log indicating the manufacturer, model, serial number, and calibration information for each instrument used.
- Definition of any special abbreviations at the first occurrence of their usage.

5.2.2.2 Well Construction Diagrams

Each TWP installed during the investigation will be depicted in an as-built well construction diagram (Figure 5-3). Each diagram will be attached to the original borehole log for that installation, and will graphically denote, by depth from the ground surface, the following information:

- Location of the borehole bottom and borehole diameter(s);
- Location of the well screen;
- Location of any joints;
- Location of the granular filter pack;
- Location of the bentonite seal;
- Location of grout;
- Location of centralizers;
- Height of riser (stickup), without cap/plug, above the ground surface;
- Height of the protective casing, without cap/cover, above ground surface;
- Depth of the protective casing base bgs;
- Location and size of drainage port;
- Location of the internal mortar collar;
- Sloped concrete pad height and diameter;
- Protective post configuration; and
- Water level 24 hours after completion of installation with date and time of measurement.

Additional information to be described on each as-built well construction diagram will include the following:

- Actual quantity and composition of the grout, bentonite seal, and granular filter pack used for construction of the monitoring well;
- The screen slot size in inches, slot configuration, total open area per foot of screen, outside diameter, nominal inside diameter, schedule/thickness, composition, and manufacturer;
- Type of material located between the bottom of the borehole and the bottom of the screen;
- The outside diameter, nominal inside diameter, schedule/thickness, composition, and manufacturer of the well casing;
- The joint design and composition;
- The design and composition of centralizers;
- Depth and description of any permanent pump or sampling device installed within the monitoring well;
- The composition and nominal inside diameter of protective casing;
- Any special problems encountered during well construction and their resolution;
- Dates and times for the start and completion of monitoring well installation; and
- Definition of any special abbreviations used at the first occurrence of their usage.

Each original well construction diagram will be submitted to the USACE Project Manager as soon as the field effort has been completed. Each diagram will be attached to the corresponding original borehole log for that location.

5.2.2.3 Borehole Abandonment Record

Each of the TWPs that will not be completed as permanent monitoring wells will be abandoned. The casing will be removed and the borehole grouted. A record will be kept for each TWP that is abandoned. An example of the abandonment record is shown in Figure 5-4. The following information will be recorded on the abandonment record:

- Project name and location;
- TWP designation;
- Casing diameter and amount removed during abandonment;
- Amount of grout used and the method used; and
- Any additional comments.

5.2.2.4 Development and Purge Records

An example of the well development and purge record is presented in Figure 5-5. For each monitoring well developed and purged during the investigation, a record will be prepared to include the following information;

- Project name and location;
- Well designation and location;
- Date(s) and time(s) of monitoring well installation;
- Date(s) and time(s) of monitoring well development;
- Static water level from the top of the well casing before and 24 hours after completion of well development with dates and times of measurements;
- Quantity of water lost during drilling, removed before well insertion, and added during granular filter placement;
- Quantity of standing water contained with the well, and contained within the saturated annulus (assuming 30 percent porosity), before well development;

- Field readings of pH, conductivity, turbidity, and temperature measured before, twice during, and after completion of well development using an appropriate device and method in accordance with USEPA Procedure 600/4-79-020 (see section 4.10 of this SAP for description of instrumentation and procedures to be utilized for field measurements);
- Depth from top of well casing to bottom of well;
- Length of the well screen;
- Depth from top of the well casing to the top of sediment inside the well, both before and after development, as measured directly at the time of development;
- Physical character of the removed water, including changes during development in clarity, color, particulates, and any noted odor;
- Type and size/capacity of the bailer or pump used for development;
- Description of the surge technique used during development;
- Height of the well casing above ground surface as measured directly at the time of development;
- Estimated recharge rate into the well at the time of development; and
- Quantity of water removed from the well during the development operation and the time for removal, presented as both incremental and total values.

5.2.2.5 Field Data Forms

Pre-printed field data forms may be used to assist in the documentation of sample collection, measurements, and observations by field personnel, and to ensure the consistency of data collection throughout the performance of field activities. Field data forms will be organized by work area/task, will remain in the project building during non-working hours, and will be maintained as part of the project file when on-site activities are not in progress.

Field data forms will be generated and managed in accordance with SAIC FTP-1215 *Field Logbooks and Field Forms*.

5.2.3 Field Photographs

Representative photographs will be taken during fieldwork activities, with particular attention to any special features of interest that are identified during the field effort (e.g., bedrock fractures or unusual geologic features). Photographs will be suitable for presentation in a public forum, as well as for documenting scientific information.

For each photograph taken during the investigation, the following items will be noted in the field logbook:

- Date and time;
- Photographer (name and signature);
- Name of the location;
- General direction faced and description of the subject; and
- Sequential number of the photograph and the roll number (if applicable).

Photographs taken to document sampling points will include two or more permanent reference points within the photograph to facilitate relocating the point at a later date. In addition to the information recorded in the field logbook, one or more site photograph reference maps will be prepared as required.

5.2.4 M&TE Calibration and Daily Checks

All instrumentation used during field activities for environmental chemical and radiological monitoring will be evaluated on a daily basis (at a minimum) to ensure proper operation and the accuracy of results/readings. The following types of M&TE instruments are anticipated to be used during field activities:

- PID;
- Combustible gas indicator (CGI); and
- Radiation detection/monitoring instruments (multiple types).

Regardless of type or function, each instrument will be operated in accordance with the manufacturer's instructions. For instruments normally calibrated by the manufacturer or rental vendor, certificates of calibration will be maintained in the project file. Field calibration will only be conducted if allowed by the operating instructions or through the use of an internal auto-calibration feature.

Instrument functionality and response checks will be performed a minimum of once daily prior to the start of field activities using approved commercially-provided calibration standards or radiological check sources. Daily response checks and calibrations for chemical monitoring instruments will be maintained in a M&TE Logbook. Initial check-in, response checks, and documentation associated with radiation monitoring equipment will be conducted by health physics personnel in accordance with the project RPP.

Any instrument found to be damaged or not operating properly will be immediately removed from service and returned to the manufacturer/vendor for repair or replacement as needed. At least one backup instrument will be maintained on-site during field activities for each type of critical monitoring to prevent schedule delays associated with instrument failures.

5.2.5 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 in the field by the individual responsible for the entry. Erroneous information or data will be corrected in a manner which will not obliterate the original entry, and all corrections will be initialed and dated by the individual responsible for the entry.

5.2.6 Laboratory Sample Documentation

Laboratory sample documentation generated during field activities will include COC forms and commercial courier airbills associated with sample shipping.

5.3 LABORATORY SAMPLE ANALYSES

Laboratory sample analytical QA/QC will be maintained by the analytical laboratory through the use of internal policies and procedures associated with the laboratory QAP and applicable analytical method SOPs in accordance with the DoD QSM (DoD 2009).

The analytical laboratory will provide to SAIC a Letter of Receipt (LOR) for each sample shipment within 24 hours of receipt. The laboratory LOR documents the condition of the sample shipping package and sample containers, preservation temperature (if applicable), and documents the specific analyses to be performed for each sample.

Upon completion of laboratory analyses and receipt of the required analytical data deliverables, SAIC will conduct a completeness review to ensure the following:

- Proper format for data deliverables;
- Results for all required analyses for all samples;
- Required minimum detectable activities (MDAs), MDLs, and reporting limits (RLs) were achieved;
- Appropriate explanations for any deviations from technical requirements; and
- Potential impacts to data quality due to any laboratory analytical problems/issues.

SAIC will forward the findings of the completeness review to USACE and will immediately identify any conditions or issues that may impact data quality. SAIC will not conduct detailed data verification or data validation reviews during this project.

5.3.1 Level of Quality Control Effort

The QC effort will follow the guidance presented in the following sections. Field QC measurements will include trip blanks, field duplicates, and equipment rinsate blanks. Laboratory QC measurements will include method blanks, LCSs, laboratory duplicates, and MS/MSD samples.

5.3.2 Accuracy, Precision, and Sensitivity of Analysis

The fundamental QA objectives for accuracy, precision, and sensitivity of laboratory analytical data are the QC acceptance criteria of the analytical protocols.

Accuracy is the nearness of a result, or the mean of a set of results, to the true or accepted value. Analytical accuracy is expressed as the percent recovery of an analyte that has been added to a blank sample or environmental sample, at a known concentration, during sample preparation. Accuracy shall be determined in the laboratory through the use of MS analyses, LCS analyses, and blank spike analyses. The percent recoveries for specific target analytes shall be calculated and used as a QC indication of the field procedures, matrix effects, and accuracy of the analyses performed.

Precision is the measure of the degree of reproducibility exhibited by a set of replicate results, or the agreement among repeat observations made under the same conditions. Analytical precision shall be determined through the use of spike analyses conducted on duplicate pairs of environmental samples (MS/MSD) or comparison of laboratory duplicate responses. The relative percent difference (RPD) between two positive results shall be calculated and used as a QC indication of the field procedures, matrix effects, and precision of the analyses performed. Sample collection precision shall be measured in the laboratory by the analyses of field duplicates.

Sensitivity is the ability for laboratory analytical method to achieve the minimum levels of detection required for meeting the data quality objectives outlined in this SAP. It is important to monitor instrument sensitivity through calibration blanks and low concentration standards to ensure consistent instrument performance. It is also critical to monitor the analytical method sensitivity through analysis of method blanks, calibration check samples, and LCSs.

5.3.3 Completeness, Representativeness, and Comparability

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. It is expected that laboratories shall provide data meeting system QC acceptance criteria for all samples tested. It is expected that GEL will provide data meeting QC acceptance criteria for 95% or more for all samples tested.

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that depends upon the proper design of the sampling program and proper laboratory protocol. The sampling approach was designed to provide data representative of site conditions. The representativeness will be satisfied by insuring the SAP is followed, proper sampling techniques are used, proper analytical procedures are followed and holding times of samples are not exceeded in the laboratory. Representativeness will be assessed by the analysis of field duplicate samples.

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data shall be comparable depends upon the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data are expected to provide comparable data.

5.4 ELECTRONIC DATA MANAGEMENT

Electronic data will be managed to ensure data integrity and backup. Electronic data types anticipated to be generated during the project include:

- Digital field photographs;
- Original field forms/logs;
- Original DQCRs;
- Field tracking logs/matrices; and
- Analytical laboratory data deliverables.

Electronic data generated during field activities will be transferred to and managed on a field portable computer. The field computer will remain in the custody of the SAIC Field Manager during non-working hours or between on-site mobilizations. Field data will be backed up to an SAIC network or removable medium on a regular basis (weekly at minimum). Electronic data generated prior to or after field activities will be maintained on an SAIC network with regularly scheduled backups.

Laboratory analytical data deliverables will be imported into the existing project database to allow for more convenient data review, evaluation, and reporting. Data integrity will be monitored through the use of a QA/QC review conducted for each electronic data set imported.

The electronic data deliverable (EDD) will be submitted from the laboratory for each SDG a spreadsheet with all analytical findings including those of the batch QC (i.e. lab duplicate and MS/MSD RPDs, LCS and MS/MSD % recoveries) and sample tracer/surrogate recoveries shall be submitted in .xls of .csv format and shall include at a minimum:

- Sample ID;
- Lab ID;
- Sample type (normal, dup, LCS, Blank etc);
- Matrix;
- Collection, extraction and analysis dates.;
- Method of analysis;
- SDG #;
- Batch #;
- CAS number;
- Compound/Element/Isotope;
- Sample result;
- Total uncertainty;

- Units;
- Lab qualifier;
- MDA/MDL;
- Dilution factor;
- LCS and MS/MSD findings with associated uncertainties and calculated % recoveries with control limits; and
- Lab duplicate and MS/MSD findings with associated uncertainties and calculated RPDs with control limits.

In general, all electronic data will be maintained in Microsoft Office 2003 or other readily available document/data formats. The EDD will be submitted from GEL in excel and the associated SDGs as a pdf.

5.5 PROJECT ADMINISTRATION

Project-level QA/QC will be maintained through the implementation of the SAIC Quality Assurance Program (SAIC QAP) and associated Quality Assurance Administrative Procedures (QAAPs). The SAIC Field Manager will serve as the SAIC QA Officer during all on-site activities.

The SAIC Energy, Environment & Infrastructure (E2I) Business Unit Quality Policy states:

"A major objective of the E2I Business Unit is to achieve and maintain the highest standards of quality in all areas of work. To help meet this objective, the QAP has been developed to delineate the quality controls and procedures necessary to help ensure the consistency, integration, and disciplined control of work, which will deliver the quality required by our customers, our management, and other stakeholders. Achieving this objective requires a sustained and consistent effort on the part of all personnel."

"SAIC staff and subcontractors performing work on E2I Business Unit projects are responsible for the quality of their work, and for implementing applicable sections of this QAP and supporting procedures. Management-level personnel are charged with ensuring that applicable QA program requirements are adhered to and for encouraging staff to identify technical or administrative problems, and participate in their resolution."

The following sections identify the most common areas of QA program actions and reporting associated with planned project activities.

5.5.1 Corrective Actions

A corrective action will be applied to correct a serious condition and to minimize the possibility of recurrence in accordance with SAIC QAAP 16.1 *Corrective Action*. The SAIC corrective action procedure establishes the requirements and responsibilities for identifying, documenting, investigating, resolving, and verifying completion of corrective action for significant conditions adverse to quality. SAIC QAAP 16.1 applies to the following conditions:

- Serious errors in design, construction, or fabrication which were detected subsequent to formal quality verification and acceptance;
- Serious errors in the execution or results of scientific investigations, performance assessments, or performance confirmation that were detected subsequent to acceptance of the resulting data;
- A breakdown in a QA program (i.e., failure of an organization to establish and implement prescribed QA and technical requirements, plans, and procedures);
- Deficiencies that may require stopping work;
- Repetitive deficiencies;

- Deficiencies in which previous corrective action has been ineffective; and
- Failure to meet governing regulatory requirements.

Corrective actions associated with conditions adverse to quality but not included in the correction action criteria above will be addressed as a non-conformance in accordance with SAIC QAAP 15.1 *Control of Non-Conforming Items and Services.*

The implementation of SAIC QAAP 15.1 includes the initiation of a Non-Conformance Report (NCR) written to identify and control items having physical characteristics (e.g., materials of construction, dimensions, surface conditions, functions, or locations) and services or processes that do not conform to specified requirements (e.g., procedures, instructions, drawings, purchase orders, statements of work). NCRs may also be written for items or services which may be unacceptable or indeterminate in their function, operation, or use even if there are no specific, stated requirements.

The NCR form includes the following key components:

- Description of the NCR;
- Disposition;
- Probable cause; and
- Actions taken to prevent recurrence.

Completed Correction Action Reports and NCR forms are maintained in the project file.

5.5.2 Field Change Orders

Any technical changes to the approved project plans identified after the submittal of the final approved documents are subject to SAIC FTP 1220 *Documenting and Controlling Changes to Approved Work Plans*. The purpose of this procedure is to document any planned deviation from the existing project scope or approved technical procedure or requirement established in the approved project plans. Any deviation from the project plans must be approved by USACE prior to implementation.

A Field Change Order will be prepared by SAIC and submitted to USACE for approval to document the technical changes made to the project scope, procedures, or requirements. Contractual action may be required if the planned deviations result in cost impacts or changes to approved contract scope or assumptions.

6. REFERENCES

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United States Army Corps of Engineers (USACE) 1997. *Radiation Protection Manual*, EM 385-1-80.

USACE 1998. *Monitoring Well Design, Installation, and Documentation at Hazardous and/or Toxic Waste Sites*, EM-1110-1-4000.

USACE 1999. Field Sampling Plan Remedial Investigation at the Niagara Falls Storage Site Niagara County, New York, DACW-49-97-D-0001, D.O. 0012, Maxim Technologies, Inc. Draft Final.

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USACE 2001b. *Field Sampling Plan Addendum Sediment Core Sampling Remedial Investigation at the Niagara Falls Storage Site Niagara County, New York*, DACW-49-97-D-0001, D.O. 0012, Maxim Technologies, Inc. August 2001.

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USACE 2009a. *Statement of Work for RIR Addendum Niagara Falls Storage Site*. Final July 2009.

USACE 2009b. Niagara Falls Storage Site FUSRAP Site Lewiston, New York. *NFSS Waste Characterization and Demobilization Waste Characterization Plan, Demobilization Plan, Site Safety and Health Plan, Radiation Protection Plan, Revision 0 – Draft, 1.* Contract: W912QR-08-D-0008. August 14, 2009.

United States Environmental Protection Agency (USEPA) 1989. *USEPA Risk Assessment Guidance for Superfund (RAGS).*

USEPA 1992a. *Guidance for Data Usability in Risk Assessment*. April 1992.

USEPA 1992b. *Guidance for Performing Site Inspections Under CERCLA: USEPA Directives 93.151-05*. September 1992.

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TABLES

Table 2-1. Key Personnel

Name	Company	Role	Contact Information
David Kulikowski, CPG	SAIC	Project Manager	(614) 791-3375 kulikowksid@saic.com
Jeff DeVaughn, CPG	SAIC	Field Operations Manager Site Safety and Health Officer	(330) 405-5813 devaughnj@saic.com
Stephen L. Davis, CIH, CSP	SAIC	Health and Safety Manager	(865) 481-4755 daviss@saic.com
Glen Cowart	SAIC	Quality Assurance Manager	(865) 481-4630 cowartg@saic.com
Steve Passig, CHP	SAIC	Health Physicist	(314) 770-3026 passigm@saic.com
David Lyerla	AVESI	AVESI Project Manager Radiation Safety Officer	(618) 628-0413 davidlyerla@avesi-usa.com
Steve Wright	Frontz Drilling	Environmental Services Manager	(330) 262-5301 swright@frontzdrilling.com
Kenneth Slaugenhoupt	Niagara Boundary	President	(716) 297-9584 klsnbms@aol.com

Table 3-1. RIR Addendum Temporary Well Point Justification for EUs 1 and 2

Exposure Unit	Proposed Location	Location Description	Justification [1]	Proposed Sample Depth [2]	Analyses
EU 1	TWP921	Off-site near site boundary and northwest edge of plume	• Define the potential off-site extent of uranium contamination in groundwater to the northwest in a downgradient direction • Downgradient of former sampling location 505, which exhibited total dissolved uranium concentrations used to define the current plume configuration • Evaluate connectivity to sand lens observed at nearby former sampling location 505	Saturated zone above GLC; GLC depth approx. 17 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP922	Off-site near northern edge of plume; west of proposed location TWP923	• Define the potential off-site extent of uranium contamination in groundwater north of EU 1	Saturated zone above GLC; GLC depth approx. 13-17 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP923	Off-site near northern edge of plume; east of proposed location TWP922	• Define the potential off-site extent of uranium contamination in groundwater north of EU 1 • Downgradient of former sampling location 506, which exhibited total dissolved uranium concentrations used to define the current plume configuration	Saturated zone above GLC; GLC depth approx. 13 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP924	West side of plume near site boundary	• Define the potential extent of uranium contamination in groundwater to the west near the site boundary • Co-located with existing lower water-bearing zone wells	Saturated zone above GLC; GLC depth approx. 16 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP925	Inside plume near northwest edge; east of TWP924	• Assess aerial source potential • Further define the uranium groundwater plume configuration	Saturated zone above GLC; GLC depth approx. 13-15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered

Table 3-1. RIR Addendum Temporary Well Point Justification for EUs 1 and 2 (continued)

Exposure Unit	Proposed Location	Location Description	Justification [1]	Proposed Sample Depth [2]	Analyses
EU 2	TWP926	Eastern portion of plume between former TWPs 506 and 808	• Further define the uranium groundwater plume configuration • Downgradient of former sampling location 808, which exhibited total dissolved uranium concentrations used to define the current plume configuration • Evaluate possible connectivity between former sampling locations 506 and 808.	Saturated zone above GLC; GLC depth approx. 13-15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered

[1] - Existing site lithologic data does not support the presence of extensive sand lenses in EU 1. A sand lens with a thickness of 2.5 feet was identified at sampling location 505 (HGL 2009). With the exception of a 7 ft sand lens at location 810, which is located slightly east of the plume area, all other sand lenses in this vicinity have a thickness of 1 ft or less.

[2] – Samples will be collected in the upper portion of the saturated zone above the GLC. If no saturated zone is identified, subsurface soil samples will be collected from the soil depth interval exhibiting the greatest field screening concentrations. If a high field screening result is obtained for a depth interval that is not within the saturated zone, the field team, under direction of the field manager, will decide which sample interval will be collected and analyzed. This decision will be based on field screening results, visual inspection of the soil, investigative objectives, and site knowledge. Proposed sample depths included on this table are estimated from lithologic information obtained from nearby borings. A sample depth range is listed where uncertainty exists concerning the depth to the GLC.

Table 3-2. RIR Addendum Temporary Well Point Justification for EU 4

Exposure Unit	Proposed Location	Location Description	Justification [1]	Proposed Sample Depth [2]	Analyses
EU 4	TWP927	Northeast of plume, south of N Street, near former 408 trench sample locations	• Define the northwest extent of VOC and uranium groundwater contamination • Evaluate sand lens per HGL cross section G-G' • Confirm presence of minor concentrations of VOCs in former trench location	Saturated zone above GLC; GLC depth approx. 15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered, VOCs
	TWP928	Northwest of plume, south of N Street	• Define the northwest extent of VOC and uranium groundwater contamination • Downgradient of the leading edge of the plume area • Evaluate connectivity of sand lenses • Obtain groundwater concentration information for this area of EU 4 (data gap)	Saturated zone above GLC; GLC depth approx. 10-15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered, VOCs
	TWP929	Northwest of plume, southwest of proposed location TWP928	• Define the extent of VOC and uranium groundwater plumes • Downgradient of the leading edge of the plume area • Evaluate connectivity of sand lenses • Obtain groundwater concentration information for this area of EU 4 (data gap)	Saturated zone above GLC; GLC depth approx. 10-15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered, VOCs
	TWP930	Slightly northeast of plume between proposed locations TWP927 and TWP932	• Define the extent and confirm the current configuration of VOC and uranium groundwater plumes • Evaluate connectivity of sand lenses to the north and northwest	Saturated zone above GLC; GLC depth approx. 15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered, VOCs
	TWP931	Within northwestern leading edge of plume	• Define the northwest extent and confirm the current configuration of VOC and uranium groundwater plumes	Saturated zone above GLC; GLC depth approx. 15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered, VOCs

Table 3-2. RIR Addendum Temporary Well Point Justification for EU 4 (Continued)

Exposure Unit	Proposed Location	Location Description	Justification [1]	Proposed Sample Depth [2]	Analyses
EU 4 (continued)	TWP932	Within plume; north of well 415A	• Define the extent and confirm the current configuration of VOC, metal and uranium groundwater plumes • Location of a soil gas analysis near the current configuration of the plume • Evaluate sand lenses north of 415A • Investigate DNAPL associated with well 415A	Saturated zone above GLC; GLC depth approx. 15 ft bgs	Soils: Iso U, VOCs, Metals + Boron Groundwater: VOCs, Iso U and Metals + Boron – filtered and unfiltered Soil Gas: VOCs Geotech: Soil Moisture, Bulk Density, Porosity
	TWP933	Within northeast edge of plume; west of well 415A	• Location of a soil gas analysis near a suspected high concentration area of the plume • Investigate DNAPL associated with well 415A	Saturated zone above GLC; GLC depth approx. 15 ft bgs	Soils: Iso U, VOCs, Metals + Boron Groundwater: VOCs, Iso U and Metals + Boron – filtered and unfiltered Soil Gas: VOCs Geotech: Soil Moisture, Bulk Density, Porosity
	TWP934	Within northeast edge of plume; south of well 415A	• Location of a soil gas analysis in the downgradient direction of the plume area • Investigate DNAPL associated with well 415A	Saturated zone above GLC; GLC depth approx. 15 ft bgs	Soils: Iso U, VOCs, Metals + Boron Groundwater: VOCs, Iso U and Metals + Boron – filtered and unfiltered Soil Gas: VOCs Geotech: Soil Moisture, Bulk Density, Porosity

1- Existing site lithologic data indicate that sand lenses are extensive in the groundwater plume area of EU 4. The thickest and most extensive sand lenses appear to exist in the lower portion of the Upper Clay Till (HGL 2009).

2 – Samples will be collected in the upper portion of the saturated zone above the GLC. If no saturated zone is identified, subsurface soil samples will be collected from the soil depth interval exhibiting the greatest field screening concentrations. If a high field screening result is obtained for a depth interval that is not within the saturated zone, the field team under direction of the field manager will decide which sample interval will be collected and analyzed. This decision will be based on field screening results, visual inspection of the soil, investigative objectives, and site knowledge. Proposed sample depths included on this table are estimated from lithologic information obtained from nearby borings. A sample depth range is listed where uncertainty exists concerning the depth to the GLC.

Table 3-3. RIR Addendum Temporary Well Point Justification for EUs 7, 9 and 10

Exposure Unit	Proposed Location	Location Description	Justification [1]	Proposed Sample Depth [2]	Analyses
EU 7	TWP936	Northwest of IWCS in the southwest corner of EU 7; on the border of EU7 and 10	• Define the extent of potential groundwater contamination to the northwest of the IWCS. • Evaluate downgradient connectivity to the minor sand lens (2 ft thickness) identified at former sampling location BH49	Saturated zone above GLC; GLC depth approx. 10-12 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
EU 9	TWP935	Northwest of IWCS near the WDD	• Further define potential groundwater contamination along the northwestern side of the IWCS downgradient of plume	Saturated zone above GLC; GLC depth approx. 10-12 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP938	West of the IWCS near the WDD; between existing wells OW14B and OW15B	• Further define potential groundwater contamination along the western side of the IWCS	Saturated zone above GLC; GLC depth approx. 10 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
EU 10	TWP937	North of the IWCS; east of TWP936; between BH49A and OW5B	• Further define potential groundwater contamination along the northern side of the IWCS • Evaluate concentration gradient between BH49A and OW5B	Saturated zone above GLC; GLC depth approx. 13-15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP939	West of the northern portion of the IWCS	• Further define groundwater contamination along the western side of the IWCS • Evaluate connectivity of sand lenses between OW15A and A19 as suggested by the cross-section review performed by HGL	Saturated zone above GLC; GLC depth approx. 10-15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered

Table 3-3. RIR Addendum Temporary Well Point Justification for EUs 7, 9 and 10 (Continued)

Exposure Unit	Proposed Location	Location Description	Justification [1]	Proposed Sample Depth [2]	Analyses
EU10 (continued)	TWP940	West of the IWCS near the WDD	• Further define the extent of potential groundwater contamination along the western side of the IWCS	Saturated zone above GLC; GLC depth approx. 14-15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP941	West of the southern portion of the IWCS	• Further define potential groundwater contamination along the southwestern side of the IWCS • Evaluate connectivity to groundwater contamination observed at well OW18B	Saturated zone above GLC; GLC depth approx. 15-17 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP942	Southwest of the IWCS	• Further define potential groundwater contamination to the southwest of the IWCS (data gap) • Evaluate the potential connection between Building 409 plume and OW18B • Location is upgradient of well OW18B, where groundwater contamination has been identified	Saturated zone above GLC; GLC depth approx. 12-15 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered
	TWP943	South of the IWCS along the west side of Building 409	• Further define groundwater contamination along the southern side of the IWCS • Evaluate sand lens • Evaluate the potential connection between Building 409 plume and the IWCS	Saturated zone above GLC; GLC depth approx. 13-16 ft bgs	Soils: Iso Th, Iso U, Iso Pu, Sr^{90}, $Ra^{226/228}$, Gamma Spec, VOCs, SVOCs, PAHs, Metals, PCBs/Pesticides Groundwater: Iso U – filtered and unfiltered

1 - Several sand lenses were identified along the west side of the IWCS, but these sand lenses occur at various elevations. As such, connectivity between these sand lenses has not been confirmed. However, plume configuration and distribution of concentrations may infer sand lens connectivity (HGL 2009).

2 – Samples will be collected in the upper portion of the saturated zone above the GLC. If no saturated zone is identified, subsurface soil samples will be collected from the soil depth interval exhibiting the greatest field screening concentrations. If a high field screening result is obtained for a depth interval that is not within the saturated zone, the field team under direction of the field manager will decide which sample interval will be collected and analyzed. This decision will be based on field screening results, visual inspection of the soil, investigative objectives, and site knowledge. Proposed sample depths included on this table are estimated from lithologic information obtained from nearby borings. A sample depth range is listed where uncertainty exists concerning the depth to the GLC.

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Table 4-1. Proposed Number of Samples by Media and Analysis

Field Activity	Isotopic Thorium	Isotopic Uranium	Isotopic Plutonium	Strontium-90	Radium 226/228	Gamma Spectroscopy [1]	Metals	Metals + Boron and Lithium	PCB/Pesticide	VOCs	VOCs by TO-15	SVOCs	Herbicide	PAHs	TCLP VOCs	TCLP SVOCs	TCLP Metals	TCLP Pesticides	TCLP Herbicides	Ignitability	Reactive Cyanide/Sulfide	Corrosivity	Paint Filter	Total Suspended Solids and Total Dissolved Solids	Soil Moisture	Bulk Density	Porosity
Temporary Well Points																											
Soil Samples (Surface and Subsurface)	40	40	40	40	40	40	40		40	40		40		40													
Grab Groundwater Sample (filtered)		20																									
Grab Groundwater Sample (unfiltered)		20								5																	
Temporary Well Points (Soil Gas)																											
Soil Samples (Surface and Subsurface)		6						6		6																	
Geotech Samples (Surface and Subsurface)																									6	6	6
Grab Groundwater Sample (filtered)		3						3																			
Grab Groundwater Sample (unfiltered)		3						3		3																	
Soil Gas Samples											3																
Permanent Monitoring Wells																											
Groundwater Sample (filtered)	10	10	3	3	10	10	10																				
Groundwater Sample (unfiltered)	10	10	3	3	10	10	10		10	10		10		10													
IDW Characterization																											
Solids	5	5	5	5	5	5		5	5	5		5	5	5	5	5	5	5	5	5	5	5	5				
Liquids (filtered)	2	2	2	2	2																						
Liquids (unfiltered)	2	2	2	2	2			2	2	2		2	2	2						2	2	2		2			
QA/QC Samples																											
Soil (duplicates)	2	1	2	2	4	3	4	1	4	4	1	4		4													
Soil (MS/MSDs)	1	1	1	1	1	1	1		1	1	1	1		1													
QC Samples Grab Groundwater (filtered)		1																									
QC Samples Grab Groundwater (unfiltered)		1								1																	
QC Samples Groundwater (filtered)	1	1	1	1	1	1	1																				
QC Samples Groundwater (unfiltered)	1	1	1	1	1	1	1		1	1		1		1													
QC Samples Rinsates	2	2	2	2	2	2	2	2	2	2		2		2													
Totals	76	129	62	62	78	73	69	22	65	80	5	65	7	65	5	5	5	5	5	7	7	7	5	2	6	6	6

[1] Gamma Spectroscopy includes: U-235, U-238, Ra-226, Ra-228, Th-228, Pa-231, Ac-227, Co-60, Cs-137, K-40, Am-241

Total Metals= 23 TAL

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Table 4-2. Summary of Field Instruments and Calibration/Performance Requirements

Instrument and Use	Calibration	Performance
Water Level Indicator, used for determination of static water level	Calibrated by manufacturer	± 0.01 ft
Horiba® U-22, used for determining groundwater pH Conductivity Temperature Dissolved Oxygen Oxidation-Reduction Potential Turbidity	Calibrated by manufacturer with daily recalibration and performance checks conducted by field crew	± 0.1 SUs ± .001 mS/cm ± 0.01 °C ± 0.1 mg/L ± 1 mV ± 0.1 NTUs
PID, used for determination of organic vapor concentrations emitted from subsurface soil material	Calibrated by manufacturer with daily performance checks conducted by field crew	± 0.1 ppm

ft = feet
mg/L = milligrams per liter
mS/cm = milli-Siemens per centimeter
mV = milli-volts mg/L = milligrams per liter
NTU = nephelometric turbidity units
PID = photoionization detector
ppm = parts per million
SU = standard units

Table 4-3. Analytical Methods for the RI Addendum Investigation

Parameter	Analytical Method
Soils	
Isotopic Plutonium	Alpha Spectroscopy – HASL 300
Isotopic Thorium	Alpha Spectroscopy – HASL 300
Isotopic Uranium	Alpha Spectroscopy – HASL 300
Radium-226	EPA 903 Mod-Lucas Cell/Emanation/GFPC
Radium-228	EPA 904 Mod - GFPC
Strontium-90	EPA 905.0 Mod
Gamma Spectroscopy[1]	Gamma Spectroscopy – HASL 300
Total VOCs	SW-846 8260B
Total SVOCs	SW-846 8270C
PAHs	SW-846 8310
PCBs	SW-846 8082
Total Pesticides	SW-846 8081A
TAL Metals	SW-846 6010B/7470A
TAL Metals + Boron + Lithium	SW-846 6010B/7470A
Geotechnical Parameters	
Soil Moisture	ASTM D2216
Bulk Density	ASTM D5057
Porosity	USACE EM 1110-2-1906 App II
Groundwater	
Isotopic Plutonium	Alpha Spectroscopy – HASL 300
Isotopic Thorium	Alpha Spectroscopy – HASL 300
Isotopic Uranium	Alpha Spectroscopy – HASL 300
Radium-226	EPA 903 Mod-Lucas Cell/Emanation/GFPC
Radium-228	EPA 904 Mod - GFPC
Strontium-90	EPA 905.0 Mod
Gamma Spectroscopy[1]	Gamma Spectroscopy – HASL 300
VOCs	SW-846 8260B
SVOCs	SW-846 8270C
PAHs	SW-846 8310
PCBs	SW-846 8082
Pesticides	SW-846 8081A
TAL Metals	SW-846 6010B/7470A
TAL Metals + Boron and Lithium	SW-846 6010B/7470A
Soil Gas	
VOCs	TO-15

Table 4-3 Analytical Methods for the RI Addendum Investigation (continued)

Parameter	Analytical Method
IDW Characterization - Solids	
TCLP VOCs	SW-846 1311/8260B
TCLP SVOCs	SW-846 1311/8270C
TCLP Pesticides	SW-846 1311/8081A
TCLP Herbicides	SW-846 1311/8151A
TCLP Metals	SW-846 1311/6010B/7470A
Total VOCs	SW-846 8260B
Total SVOCs	SW-846 8270C
Total Pesticides	SW-846 8081A
Total Herbicides	SW-846 8151A
Total PCBs	SW846 8082
Metals (23-TAL) +Boron and Lithium	SW846 6020
PAHs	SW846 8310
Radium-226	EPA 903 Mod-Lucas Cell/Emanation/GFPC
Radium-228	EPA 904 Mod - GFPC
Isotopic Thorium	Alpha Spectroscopy – HASL 300
Isotopic Uranium	Alpha Spectroscopy – HASL 300
Isotopic Plutonium	Alpha Spectroscopy – HASL 300
Strontium-90	EPA 905.0 Mod
Gamma Spectroscopy	Gamma Spectroscopy – HASL 300
Ignitability	SW-846 1010/1020
Corrosivity	SW-846 9045C
Paint Filter	SW-846 9095
Reactive Cyanide/Sulfide	SW-846 Ch. 7.3
IDW Characterization – Liquids	
Total VOCs	SW-846 8260B
Total SVOCs	SW-846 8270C
Total PCB	SW-846 8082
Total Pesticides	SW-846 8081A
Total Herbicides	SW-846 8151A
Metals (23-TAL) +Boron and Lithium	SW846 6020
Radium-226	EPA 903 Mod-Lucas Cell/Emanation/GFPC
Radium-228	EPA 904 Mod - GFPC
Isotopic Thorium	Alpha Spectroscopy – HASL 300
Isotopic Uranium	Alpha Spectroscopy – HASL 300
Isotopic Plutonium	Alpha Spectroscopy – HASL 300
Strontium-90	EPA 905.0 Mod
Gamma Spectroscopy[1]	Gamma Spectroscopy – HASL 300
PAHs	SW-846 8310
Total Suspended Solids	SM 2540D
Total Dissolved Solids	EPA 160.1
Ignitability	SW-846 1010/1020
Corrosivity	SW-846 Ch. 7.3
Reactive Cyanide/Sulfide	SW-846 9045C

[1]Gamma Spectroscopy includes: U-235, U-238, Ra-226, Ra-228, Th-228, Pa-231, Ac-227, Co-60, Cs-137, K-40, Am-241

Table 4-4. Radiological Parameters MDA/MDL

Parameter	Analytical Method	MDA/MDL	Unit	Matrix
Isotopic Thorium	HASL 300 - Alpha Spectroscopy	0.5	pCi/g	Solid
Isotopic Uranium	HASL 300 - Alpha Spectroscopy	0.5	pCi/g	Solid
Isotopic Plutonium	HASL 300 - Alpha Spectroscopy	1	pCi/g	Solid
Strontium-90	USEPA 905.0 Mod	1	pCi/g	Solid
Radium-226	EPA 903 Mod-Lucas Cell/Emanation/GFPC	1	pCi/g	Solid
Radium-228	EPA 904 Mod - GFPC	1	pCi/g	Solid
Gamma Spectroscopy*	HASL 300 - Gamma Spectroscopy	0.1 (Cs-137)	pCi/g	Solid
Isotopic Thorium	HASL 300 - Alpha Spectroscopy	0.5	pCi/L	Liquid
Isotopic Uranium	HASL 300 - Alpha Spectroscopy	0.5	pCi/L	Liquid
Isotopic Plutonium	HASL 300 - Alpha Spectroscopy	1	pCi/L	Liquid
Strontium-90	USEPA 905.0 Mod	1	pCi/L	Liquid
Radium-226	EPA 903 Mod-Lucas Cell/Emanation/GFPC	1	pCi/L	Liquid
Radium-228	EPA 904 Mod - GFPC	1	pCi/L	Liquid
Gamma Spectroscopy*	HASL 300 - Gamma Spectroscopy	0.1 (Cs-137)	pCi/L	Liquid

*Gamma Spectroscopy includes: U-235, U-238, Ra-226, Ra-228, Th-228, Pa-231, Ac-227, Co-60, Cs-137, K-40, Am-241

Table 4-5. Chemical Parameters MDL

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
Volatile Organic Compounds				
1,1,1,2-Tetrachloroethane	0.3	1	µg/L	Liquid
1,1,1-Trichloroethane	0.325	1	µg/L	Liquid
1,1,2,2-Tetrachloroethane	0.25	1	µg/L	Liquid
1,1,2-Trichloroethane	0.25	1	µg/L	Liquid
1,1-Dichloroethane	0.3	1	µg/L	Liquid
1,1-Dichloroethylene	0.3	1	µg/L	Liquid
1,1-Dichloropropene	0.25	1	µg/L	Liquid
1,2,3-Trichlorobenzene	0.332	1	µg/L	Liquid
1,2,3-Trichloropropane	0.3	1	µg/L	Liquid
1,2,4-Trichlorobenzene	0.3	1	µg/L	Liquid
1,2,4-Trimethylbenzene	0.25	1	µg/L	Liquid
1,2-Dibromo-3-chloropropane	0.3	1	µg/L	Liquid
1,2-Dibromoethane	0.25	1	µg/L	Liquid
1,2-Dichlorobenzene	0.25	1	µg/L	Liquid
1,2-Dichloroethane	0.25	1	µg/L	Liquid
1,2-Dichloroethylene (total)	0.3	1	µg/L	Liquid
1,2-Dichloropropane	0.25	1	µg/L	Liquid
1,3,5-Trimethylbenzene	0.25	1	µg/L	Liquid
1,3-Dichlorobenzene	0.25	1	µg/L	Liquid
1,3-Dichloropropane	0.3	1	µg/L	Liquid
1,3-Dichloropropylene	0.25	1	µg/L	Liquid
1,3-Dichloropropylene(total)	0.25	1	µg/L	Liquid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
1,4-Dichlorobenzene	0.25	1	µg/L	Liquid
1,4-Dioxane	15	50	µg/L	Liquid
1-Chlorohexane	0.3	1	µg/L	Liquid
2,2-Dichloropropane	0.3	1	µg/L	Liquid
2-Butanone	1.25	5	µg/L	Liquid
2-Chloro-1,1,1-trifluoroethane	3	10	µg/L	Liquid
2-Chloro-1,3-butadiene	0.3	1	µg/L	Liquid
2-Chloroethylvinyl ether	1.5	5	µg/L	Liquid
2-Chlorotoluene	0.25	1	µg/L	Liquid
2-Hexanone	1.25	5	µg/L	Liquid
2-Methylpentane	0.5	1	µg/L	Liquid
2-Nitropropane	1	5	µg/L	Liquid
4-Chlorotoluene	0.25	1	µg/L	Liquid
4-Isopropyltoluene	0.25	1	µg/L	Liquid
4-Methyl-2-pentanone	1.25	5	µg/L	Liquid
Acetone	1.5	5	µg/L	Liquid
Acetonitrile	6.25	25	µg/L	Liquid
Acrolein	1.25	5	µg/L	Liquid
Acrylonitrile	1	5	µg/L	Liquid
Allyl chloride	1.5	5	µg/L	Liquid
Benzene	0.3	1	µg/L	Liquid
Benzyl chloride	1.3	5	µg/L	Liquid
Bromobenzene	0.25	1	µg/L	Liquid
Bromochloromethane	0.3	1	µg/L	Liquid
Bromodichloromethane	0.25	1	µg/L	Liquid
Bromoform	0.25	1	µg/L	Liquid
Bromomethane	0.3	1	µg/L	Liquid
Carbon disulfide	1.25	5	µg/L	Liquid
Carbon tetrachloride	0.3	1	µg/L	Liquid
Chlorobenzene	0.25	1	µg/L	Liquid
Chloroethane	0.3	1	µg/L	Liquid
Chloroform	0.25	1	µg/L	Liquid
Chloromethane	0.3	1	µg/L	Liquid
Chlorotrifluoroethylene	3	10	µg/L	Liquid
Cyclohexane	0.3	1	µg/L	Liquid
Cyclohexanone	15	50	µg/L	Liquid
Dibromochloromethane	0.3	1	µg/L	Liquid
Dibromomethane	0.3	1	µg/L	Liquid
Dichlorodifluoromethane	0.3	1	µg/L	Liquid
Ethyl acetate	1.6	5	µg/L	Liquid
Ethyl ether	0.3	1	µg/L	Liquid
Ethyl methacrylate	1	5	µg/L	Liquid
Ethyl tert-butyl ether	0.3	1	µg/L	Liquid
Ethylbenzene	0.25	1	µg/L	Liquid
Hexachlorobutadiene	0.3	1	µg/L	Liquid
Iodomethane	1.25	5	µg/L	Liquid
Isobutyl alcohol	12.5	50	µg/L	Liquid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
Isopropyl Alcohol	10	50	µg/L	Liquid
Isopropyl ether	0.3	1	µg/L	Liquid
Isopropylbenzene	0.25	1	µg/L	Liquid
Methacrylonitrile	1	5	µg/L	Liquid
Methyl acetate	1.25	5	µg/L	Liquid
Methyl methacrylate	1	5	µg/L	Liquid
Methyl tert-amyl ether	0.3	1	µg/L	Liquid
Methylcyclohexane	0.25	1	µg/L	Liquid
Methylene chloride	2	5	µg/L	Liquid
Naphthalene	0.25	1	µg/L	Liquid
Pentachloroethane	1	5	µg/L	Liquid
Propionitrile	1.5	5	µg/L	Liquid
Styrene	0.25	1	µg/L	Liquid
Tetrachloroethylene	0.3	1	µg/L	Liquid
Tetrahydrofuran	1.25	5	µg/L	Liquid
Toluene	0.25	1	µg/L	Liquid
Trichloroethylene	0.25	1	µg/L	Liquid
Trichlorofluoromethane	0.3	1	µg/L	Liquid
Trichlorotrifluoroethane	1	5	µg/L	Liquid
Vinyl acetate	1.5	5	µg/L	Liquid
Vinyl chloride	0.5	1	µg/L	Liquid
Xylenes (total)	0.3	1	µg/L	Liquid
bis(2-Chloroisopropyl)ether	1.5	5	µg/L	Liquid
cis-1,2-Dichloroethylene	0.3	1	µg/L	Liquid
cis-1,3-Dichloropropylene	0.25	1	µg/L	Liquid
cis-1,4-Dichloro-2-butene	1	5	µg/L	Liquid
m,p-Xylenes	0.5	2	µg/L	Liquid
n-Butyl alcohol	15	50	µg/L	Liquid
n-Butylbenzene	0.25	1	µg/L	Liquid
n-Propylbenzene	0.25	1	µg/L	Liquid
o-Xylene	0.3	1	µg/L	Liquid
sec-Butylbenzene	0.25	1	µg/L	Liquid
tert-Butyl Alcohol	10	50	µg/L	Liquid
tert-Butyl methyl ether	0.25	1	µg/L	Liquid
tert-Butylbenzene	0.25	1	µg/L	Liquid
trans-1,2-Dichloroethylene	0.3	1	µg/L	Liquid
trans-1,3-Dichloropropylene	0.25	1	µg/L	Liquid
trans-1,4-Dichloro-2-butene	1	5	µg/L	Liquid
1,1,1,2-Tetrachloroethane	0.3	1	µg/kg	Solid
1,1,1-Trichloroethane	0.3	1	µg/kg	Solid
1,1,2,2-Tetrachloroethane	0.3	1	µg/kg	Solid
1,1,2-Trichloroethane	0.3	1	µg/kg	Solid
1,1-Dichloroethane	0.3	1	µg/kg	Solid
1,1-Dichloroethylene	0.3	1	µg/kg	Solid
1,1-Dichloropropene	0.3	1	µg/kg	Solid
1,2,3-Trichlorobenzene	0.3	1	µg/kg	Solid
1,2,3-Trichloropropane	0.3	1	µg/kg	Solid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD MDL	LOQ PQL	Unit	Matrix
1,2,4-Trichlorobenzene	0.3	1	µg/kg	Solid
1,2,4-Trimethylbenzene	0.3	1	µg/kg	Solid
1,2-Dibromo-3-chloropropane	0.3	1	µg/kg	Solid
1,2-Dibromoethane	0.3	1	µg/kg	Solid
1,2-Dichlorobenzene	0.3	1	µg/kg	Solid
1,2-Dichloroethane	0.3	1	µg/kg	Solid
1,2-Dichloroethylene (total)	0.3	1	µg/kg	Solid
1,2-Dichloropropane	0.3	1	µg/kg	Solid
1,3,5-Trimethylbenzene	0.3	1	µg/kg	Solid
1,3-Dichlorobenzene	0.3	1	µg/kg	Solid
1,3-Dichloropropane	0.3	1	µg/kg	Solid
1,4-Dichlorobenzene	0.3	1	µg/kg	Solid
1,4-Dioxane	16.3	50	µg/kg	Solid
2,2-Dichloropropane	0.3	1	µg/kg	Solid
2-Butanone	1.5	5	µg/kg	Solid
2-Chloro-1,1,1-trifluoroethane	3	10	µg/kg	Solid
2-Chloro-1,3-butadiene	0.3	1	µg/kg	Solid
2-Chloroethylvinyl ether	1.25	5	µg/kg	Solid
2-Chlorotoluene	0.3	1	µg/kg	Solid
2-Hexanone	1.5	5	µg/kg	Solid
2-Methylpentane	0.5	1	µg/kg	Solid
2-Nitropropane	1.35	5	µg/kg	Solid
4-Chlorotoluene	0.3	1	µg/kg	Solid
4-Isopropyltoluene	0.3	1	µg/kg	Solid
4-Methyl-2-pentanone	1.25	5	µg/kg	Solid
Acetone	1.66	5	µg/kg	Solid
Acetonitrile	6.25	25	µg/kg	Solid
Acrolein	1.55	5	µg/kg	Solid
Acrylonitrile	1	5	µg/kg	Solid
Allyl chloride	1	5	µg/kg	Solid
Benzene	0.3	1	µg/kg	Solid
Benzyl chloride	1	5	µg/kg	Solid
Bromobenzene	0.3	1	µg/kg	Solid
Bromochloromethane	0.33	1	µg/kg	Solid
Bromodichloromethane	0.3	1	µg/kg	Solid
Bromoform	0.3	1	µg/kg	Solid
Bromomethane	0.3	1	µg/kg	Solid
Carbon disulfide	1.25	5	µg/kg	Solid
Carbon tetrachloride	0.3	1	µg/kg	Solid
Chlorobenzene	0.3	1	µg/kg	Solid
Chloroethane	0.3	1	µg/kg	Solid
Chloroform	0.3	1	µg/kg	Solid
Chloromethane	0.3	1	µg/kg	Solid
Chlorotrifluoroethylene	3	10	µg/kg	Solid
Cyclohexane	0.3	1	µg/kg	Solid
Cyclohexanone	15	50	µg/kg	Solid
Dibromochloromethane	0.3	1	µg/kg	Solid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
Dibromomethane	0.3	1	µg/kg	Solid
Dichlorodifluoromethane	0.34	1	µg/kg	Solid
Ethyl acetate	1.25	5	µg/kg	Solid
Ethyl ether	0.3	1	µg/kg	Solid
Ethyl methacrylate	1	5	µg/kg	Solid
Ethylbenzene	0.3	1	µg/kg	Solid
Hexachlorobutadiene	0.3	1	µg/kg	Solid
Iodomethane	1.6	5	µg/kg	Solid
Isobutyl alcohol	16.2	50	µg/kg	Solid
Isopropyl Alcohol	33	50	µg/kg	Solid
Isopropylbenzene	0.3	1	µg/kg	Solid
Methacrylonitrile	1.3	5	µg/kg	Solid
Methyl acetate	1.66	5	µg/kg	Solid
Methyl methacrylate	1	5	µg/kg	Solid
Methylcyclohexane	0.3	1	µg/kg	Solid
Methylene chloride	2	5	µg/kg	Solid
Naphthalene	0.3	1	µg/kg	Solid
Pentachloroethane	1.25	5	µg/kg	Solid
Propionitrile	1.67	5	µg/kg	Solid
Styrene	0.3	1	µg/kg	Solid
Tetrachloroethylene	0.3	1	µg/kg	Solid
Tetrahydrofuran	1.7	5	µg/kg	Solid
Toluene	0.3	1	µg/kg	Solid
Trichloroethylene	0.33	1	µg/kg	Solid
Trichlorofluoromethane	0.57	1	µg/kg	Solid
Trichlorotrifluoroethane	1.6	5	µg/kg	Solid
Vinyl acetate	1.25	5	µg/kg	Solid
Vinyl chloride	0.3	1	µg/kg	Solid
Xylenes (total)	0.3	1	µg/kg	Solid
bis(2-Chloroisopropyl)ether	1.5	5	µg/kg	Solid
cis-1,2-Dichloroethylene	0.3	1	µg/kg	Solid
cis-1,3-Dichloropropylene	0.3	1	µg/kg	Solid
cis-1,4-Dichloro-2-butene	1	5	µg/kg	Solid
m,p-Xylenes	0.3	2	µg/kg	Solid
n-Butyl alcohol	26	50	µg/kg	Solid
n-Butylbenzene	0.3	1	µg/kg	Solid
n-Propylbenzene	0.3	1	µg/kg	Solid
o-Xylene	0.3	1	µg/kg	Solid
sec-Butylbenzene	0.3	1	µg/kg	Solid
tert-Butyl Alcohol	26	50	µg/kg	Solid
tert-Butyl methyl ether	0.3	1	µg/kg	Solid
tert-Butylbenzene	0.3	1	µg/kg	Solid
trans-1,2-Dichloroethylene	0.3	1	µg/kg	Solid
trans-1,3-Dichloropropylene	0.3	1	µg/kg	Solid
trans-1,4-Dichloro-2-butene	0.65	5	µg/kg	Solid
Volatile Organic Compounds by TO-15				
1,1,1,2-Tetrachloroethane	0.2	1	ppb	Vapor

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
1,1,1-Trichloroethane	0.2	1	ppb	Vapor
1,1,2,2-Tetrachloroethane	0.2	1	ppb	Vapor
1,1,2-Trichloroethane	0.2	1	ppb	Vapor
1,1-Dichloroethane	0.2	1	ppb	Vapor
1,1-Dichloroethene	0.2	1	ppb	Vapor
1,2,3-Trichloropropane	0.2	1	ppb	Vapor
1,2,4-Trimethylbenzene	0.2	1	ppb	Vapor
1,2-Dibromoethane	0.2	1	ppb	Vapor
1,2-Dichlorobenzene	0.2	1	ppb	Vapor
1,2-Dichloroethane	0.2	1	ppb	Vapor
1,2-Dichloropropane	0.2	1	ppb	Vapor
1,3,5-Trimethylbenzene	0.2	1	ppb	Vapor
1,3-Butadiene	0.5	2	ppb	Vapor
1,3-Dichlorobenzene	0.2	1	ppb	Vapor
1,4-Dichlorobenzene	0.2	1	ppb	Vapor
2-Butanone	0.5	2	ppb	Vapor
2-Hexanone	0.5	2	ppb	Vapor
3-Chloropropene	0.2	1	ppb	Vapor
4-Ethyltoluene	0.2	1	ppb	Vapor
4-Methyl-2-Pentanone	0.5	2	ppb	Vapor
Acetone	0.5	2	ppb	Vapor
Benzene	0.2	1	ppb	Vapor
Bromobenzene	0.2	1	ppb	Vapor
Bromodichloromethane	0.2	1	ppb	Vapor
Bromoform	0.2	1	ppb	Vapor
Bromomethane	0.2	1	ppb	Vapor
Carbon Disulfide	0.2	1	ppb	Vapor
Carbon Tetrachloride	0.2	1	ppb	Vapor
Chlorobenzene	0.2	1	ppb	Vapor
Chlorodifluoromethane	0.2	1	ppb	Vapor
Chloroethane	0.2	1	ppb	Vapor
Chloroform	0.2	1	ppb	Vapor
Chloromethane	0.2	1	ppb	Vapor
Cumene	0.2	1	ppb	Vapor
Dibromochloromethane	0.2	1	ppb	Vapor
Dibromomethane	0.2	1	ppb	Vapor
Dichlorodifluoromethane	0.2	1	ppb	Vapor
Dichlorofluoromethane	0.2	1	ppb	Vapor
Ethylbenzene	0.2	1	ppb	Vapor
Freon 113	0.5	2	ppb	Vapor
Freon 114	0.2	1	ppb	Vapor
Heptane	0.2	1	ppb	Vapor
Hexachloroethane	0.2	1	ppb	Vapor
Hexane	0.2	1	ppb	Vapor
Isooctane	0.2	1	ppb	Vapor
Methyl t-Butyl Ether	0.2	1	ppb	Vapor
Methylene Chloride	0.2	1	ppb	Vapor

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD MDL	LOQ PQL	Unit	Matrix
Octane	0.2	1	ppb	Vapor
Pentane	0.2	1	ppb	Vapor
Styrene	0.2	1	ppb	Vapor
Tetrachloroethene	0.2	1	ppb	Vapor
Toluene	0.2	1	ppb	Vapor
Trichloroethene	0.2	1	ppb	Vapor
Trichlorofluoromethane	0.2	1	ppb	Vapor
Vinyl Chloride	0.2	1	ppb	Vapor
cis-1,2-Dichloroethene	0.2	1	ppb	Vapor
cis-1,3-Dichloropropene	0.2	1	ppb	Vapor
m/p-Xylene	0.2	1	ppb	Vapor
o-Xylene	0.2	1	ppb	Vapor
trans-1,2-Dichloroethene	0.2	1	ppb	Vapor
trans-1,3-Dichloropropene	0.2	1	ppb	Vapor
Semi-Volatile Organic Compounds				
1,1'-Biphenyl	3	10	µg/L	Liquid
1,2,4,5-Tetrachlorobenzene	3	10	µg/L	Liquid
1,2,4-Trichlorobenzene	2	10	µg/L	Liquid
1,2-Dichlorobenzene	2	10	µg/L	Liquid
1,2-Diphenylhydrazine	2	10	µg/L	Liquid
1,3,5-Trinitrobenzene	3	10	µg/L	Liquid
1,3-Dichlorobenzene	2	10	µg/L	Liquid
1,4-Dichlorobenzene	2	10	µg/L	Liquid
1,4-Dinitrobenzene	5	50	µg/L	Liquid
1,4-Dioxane	2	10	µg/L	Liquid
1,4-Naphthoquinone	3	10	µg/L	Liquid
1-Methylnaphthalene	0.3	1	µg/L	Liquid
1-Naphthylamine	3	10	µg/L	Liquid
2,3,4,6-Tetrachlorophenol	2	10	µg/L	Liquid
2,3-Dichloroaniline	2	10	µg/L	Liquid
2,4,5-Trichlorophenol	2	10	µg/L	Liquid
2,4,6-Trichlorophenol	2	10	µg/L	Liquid
2,4-Dichlorophenol	2	10	µg/L	Liquid
2,4-Dimethylphenol	2	10	µg/L	Liquid
2,4-Dinitrophenol	5	20	µg/L	Liquid
2,4-Dinitrotoluene	2	10	µg/L	Liquid
2,6-Dichlorophenol	2	10	µg/L	Liquid
2,6-Dinitrotoluene	2	10	µg/L	Liquid
2-Acetylaminofluorene	3	10	µg/L	Liquid
2-Chloronaphthalene	0.3	1	µg/L	Liquid
2-Chlorophenol	2	10	µg/L	Liquid
2-Methyl-4,6-dinitrophenol	3	10	µg/L	Liquid
2-Methylnaphthalene	0.3	1	µg/L	Liquid
2-Naphthylamine	3	10	µg/L	Liquid
2-Nitrophenol	2	10	µg/L	Liquid
2-Picoline	3	10	µg/L	Liquid
3,3'-Dichlorobenzidine	2	10	µg/L	Liquid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
3,3'-Dimethylbenzidine	3.3	10	µg/L	Liquid
3-Methylcholanthrene	2	10	µg/L	Liquid
4,4'-Methylenebis(2-chloroaniline)	2.5	50	µg/L	Liquid
4-Aminobiphenyl	3	10	µg/L	Liquid
4-Bromophenylphenylether	2	10	µg/L	Liquid
4-Chloro-3-methylphenol	2	10	µg/L	Liquid
4-Chloroaniline	2	10	µg/L	Liquid
4-Chlorophenylphenylether	2	10	µg/L	Liquid
4-Nitrophenol	2	10	µg/L	Liquid
4-Nitroquinoline-1-oxide	3	10	µg/L	Liquid
5-Nitro-o-toluidine	3	10	µg/L	Liquid
7,12Dimethylbenz(a)anthracene	3	10	µg/L	Liquid
Acenaphthene	0.31	1	µg/L	Liquid
Acenaphthylene	0.2	1	µg/L	Liquid
Acetophenone	2	10	µg/L	Liquid
Aniline	2.5	10	µg/L	Liquid
Anthracene	0.2	1	µg/L	Liquid
Aramite	3	10	µg/L	Liquid
Atrazine	3	10	µg/L	Liquid
Benzaldehyde	3	10	µg/L	Liquid
Benzidine	3	10	µg/L	Liquid
Benzo(a)anthracene	0.2	1	µg/L	Liquid
Benzo(a)pyrene	0.2	1	µg/L	Liquid
Benzo(b)fluoranthene	0.2	1	µg/L	Liquid
Benzo(b,k)fluoranthene	0.2	10	µg/L	Liquid
Benzo(ghi)perylene	0.2	1	µg/L	Liquid
Benzo(k)fluoranthene	0.2	1	µg/L	Liquid
Benzoic acid	6	20	µg/L	Liquid
Benzyl alcohol	2	10	µg/L	Liquid
Butylbenzylphthalate	2	10	µg/L	Liquid
Caprolactam	2	10	µg/L	Liquid
Carbazole	0.2	1	µg/L	Liquid
Chlorobenzilate	3	10	µg/L	Liquid
Chrysene	0.2	1	µg/L	Liquid
Di-n-butylphthalate	2	10	µg/L	Liquid
Di-n-octylphthalate	3	10	µg/L	Liquid
Diallate	3	10	µg/L	Liquid
Dibenzo(a,e)pyrene	3	10	µg/L	Liquid
Dibenzo(a,h)anthracene	0.2	1	µg/L	Liquid
Dibenzofuran	2	10	µg/L	Liquid
Diethylphthalate	2	10	µg/L	Liquid
Dimethoate	2	10	µg/L	Liquid
Dimethylphthalate	2	10	µg/L	Liquid
Dinoseb	2	10	µg/L	Liquid
Diphenylamine	3	10	µg/L	Liquid
Disulfoton	2	10	µg/L	Liquid
Ethyl Methanesulfonate	2	10	µg/L	Liquid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD MDL	LOQ PQL	Unit	Matrix
Ethyl methacrylate	2	10	µg/L	Liquid
Famphur	3	10	µg/L	Liquid
Fluoranthene	0.2	1	µg/L	Liquid
Fluorene	0.2	1	µg/L	Liquid
Hexachlorobenzene	2	10	µg/L	Liquid
Hexachlorobutadiene	2	10	µg/L	Liquid
Hexachlorocyclopentadiene	3	10	µg/L	Liquid
Hexachloroethane	2	10	µg/L	Liquid
Hexachlorophene	185	500	µg/L	Liquid
Hexachloropropene	3	10	µg/L	Liquid
Indeno(1,2,3-cd)pyrene	0.2	1	µg/L	Liquid
Isodrin	3	10	µg/L	Liquid
Isophorone	3	10	µg/L	Liquid
Isosafrole	2	10	µg/L	Liquid
Kepone	3	10	µg/L	Liquid
Methapyrilene	3	10	µg/L	Liquid
Methoxychlor	2	10	µg/L	Liquid
Methyl methacrylate	2	10	µg/L	Liquid
Methyl methanesulfonate	2	10	µg/L	Liquid
Methyl parathion	2	10	µg/L	Liquid
N-Methyl-N-nitrosomethylamine	2	10	µg/L	Liquid
N-Nitrosodi-n-butylamine	3	10	µg/L	Liquid
N-Nitrosodiethylamine	2	10	µg/L	Liquid
N-Nitrosodipropylamine	2	10	µg/L	Liquid
N-Nitrosomethylethylamine	2	10	µg/L	Liquid
N-Nitrosomorpholine	2	10	µg/L	Liquid
N-Nitrosopiperidine	2	10	µg/L	Liquid
N-Nitrosopyrrolidine	2	10	µg/L	Liquid
Naphthalene	0.3	1	µg/L	Liquid
Nitrobenzene	3	10	µg/L	Liquid
Parathion	3	10	µg/L	Liquid
Pentachlorobenzene	3	10	µg/L	Liquid
Pentachloroethane	3	10	µg/L	Liquid
Pentachloronitrobenzene	2	10	µg/L	Liquid
Pentachlorophenol	2	10	µg/L	Liquid
Phenacetin	2	10	µg/L	Liquid
Phenanthrene	0.2	1	µg/L	Liquid
Phenol	1	10	µg/L	Liquid
Phorate	2	10	µg/L	Liquid
Pronamide	3	10	µg/L	Liquid
Pyrene	0.3	1	µg/L	Liquid
Pyridine	3	10	µg/L	Liquid
Safrole	2	10	µg/L	Liquid
Sulfotepp	2	10	µg/L	Liquid
Thionazin	2	10	µg/L	Liquid
Tributylphosphate	3	10	µg/L	Liquid
Triethylphosphorothioate	2	10	µg/L	Liquid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
a,a-Dimethylphenethylamine	3	10	µg/L	Liquid
alpha-Terpineol	3	10	µg/L	Liquid
bis(2-Chloroethoxy)methane	3	10	µg/L	Liquid
bis(2-Chloroethyl) ether	2	10	µg/L	Liquid
bis(2-Chloroisopropyl)ether	2	10	µg/L	Liquid
bis(2-Ethylhexyl)phthalate	2	10	µg/L	Liquid
m,p-Cresols	3	10	µg/L	Liquid
m-Dinitrobenzene	2	10	µg/L	Liquid
m-Nitroaniline	2	10	µg/L	Liquid
m-Toluidine	2	10	µg/L	Liquid
n-Decane	3	10	µg/L	Liquid
n-Octadecane	2	10	µg/L	Liquid
o-Cresol	2	10	µg/L	Liquid
o-Nitroaniline	2	10	µg/L	Liquid
o-Toluidine	3	10	µg/L	Liquid
p-(Dimethylamino)azobenzene	3	10	µg/L	Liquid
p-Benzoquinone	2	10	µg/L	Liquid
p-Nitroaniline	3	10	µg/L	Liquid
p-Phenylenediamine	2	20	µg/L	Liquid
p-Toluidine	3	10	µg/L	Liquid
(2,3-Dibromopropyl)phosphate	26.64	1650	µg/kg	Solid
1,1'-Biphenyl	99.9	333	µg/kg	Solid
1,2,4,5-Tetrachlorobenzene	66.6	333	µg/kg	Solid
1,2,4-Trichlorobenzene	66.6	333	µg/kg	Solid
1,2-Dichlorobenzene	66.6	333	µg/kg	Solid
1,2-Diphenylhydrazine	66.6	333	µg/kg	Solid
1,3,5-Trinitrobenzene	66.6	333	µg/kg	Solid
1,3-Dichlorobenzene	66.6	333	µg/kg	Solid
1,4-Dichlorobenzene	66.6	333	µg/kg	Solid
1,4-Dinitrobenzene	99.9	330	µg/kg	Solid
1,4-Dioxane	66.6	333	µg/kg	Solid
1,4-Naphthoquinone	66.6	333	µg/kg	Solid
1-Methylnaphthalene	9.99	33.3	µg/kg	Solid
1-Naphthylamine	99.9	333	µg/kg	Solid
2,3,4,6-Tetrachlorophenol	66.6	333	µg/kg	Solid
2,3-Dichloroaniline	99.9	330	µg/kg	Solid
2,4,5-Trichlorophenol	66.6	333	µg/kg	Solid
2,4,6-Trichlorophenol	66.6	333	µg/kg	Solid
2,4-Dichlorophenol	66.6	333	µg/kg	Solid
2,4-Dimethylphenol	116.55	333	µg/kg	Solid
2,4-Dinitrophenol	126.54	666	µg/kg	Solid
2,4-Dinitrotoluene	33.3	333	µg/kg	Solid
2,6-Dichlorophenol	99.9	333	µg/kg	Solid
2,6-Dinitrotoluene	33.3	333	µg/kg	Solid
2-Acetylaminofluorene	99.9	333	µg/kg	Solid
2-Chloronaphthalene	10.989	33.3	µg/kg	Solid
2-Chlorophenol	66.6	333	µg/kg	Solid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
2-Ethoxyethanol	333	1650	µg/kg	Solid
2-Methyl-4,6-dinitrophenol	66.6	333	µg/kg	Solid
2-Methylnaphthalene	6.66	33.3	µg/kg	Solid
2-Naphthylamine	109.89	333	µg/kg	Solid
2-Nitrophenol	66.6	333	µg/kg	Solid
2-Picoline	66.6	333	µg/kg	Solid
3,3'-Dichlorobenzidine	99.9	333	µg/kg	Solid
3,3'-Dimethylbenzidine	99.9	330	µg/kg	Solid
3-Methylcholanthrene	109.89	333	µg/kg	Solid
4,4'-Methylenebis(2-chloroaniline)	333	1650	µg/kg	Solid
4-Aminobiphenyl	66.6	333	µg/kg	Solid
4-Bromophenylphenylether	66.6	333	µg/kg	Solid
4-Chloro-3-methylphenol	66.6	333	µg/kg	Solid
4-Chloroaniline	66.6	333	µg/kg	Solid
4-Chlorophenylphenylether	66.6	333	µg/kg	Solid
4-Nitrophenol	109.89	333	µg/kg	Solid
4-Nitroquinoline-1-oxide	99.9	333	µg/kg	Solid
5-Nitro-o-toluidine	66.6	333	µg/kg	Solid
7,12Dimethylbenz(a)anthracene	99.9	333	µg/kg	Solid
Acenaphthene	10.989	33.3	µg/kg	Solid
Acenaphthylene	9.99	33.3	µg/kg	Solid
Acetophenone	66.6	333	µg/kg	Solid
Aniline	99.9	333	µg/kg	Solid
Anthracene	6.66	33.3	µg/kg	Solid
Aramite	109.89	333	µg/kg	Solid
Atrazine	99.9	333	µg/kg	Solid
Benzaldehyde	99.9	333	µg/kg	Solid
Benzidine	99.9	330	µg/kg	Solid
Benzo(a)anthracene	9.99	33.3	µg/kg	Solid
Benzo(a)pyrene	9.99	33.3	µg/kg	Solid
Benzo(b)fluoranthene	9.99	33.3	µg/kg	Solid
Benzo(ghi)perylene	9.99	33.3	µg/kg	Solid
Benzo(k)fluoranthene	9.99	33.3	µg/kg	Solid
Benzoic acid	166.5	660	µg/kg	Solid
Benzyl alcohol	99.9	333	µg/kg	Solid
Butylbenzylphthalate	66.6	333	µg/kg	Solid
Caprolactam	66.6	333	µg/kg	Solid
Carbazole	9.99	33.3	µg/kg	Solid
Chlorobenzilate	99.9	333	µg/kg	Solid
Chrysene	9.99	33.3	µg/kg	Solid
Di-n-butylphthalate	66.6	333	µg/kg	Solid
Di-n-octylphthalate	66.6	333	µg/kg	Solid
Diallate	66.6	333	µg/kg	Solid
Dibenzo(a,e)pyrene	99.9	330	µg/kg	Solid
Dibenzo(a,h)anthracene	9.99	33.3	µg/kg	Solid
Dibenzofuran	66.6	333	µg/kg	Solid
Diethylphthalate	66.6	333	µg/kg	Solid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD MDL	LOQ PQL	Unit	Matrix
Dimethoate	66.6	333	µg/kg	Solid
Dimethylphthalate	66.6	333	µg/kg	Solid
Dinoseb	66.6	333	µg/kg	Solid
Diphenylamine	66.6	333	µg/kg	Solid
Disulfoton	99.9	333	µg/kg	Solid
Ethyl Methanesulfonate	66.6	333	µg/kg	Solid
Ethyl methacrylate	66.6	333	µg/kg	Solid
Famphur	66.6	333	µg/kg	Solid
Fluoranthene	9.99	33.3	µg/kg	Solid
Fluorene	9.99	33.3	µg/kg	Solid
Hexachlorobenzene	66.6	333	µg/kg	Solid
Hexachlorobutadiene	66.6	333	µg/kg	Solid
Hexachlorocyclopentadiene	66.6	333	µg/kg	Solid
Hexachloroethane	66.6	333	µg/kg	Solid
Hexachlorophene	3862.8	16500	µg/kg	Solid
Hexachloropropene	66.6	333	µg/kg	Solid
Indeno(1,2,3-cd)pyrene	9.99	33.3	µg/kg	Solid
Isodrin	66.6	333	µg/kg	Solid
Isophorone	66.6	333	µg/kg	Solid
Isosafrole	66.6	333	µg/kg	Solid
Kepone	99.9	333	µg/kg	Solid
Methapyrilene	109.89	333	µg/kg	Solid
Methoxychlor	66.6	333	µg/kg	Solid
Methyl methacrylate	66.6	333	µg/kg	Solid
Methyl methanesulfonate	66.6	333	µg/kg	Solid
Methyl parathion	66.6	333	µg/kg	Solid
N-Methyl-N-nitrosomethylamine	66.6	330	µg/kg	Solid
N-Nitrosodi-n-butylamine	66.6	333	µg/kg	Solid
N-Nitrosodiethylamine	66.6	333	µg/kg	Solid
N-Nitrosodipropylamine	66.6	333	µg/kg	Solid
N-Nitrosomethylethylamine	66.6	333	µg/kg	Solid
N-Nitrosomorpholine	66.6	333	µg/kg	Solid
N-Nitrosopiperidine	66.6	333	µg/kg	Solid
N-Nitrosopyrrolidine	66.6	333	µg/kg	Solid
Naphthalene	9.99	33.3	µg/kg	Solid
Nitrobenzene	66.6	333	µg/kg	Solid
Parathion	66.6	333	µg/kg	Solid
Pentachlorobenzene	66.6	333	µg/kg	Solid
Pentachloroethane	66.6	333	µg/kg	Solid
Pentachloronitrobenzene	66.6	333	µg/kg	Solid
Pentachlorophenol	83.25	333	µg/kg	Solid
Phenacetin	66.6	333	µg/kg	Solid
Phenanthrene	9.99	33.3	µg/kg	Solid
Phenol	66.6	333	µg/kg	Solid
Phorate	66.6	333	µg/kg	Solid
Phthalic Anhydride	532.8	1650	µg/kg	Solid
Pronamide	66.6	333	µg/kg	Solid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
Pyrene	9.99	33.3	µg/kg	Solid
Pyridine	66.6	333	µg/kg	Solid
Safrole	66.6	333	µg/kg	Solid
Sulfotepp	66.6	333	µg/kg	Solid
Thionazin	66.6	333	µg/kg	Solid
Tributylphosphate	66.6	333	µg/kg	Solid
Triethylphosphorothioate	66.6	333	µg/kg	Solid
a,a-Dimethylphenethylamine	109.89	330	µg/kg	Solid
alpha-Terpineol	66.6	330	µg/kg	Solid
bis(2-Chloroethoxy)methane	66.6	333	µg/kg	Solid
bis(2-Chloroethyl) ether	66.6	333	µg/kg	Solid
bis(2-Chloroisopropyl)ether	66.6	333	µg/kg	Solid
bis(2-Ethylhexyl)phthalate	66.6	333	µg/kg	Solid
m,p-Cresols	99.9	333	µg/kg	Solid
m-Dinitrobenzene	66.6	330	µg/kg	Solid
m-Nitroaniline	66.6	333	µg/kg	Solid
m-Toluidine	99	330	µg/kg	Solid
n-Decane	66.6	330	µg/kg	Solid
n-Octadecane	99.9	330	µg/kg	Solid
o-Cresol	66.6	333	µg/kg	Solid
o-Nitroaniline	66.6	333	µg/kg	Solid
o-Toluidine	99.9	330	µg/kg	Solid
p-(Dimethylamino)azobenzene	66.6	330	µg/kg	Solid
p-Benzoquinone	199.8	660	µg/kg	Solid
p-Nitroaniline	99.9	333	µg/kg	Solid
p-Phenylenediamine	166.5	330	µg/kg	Solid
p-Toluidine	99.9	333	µg/kg	Solid
PAHs				
1-Methylnaphthalene	0.125	0.5	µg/L	Liquid
2-Methylnaphthalene	0.125	0.5	µg/L	Liquid
Acenaphthene	0.125	0.5	µg/L	Liquid
Acenaphthylene	0.125	0.5	µg/L	Liquid
Anthracene	0.13	0.5	µg/L	Liquid
Benzo(a)anthracene	0.016	0.05	µg/L	Liquid
Benzo(a)pyrene	0.016	0.05	µg/L	Liquid
Benzo(b)fluoranthene	0.016	0.05	µg/L	Liquid
Benzo(ghi)perylene	0.016	0.05	µg/L	Liquid
Benzo(k)fluoranthene	0.016	0.025	µg/L	Liquid
Chrysene	0.016	0.05	µg/L	Liquid
Dibenzo(a,h)anthracene	0.016	0.05	µg/L	Liquid
Fluoranthene	0.016	0.05	µg/L	Liquid
Fluorene	0.125	0.5	µg/L	Liquid
Indeno(1,2,3-cd)pyrene	0.016	0.05	µg/L	Liquid
Naphthalene	0.125	0.5	µg/L	Liquid
Phenanthrene	0.125	0.5	µg/L	Liquid
Pyrene	0.016	0.05	µg/L	Liquid
1-Methylnaphthalene	5.0283	16.65	µg/kg	Solid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
2-Methylnaphthalene	4.995	16.65	µg/kg	Solid
Acenaphthene	4.995	16.65	µg/kg	Solid
Acenaphthylene	1.665	16.65	µg/kg	Solid
Anthracene	4.995	16.65	µg/kg	Solid
Benzo(a)anthracene	0.5328	1.665	µg/kg	Solid
Benzo(a)pyrene	0.5328	1.665	µg/kg	Solid
Benzo(b)fluoranthene	0.5328	1.665	µg/kg	Solid
Benzo(ghi)perylene	0.5328	1.665	µg/kg	Solid
Benzo(k)fluoranthene	0.333	0.8325	µg/kg	Solid
Chrysene	0.56943	1.665	µg/kg	Solid
Decafluorobiphenyl		16.65	µg/kg	Solid
Dibenzo(a,h)anthracene	0.5328	1.665	µg/kg	Solid
Fluoranthene	0.5328	1.665	µg/kg	Solid
Fluorene	3.33	16.65	µg/kg	Solid
Indeno(1,2,3-cd)pyrene	0.5328	1.665	µg/kg	Solid
Naphthalene	4.995	16.65	µg/kg	Solid
Phenanthrene	1.665	16.65	µg/kg	Solid
Pyrene	0.5328	1.665	µg/kg	Solid
Total PCBs				
Aroclor-1016	0.0333	0.1	µg/L	Liquid
Aroclor-1221	0.0333	0.1	µg/L	Liquid
Aroclor-1232	0.0333	0.1	µg/L	Liquid
Aroclor-1242	0.0333	0.1	µg/L	Liquid
Aroclor-1248	0.0333	0.1	µg/L	Liquid
Aroclor-1254	0.0333	0.1	µg/L	Liquid
Aroclor-1260	0.0333	0.1	µg/L	Liquid
Aroclor-1262	0.0333	0.1	µg/L	Liquid
Aroclor-1268	0.0333	0.1	µg/L	Liquid
Aroclor-Total	0.0333	0.1	µg/L	Liquid
Aroclor-1016	1.0989	3.333	µg/kg	Solid
Aroclor-1221	1.0989	3.333	µg/kg	Solid
Aroclor-1232	1.0989	3.333	µg/kg	Solid
Aroclor-1242	1.0989	3.333	µg/kg	Solid
Aroclor-1248	1.0989	3.333	µg/kg	Solid
Aroclor-1254	1.0989	3.333	µg/kg	Solid
Aroclor-1260	1.0989	3.333	µg/kg	Solid
Aroclor-1262	1.0989	3.333	µg/kg	Solid
Aroclor-1268	1.0989	3.333	µg/kg	Solid
Aroclor-Total	1.10889	3.33	µg/kg	Solid
Total Metals				
Aluminum	68	200	µg/L	Liquid
Antimony	3	10	µg/L	Liquid
Arsenic	5	30	µg/L	Liquid
Barium	1	5	µg/L	Liquid
Beryllium	1	5	µg/L	Liquid
Boron	15	50	µg/L	Liquid
Cadmium	1	5	µg/L	Liquid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
Calcium	50	200	µg/L	Liquid
Chromium	1	5	µg/L	Liquid
Cobalt	1	5	µg/L	Liquid
Copper	3	10	µg/L	Liquid
Iron	30	100	µg/L	Liquid
Lead	3.3	10	µg/L	Liquid
Lithium	2	10	µg/L	Liquid
Magnesium	85	300	µg/L	Liquid
Manganese	2	10	µg/L	Liquid
Molybdenum	2	10	µg/L	Liquid
Nickel	1.5	5	µg/L	Liquid
Phosphorous	60	150	µg/L	Liquid
Potassium	50	150	µg/L	Liquid
Selenium	5	30	µg/L	Liquid
Silica	53	213	µg/L	Liquid
Silicon	25	100	µg/L	Liquid
Silver	1	5	µg/L	Liquid
Sodium	100	300	µg/L	Liquid
Strontium	1	5	µg/L	Liquid
Sulfur	12	50	µg/L	Liquid
Thallium	5	20	µg/L	Liquid
Tin	2.5	10	µg/L	Liquid
Titanium	1	5	µg/L	Liquid
Uranium	10	50	µg/L	Liquid
Vanadium	1	5	µg/L	Liquid
Zinc	3.3	10	µg/L	Liquid
Aluminum	6800	20000	µg/kg	Solid
Antimony	330	1000	µg/kg	Solid
Arsenic	500	3000	µg/kg	Solid
Barium	100	500	µg/kg	Solid
Beryllium	100	500	µg/kg	Solid
Boron	1000	5000	µg/kg	Solid
Cadmium	100	500	µg/kg	Solid
Calcium	8000	25000	µg/kg	Solid
Chromium	150	500	µg/kg	Solid
Cobalt	150	500	µg/kg	Solid
Copper	300	1000	µg/kg	Solid
Iron	8000	25000	µg/kg	Solid
Lead	250	1000	µg/kg	Solid
Lithium	200	1000	µg/kg	Solid
Magnesium	8500	30000	µg/kg	Solid
Manganese	200	1000	µg/kg	Solid
Molybdenum	200	1000	µg/kg	Solid
Nickel	150	500	µg/kg	Solid
Phosphorous	5000	15000	µg/kg	Solid
Potassium	6400	25000	µg/kg	Solid
Selenium	500	3000	µg/kg	Solid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
Silica	3208.5	21400	µg/kg	Solid
Silicon	1500	10000	µg/kg	Solid
Silver	100	500	µg/kg	Solid
Sodium	7000	25000	µg/kg	Solid
Strontium	100	500	µg/kg	Solid
Sulfur	2500	10000	µg/kg	Solid
Thallium	500	2000	µg/kg	Solid
Tin	300	1000	µg/kg	Solid
Titanium	100	500	µg/kg	Solid
Uranium	1000	5000	µg/kg	Solid
Vanadium	100	500	µg/kg	Solid
Zinc	330	1000	µg/kg	Solid
TCLP Volatile Organic Compounds				
1,1-Dichloroethylene	0.003	0.01	mg/L	Solid
1,2-Dichloroethane	0.0025	0.01	mg/L	Solid
1,4-Dichlorobenzene	0.0025	0.01	mg/L	Solid
2-Butanone	0.0125	0.05	mg/L	Solid
Benzene	0.003	0.01	mg/L	Solid
Carbon tetrachloride	0.003	0.01	mg/L	Solid
Chlorobenzene	0.0025	0.01	mg/L	Solid
Chloroethane	0.003	0.01	mg/L	Solid
Chloroform	0.0025	0.01	mg/L	Solid
Tetrachloroethylene	0.003	0.01	mg/L	Solid
Vinyl chloride	0.005	0.01	mg/L	Solid
TCLP Semi-Volatile Organic Compounds				
1,4-Dichlorobenzene	0.01	0.05	mg/L	Solid
2,4,5-Trichlorophenol	0.01	0.05	mg/L	Solid
2,4,6-Trichlorophenol	0.01	0.05	mg/L	Solid
2,4-Dinitrotoluene	0.01	0.05	mg/L	Solid
Hexachlorobenzene	0.01	0.05	mg/L	Solid
Hexachlorobutadiene	0.01	0.05	mg/L	Solid
Hexachloroethane	0.01	0.05	mg/L	Solid
Nitrobenzene	0.015	0.05	mg/L	Solid
Pentachlorophenol	0.01	0.05	mg/L	Solid
Pyridine	0.015	0.05	mg/L	Solid
m,p-Cresols	0.015	0.05	mg/L	Solid
o-Cresol	0.01	0.05	mg/L	Solid
TCLP Herbicide				
2,4-D	0.0166	0.05	mg/L	Solid
2,4,5-TP	0.0166	0.05	mg/L	Solid
TCLP Metals				
Arsenic	0.05	0.3	mg/L	Solid
Barium	0.01	0.05	mg/L	Solid
Cadmium	0.01	0.05	mg/L	Solid
Chromium	0.01	0.05	mg/L	Solid
Lead	0.033	0.1	mg/L	Solid
Mercury	0.00066	0.002	mg/L	Solid

Table 4-5. Chemical Parameters MDL (continued)

Parameter	LOD	LOQ	Unit	Matrix
	MDL	PQL		
Selenium	0.05	0.3	mg/L	Solid
Silver	0.01	0.05	mg/L	Solid
TCLP Pesticides				
Chlordane (tech.)	0.003825	0.0125	mg/L	Solid
Endrin	0.0005	0.002	mg/L	Solid
Heptachlor	0.00025	0.001	mg/L	Solid
gamma-BHC (Lindane)	0.00025	0.001	mg/L	Solid
Methoxychlor	0.0025	0.01	mg/L	Solid
Toxaphene	0.0075	0.025	mg/L	Solid
Miscellaneous				
Reactive Releasable Sulfide		500	mg/L	Liquid
Reactive Releasable Sulfide		500	mg/kg	Solid
Reactive Releasable Cyanide	1	250	mg/L	Liquid
Reactive Releasable Cyanide	1	250	mg/kg	Solid
Flashpoint-140	75	75	F	Solid/Liquid
Flashpoint-200	75	75	F	Solid/Liquid
Paint Filter	NA	NA	NA	Solid
Soil Moisture	NA	NA	NA	Solid
Bulk Density	NA	NA	NA	Solid
Porosity	NA	NA	NA	Solid
Total Suspended Solids	1.14	5	mg/L	Liquid
Total Dissolved Solids	2.38	10.0	mg/L	Liquid
Corrosivity	0.01	0.1	SU	Solid/Liquid

LOD - Limit of Detection MDL - Method Detection Limit

LOQ - Limit of Quantitation PQL - Practical Quantitation Limit

Table 4-6. Container Requirements for Soil Samples

Parameter	Container Type/Sample	Preservative	Holding Times
Iso Th, Pu, Sr-90	1 - 8 oz wide mouth	N/A	6 months
Iso U	1 - 4 oz wide mouth	N/A	6 months
Ra-226/228	1 - 4 oz wide mouth	N/A	6 months
Gamma Spec	1 - 8 oz wide mouth	N/A	6 months
Metals	1 - 4 oz wide mouth	4°C	6 months
Metals + Boron and Lithium	1 - 4 oz wide mouth	4°C	6 months
Mercury			28 days
Pesticides	1 - 8 oz wide mouth glass	4°C	14 days
PCB			365 days
VOC	1 - 4 oz wide mouth glass	4°C	14 days
VOCs by TO-15	1 - Summa Canister	N/A	NA
SVOC, PAH	1 - 8 oz wide mouth glass	4°C	14 days
Herbicides	1 - 8 oz wide mouth glass	4°C	14 days
Full TCLP - VOC, SVOC, Pest, Herb, Metals	1 - 16 oz wide mouth	4°C	*
Ignitability, Paint Filter	1 - 16 oz wide mouth	4°C	NA
Corrosivity,			Immediate
Reactive CN & H_2S			14 days, 7 days
Soil Moisture	1 - Shelby Tube	N/A	NA
Bulk Density			NA
Porosity			NA

*TCLP Holding Times:

Parameter	From Collection to TCLP Extraction	From TCLP Extraction to Prep Extraction	From Prep Extraction to Analysis
VOC	14 days	N/A	14 days
SVOC/Pest/Herb	14 days	7 days	40 days
Mercury	28 days	N/A	28 days
Metals (excluding Hg)	180 days	N/A	180 days

Table 4-7. Container Requirements for Water Samples

Parameter	Container Type/Sample	Preservative	Holding Times
Iso Th	2 - 1L poly	HNO_3 to pH<2	6 months
Iso Pu	2 - 1L poly	HNO_3 to pH<2	6 months
Iso U	2 - 1L poly	HNO_3 to pH<2	6 months
Sr-90	2 - 1L poly	HNO_3 to pH<2	6 months
Ra-226/228	2 - 1L poly	HNO_3 to pH<2	6 months
Gamma Spec	2 - 1L poly	HNO_3 to pH<2	6 months
Metals	1 - 250 ml poly	HNO_3 to pH<2	6 months
Metals + Boron and Lithium	1 - 250 ml poly	HNO_3 to pH<2	6 months
Pesticides	2 - 1L amber glass	4°C	7 days
PCB	2 - 1L amber glass	4°C	365 days
VOC	3 - 40 ml Vials	4° C, HCL, zero headspace	14 days
SVOC	2 - 1L amber glass	4°C	7 days
PAH	2 - 1L amber glass; 3 - 1L for QC	4°C	7 days
Herbicides	2 - 1L amber glass; 3 - 1L for QC	4°C	7 days
Ignitability	1 - 250 ml Poly	zero headspace	NA
Corrosivity			Immediate
TSS	1 - 1L poly	4°C	7 days
Reactive CN and H_2S			14 days, 7 days
TDS	1-500 ml poly	4°C	7 days

Table 4-8. Radiation Dose and Removable Contamination Shipping Limits

Surface	Package Type	Package Radiation Limits[1] SAIC Administrative (mrem/h)	DOT (mrem/h)
External Package Surface	Excepted Package - Limited Quantity	0.3	0.5
Surface	**Radionuclides**	**Removable Contamination Limits[1,2] SAIC Administrative (dpm/100cm^2)**	**DOT (dpm/100cm^2)**
External Package Surface	Beta and Gamma Emitters and Low Toxicity Alpha Emitters	1,000	22,000
	All Other Alpha Emitters	20	2,200

[1] SAIC Administrative limits may be exceeded with the approval of the RSO, however, the DOT Limits are not to be exceeded.
[2] Averaged over 300 cm^2 area with an assumed wipe efficiency of 0.1.

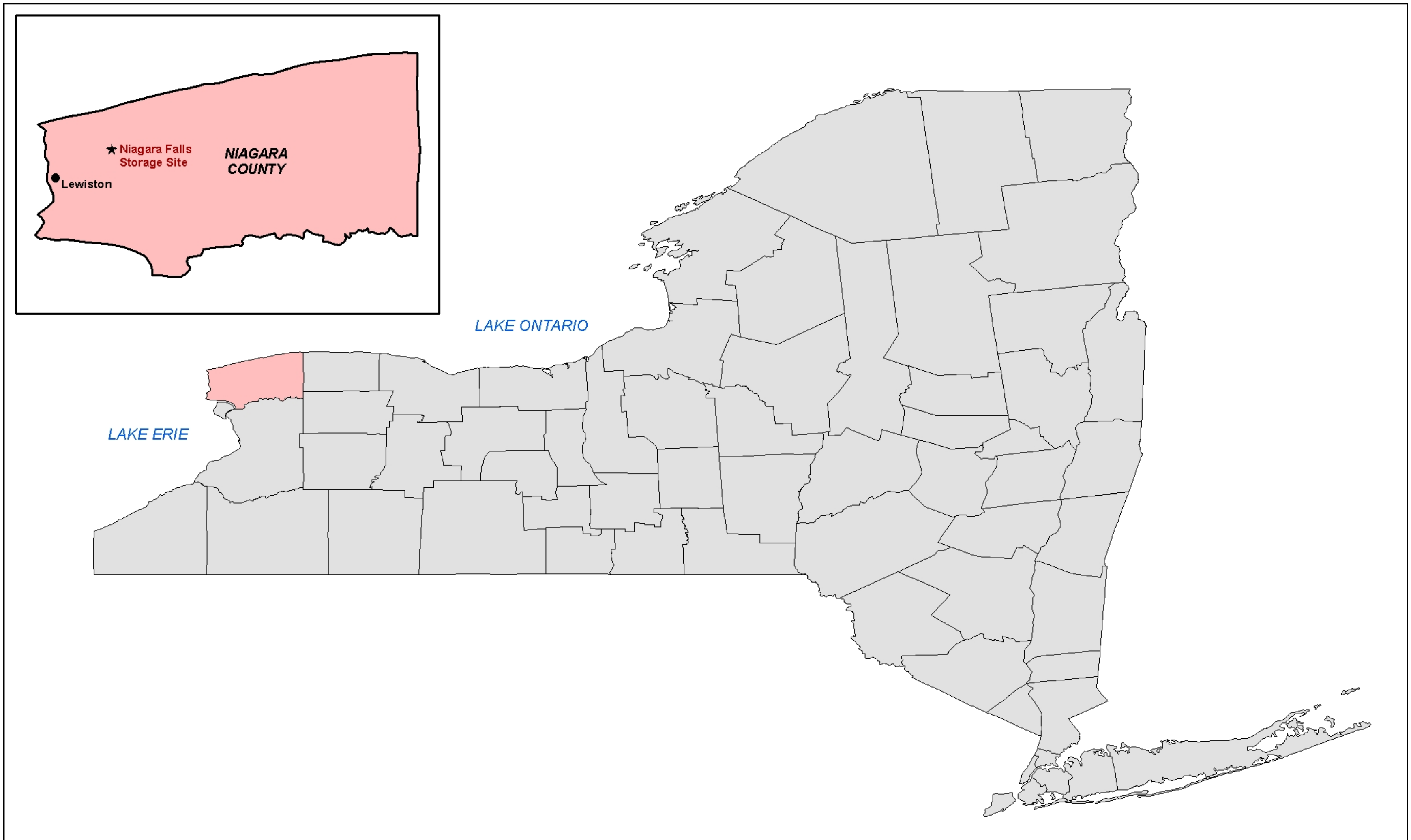
Source: SAIC HP-60 Packaging and Shipment of Radioactive Material/Waste - General Requirements (Revision 0)

Table 5-1. Soil and Rock Parameters to be Recorded on Borehole Logs

Soil Parameters	Rock Parameters
USCS Classification	Rock Type
Depositional environment and formation, if known	Formation
ASTM D 2488 group symbol	Modifier denoting variety
Color (using Munsell Soil or GSA Rock Color Chart). Give both narrative and numerial description and note which chart was used.	Bedding/banding characteristics
Plasticity	Color (same as for soil)
Consistency (cohesive soil; very soft; soft; medium stiff; stiff; very stiff; hard	Hardness
Density (noncohesive soil; loose; medium dense; dense; very dense)	Degree of cementation
Moisture content in relative terms Dry – crumbly Damp – between crumbly and plastic limit Moist – between plastic limit and liquid limit Wet – greater then the liquid limit Saturated – runny, all voids filled with water	Texture Structure of orientation Degree of weathering Solution or void conditions
Structure and orientation	Primary and secondary permeability, include estimates and rationale
Grain angularity	Lost core interval and reason for loss

ASTM – American Society for Testing and Materials
GSA – Geological Society of America

FIGURES



PROJECT NAME: Niagara Falls Storage Site - RI Report Addendum		DRAWN BY:	1-1
DRAWING TITLE: Figure 1-1. General Site Location	N W E S	CHECKED BY:	

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Figure 1-1. General Location and Orientation of the NFSS

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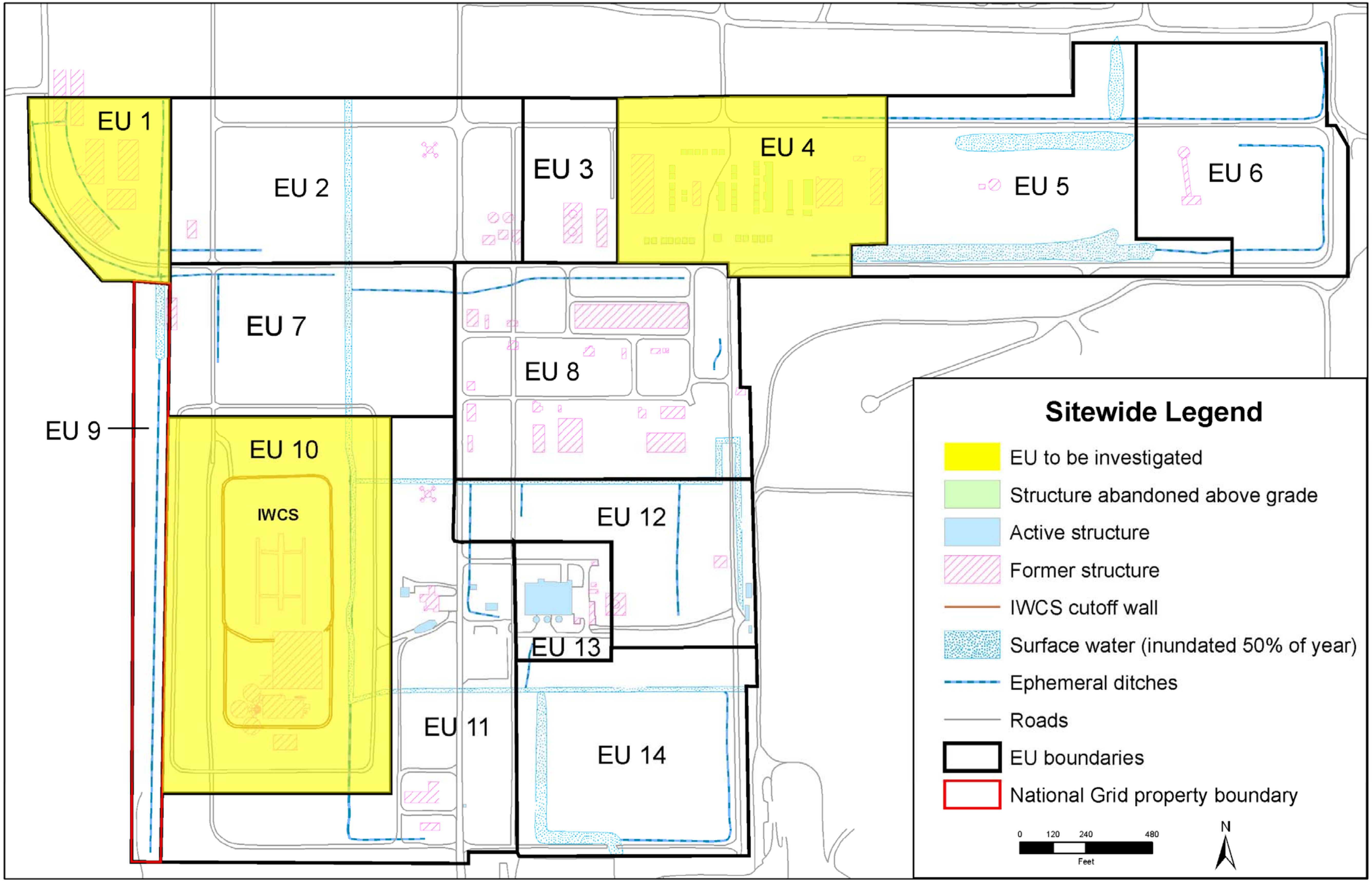

Figure 1-2. NFSS with Investigation EUs Identified

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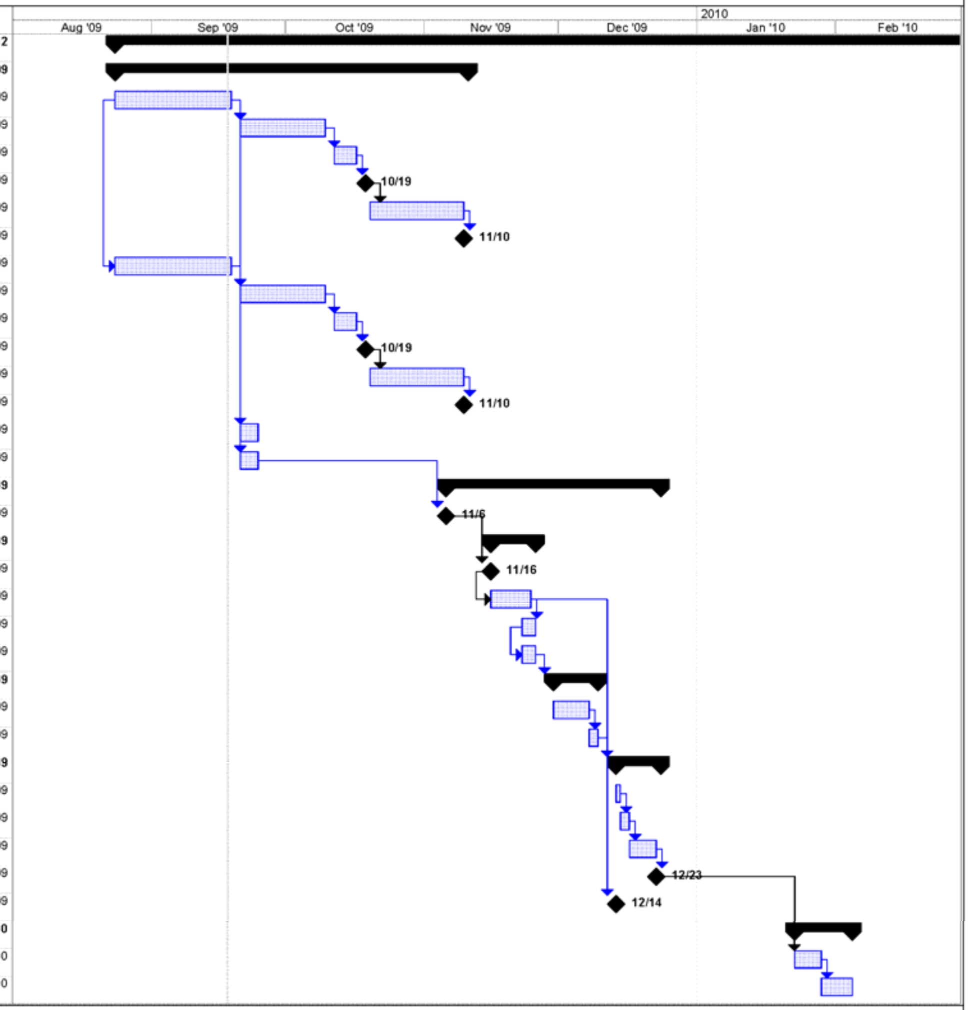
Figure 1-3. RI Addendum Field Activities Schedule

ID	Text1	Task Name	Duration	Start	Finish
2	**Task 1**	**Task 1 RIR Addendum**	**785 days**	**Mon 8/24/09**	**Tue 8/14/12**
8		**RI Addendum Work Plans**	**56 days**	**Mon 8/24/09**	**Tue 11/10/09**
9	1b.a	Draft SAP/WCP	19 days	Mon 8/24/09	Fri 9/18/09
10		USACE Review	15 days	Mon 9/21/09	Fri 10/9/09
11	1b.b	SAP/WCP Comment Responses	5 days	Mon 10/12/09	Fri 10/16/09
12	1b.c	Draft Final SAP/WCP	1 day	Mon 10/19/09	Mon 10/19/09
13		USACE/NYSDEC Review	15 days	Tue 10/20/09	Mon 11/9/09
14		Final SAP/WCP	1 day	Tue 11/10/09	Tue 11/10/09
15	1b.d	Draft APP/SSHP/RPP	19 days	Mon 8/24/09	Fri 9/18/09
16		USACE Review	15 days	Mon 9/21/09	Fri 10/9/09
17	1b.e	APP/SSHP/RPP Comment Responses	5 days	Mon 10/12/09	Fri 10/16/09
18	1b.f	Draft Final APP/SSHP/RPP	1 day	Mon 10/19/09	Mon 10/19/09
19		USACE/NYSDEC Review	15 days	Tue 10/20/09	Mon 11/9/09
20		Final APP/SSHP/RPP	1 day	Tue 11/10/09	Tue 11/10/09
21	1b.g	SAP/WCP ITR	4 days	Mon 9/21/09	Thu 9/24/09
22	1b.h	APP/SSHP/RPP ITR	4 days	Mon 9/21/09	Thu 9/24/09
23		**RI Addendum Field Work**	**40 days**	**Fri 11/6/09**	**Wed 12/23/09**
24	1c.3b.k	Readiness Review	1 day	Fri 11/6/09	Fri 11/6/09
25		**Cycle 1**	**10 days**	**Mon 11/16/09**	**Wed 11/25/09**
26	1c.3b.a	Mobilization	1 day	Mon 11/16/09	Mon 11/16/09
27	1c.3b.b	SB/TWP Installation and Sampling	9 days	Mon 11/16/09	Tue 11/24/09
28	1c.3b.c	TWP Sampling	3 days	Mon 11/23/09	Wed 11/25/09
29	1c.3b.d	Soil Gas/GW Sampling	3 days	Mon 11/23/09	Wed 11/25/09
30		**Cycle 2**	**10 days**	**Mon 11/30/09**	**Wed 12/9/09**
31	1c.3b.e	Permanent Well Installation/Development	8 days	Mon 11/30/09	Mon 12/7/09
32	1c.3b.f	TWP Abandonment	2 days	Tue 12/8/09	Wed 12/9/09
33		**Cycle 3**	**10 days**	**Mon 12/14/09**	**Wed 12/23/09**
34	1c.3b.g	IDW Sampling	1 day	Mon 12/14/09	Mon 12/14/09
35	1c.3b.h	Surveying	2 days	Tue 12/15/09	Wed 12/16/09
36	1c.3b.i	Groundwater Well Sampling	6 days	Thu 12/17/09	Tue 12/22/09
37	1c.3b.j	Demobilization	1 day	Wed 12/23/09	Wed 12/23/09
38	1c.3b.l	Field QA Surveillance	1 day	Mon 12/14/09	Mon 12/14/09
39		**Waste Profiles**	**10 days**	**Sat 1/23/10**	**Thu 2/4/10**
40	1d.a-b	Generate Waste Profiles/ITR	5 days	Sat 1/23/10	Thu 1/28/10
41	1d.c	Revise Waste Profiles	5 days	Fri 1/29/10	Thu 2/4/10



Project: RIAddendumSchedule091809
Date: Fri 9/18/09

Task | Progress | Milestone | Summary | Project Summary

Page 1

Figure 1-3. Project Schedule

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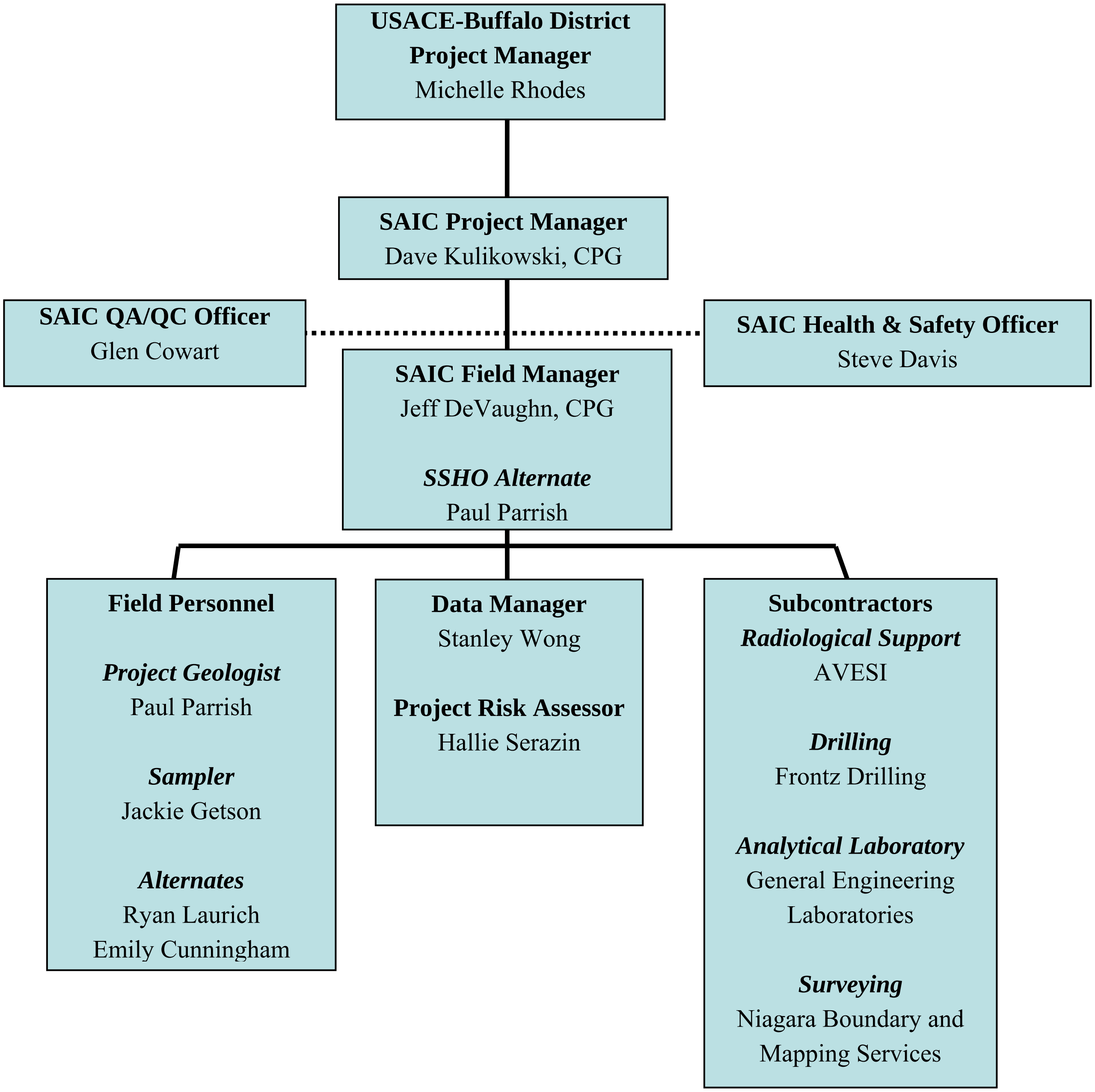

Figure 2-1. Project Personnel Organization Chart

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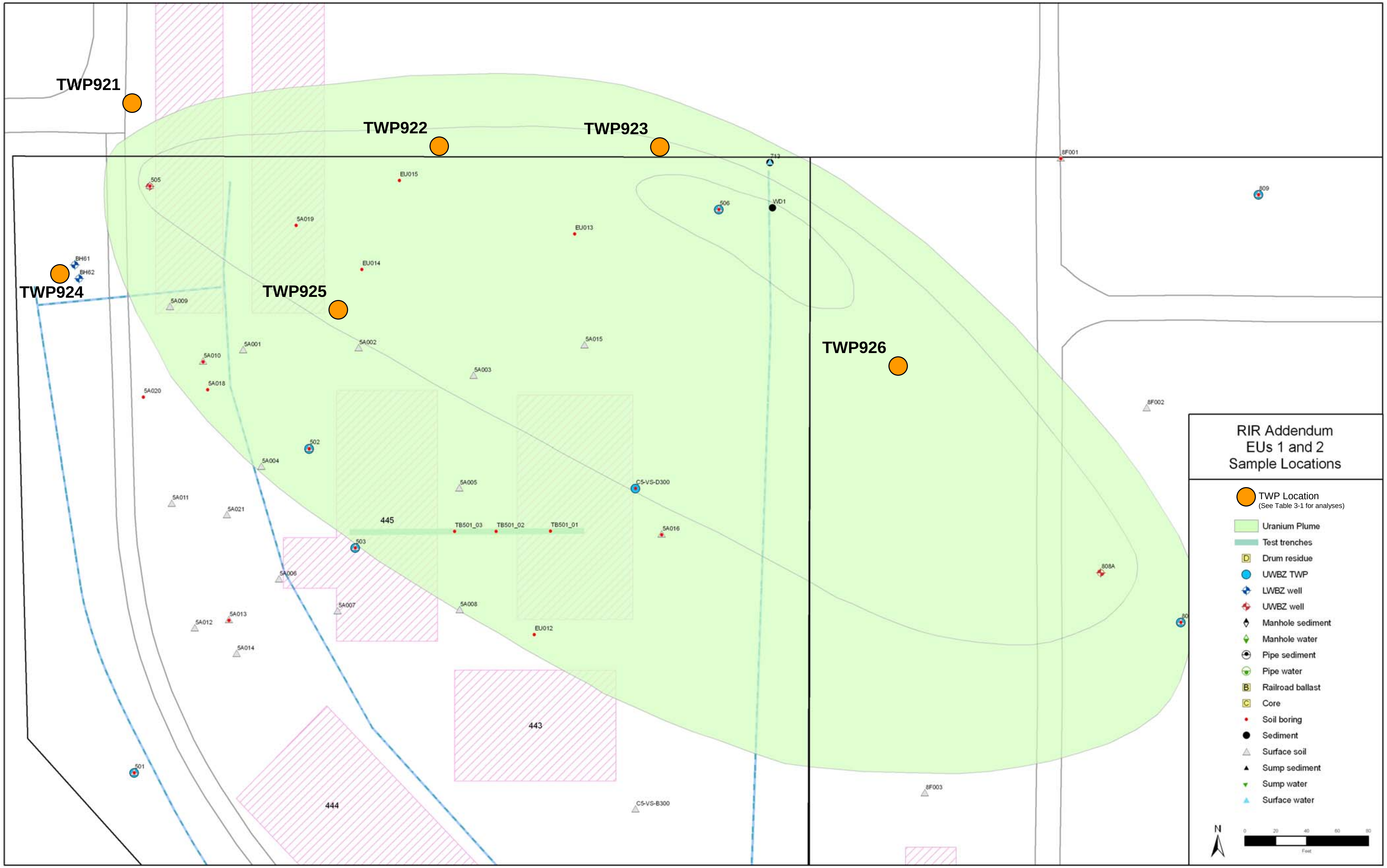

Figure 3-1. Temporary Well Point Locations EUs 1 and 2

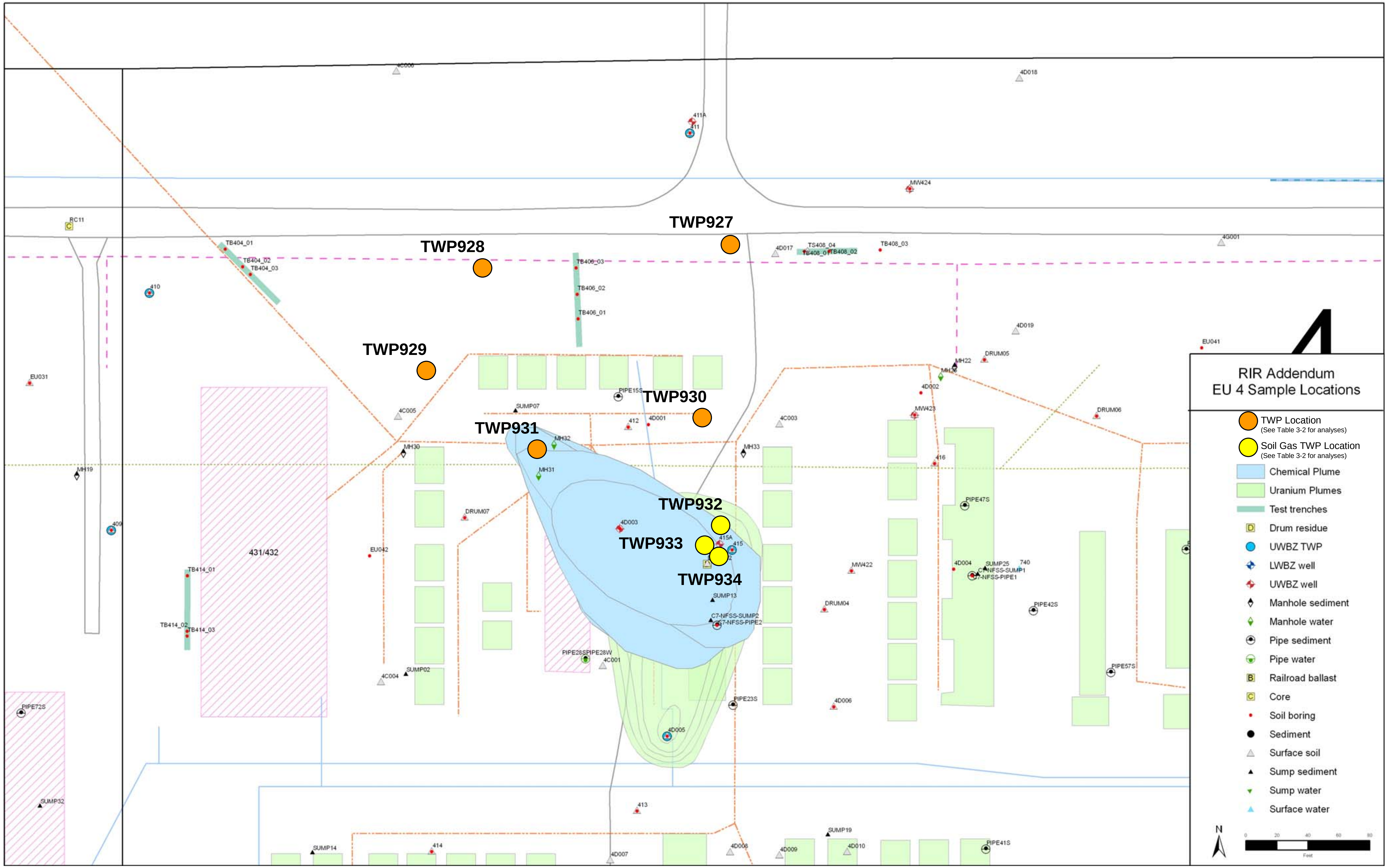

Figure 3-2. Temporary Well Point Locations EU4

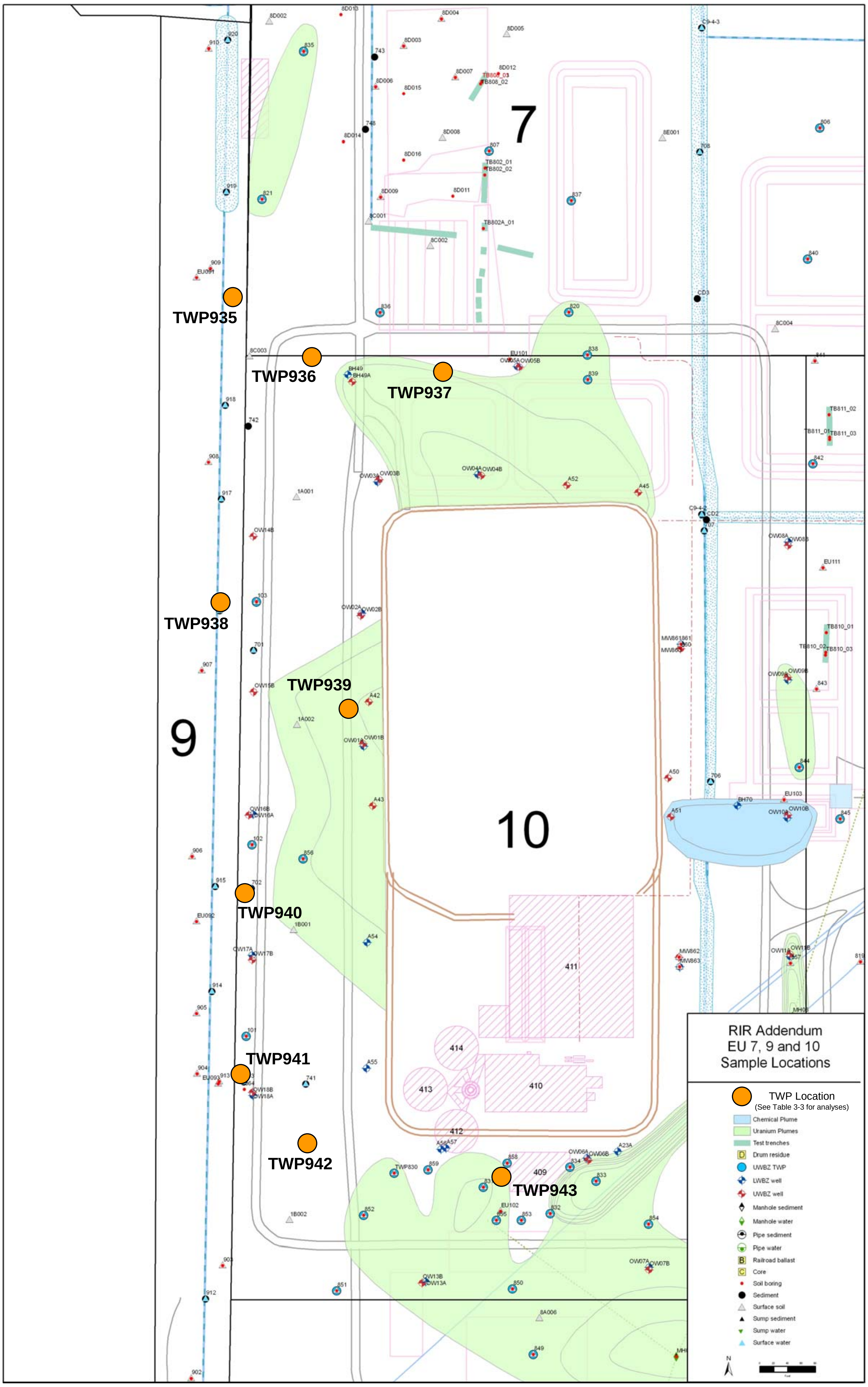

Figure 3-3. Temporary Well Point Locations EUs 7, 9 and 10

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Sampling Location Identification: XXXNNxx-xxF-####	
XXX = Sample Location Code	<u>Examples</u> 921 - Temporary Well Point Location 921 935 - Temporary Well Point Location 935
NN = Sample Type	<u>Examples</u> SS = Surface Soil SB = Subsurface Soil TW = Groundwater From TWP GW = Groundwater From Monitoring Well TB = Trip Blank RB = Rinsate Blank
xx-xx = Sample Depth or Sampling Event	<u>Examples</u> 0.0-0.5 = Surface Soil Sample Depth 1.0-3.0 = Subsurface Soil Sample Depth 0001 = Sample event at specific location
F = Filtered Sample (Liquid Sample Only)	<u>Examples</u> F = Filtered Sample Will not be used for soil or unfiltered samples
#### = Sequential Sample Number [must be unique for entire investigation]	<u>Examples</u> 0001 - First sample collected for the project 0086 - 86th sample collected for the project 9003 – Third QA/QC sample for the project
Examples of Sample IDs for this Investigation 921SS0.0-0.5-0001 – Surface Soil Sample collected from 0.0-0.5'bgs from location 921 921SB3.0-5.0-0002 – Subsurface Soil Sample collected from 3.0-5.0'bgs from location 921 921TW0001-0003 – 1st Groundwater sample collected from TWP921 unfiltered 921TW0001F-0004 – 1st Groundwater sample collected from TWP921 filtered 921SB3.0-5.0-9001 – Duplicate subsurface soil sample collected from 3.0-5.0'bgs from location 921 921TB0001-9002 – Trip blank sample 935GW0001-0086 – 1st Groundwater sample collected from permanent monitoring well at location 935 935GW0001-9003 – Duplicate groundwater sample collected from permanent monitoring well at location 935 935RB0001-9004 – Rinsate blank collected and associated with samples collected a location 935	

Figure 4-1. Sample Identification System

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Laboratory Chain of Custody Record

SAIC

COC No.: **NFSS-RIA-001**
Page 1 of 1 Date: 11/20/2009

Name: Science Applications International Corporation
Address: 4700 Lakehurst Ct., Suite 110, Dublin, OH 43016
Phone Number: (614) 791-3375
Project Manager: Dave Kulikowski
Project Name: NFSS RI Addendum
Job/P.O. #: 185338.00.004.000
Sampler (Signature) (Printed Name)

Laboratory: General Engineering Laboratories , LLC
Address: 2040 Savage Road
Charleston, SC 29407
POC: Valorie
Phone: (843) 556-8171
Fax: (843) 766-1178

Requested Parameters

Site ID	Field Sample #	Site Type	Depth	Date	Time	Matrix	VOC ^{A1} SO	SVOC ^{A2} SO	Pesticides ^{A3} SO	PCBs ^{A4} SO	Metals (TAL) ^{A5} SO	PAH ^{A6} SO	Isotopic Uranium ^{E7} SO	Isotopic Thorium ^{E7} SO	Isotopic Plutonium ^{E7} SO	Gamma Spec E^{8} SO	Radium 226/228 ^{E7,9,10} SO	Strotium-90 ^{E11} SO	Isotopic Uranium ^{E7} WA	VOC ^{B1} WA	No. of Containers	OBSERVATIONS, COMMENTS SPECIAL INSTRUCTIONS
TWP-921	921SS0.0-0.5-0001	TWP	0.0-0.5	11/20/09	1130	SO	X	X	X	X	X	X	X	X	X	X	X	X			6	
TWP-921	921SB5.0-7.0-0002	TWP	5.0-7.0	11/20/09	1145	SO	X	X	X	X	X	X	X	X	X	X	X	X			6	
TWP-921	921TW0001-0003	TWP	NA	11/20/09	1315	WA													X		1	**7 Day TAT**
TWP-921	921TW0001F-0004	TWP	NA	11/20/09	1320	WA													X		1	**7 Day TAT**
TWP-921	921TW0001-9001	TWP	NA	11/20/09	1315	WA													X		1	**7 Day TAT**
TWP-921	921TB0001-9002	QA	NA	11/20/09	1130	WA														X	3	

Relinquished by	Date	Received by	Date
Signature	11/20/09	Signature	
Printed Name	Time 1130	Printed Name	Time
SAIC Company		Company	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Total Number of Containers (this page): 18

Preservatives:
A. Cool 4°C C. HNO_3 pH < 2 Cool 4°C E. None
B. HCl pH < 2 Cool 4°C D. NaOH pH > 12 Cool 4°C

Methods:

1. SW-846 8260B	10. EPA 904 Mod
2. SW-846 8270C	11. EPA 905.0 Mod
3. SW-846 8081A	12. TCLP Pesticides
4. SW-846 8082	13. TCLP Herbicides
5. SW-846 6010B/6020/7470A	14. TCLP Metals
6. SW-846 8330 Mod	15. SW-846 1020
7. HASL 300	16. SW-846 1030
8. Gamma Spec	17. EPA 376.2
9. EPA 903 Mod	18. SW-846 6860

Reporting Directions:

Total # of coolers:
Shipping Method:

Notes:

SAIC Location - Dublin
4700 Lakehurst Court Suite 110
Dublin, OH 43016
(614) 793-7600

Science Applications International Corporation *White: Laboratory* *Yellow: Project Manager*

Figure 4-2. Chain-of-Custody Form

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HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT	HOLE NUMBER
1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET OF SHEETS

3. PROJECT	4. LOCATION
5. NAME OF DRILLER	6. MANUFACTURER'S DESIGNATION OF DRILL
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION
	9. SURFACE ELEVATION
	10. DATE STARTED / 11. DATE COMPLETED
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
14. TOTAL DEPTH OF HOLE	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR		

LOCATION SKETCH/COMMENTS **SCALE:**

PROJECT	HOLE NO.

Figure 5-1. Engineer Form 5056-R HTRW Drilling Log

HTRW DRILLING LOG (CONTINUATION SHEET)		HOLE NUMBER
PROJECT	INSPECTOR	SHEET OF SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)

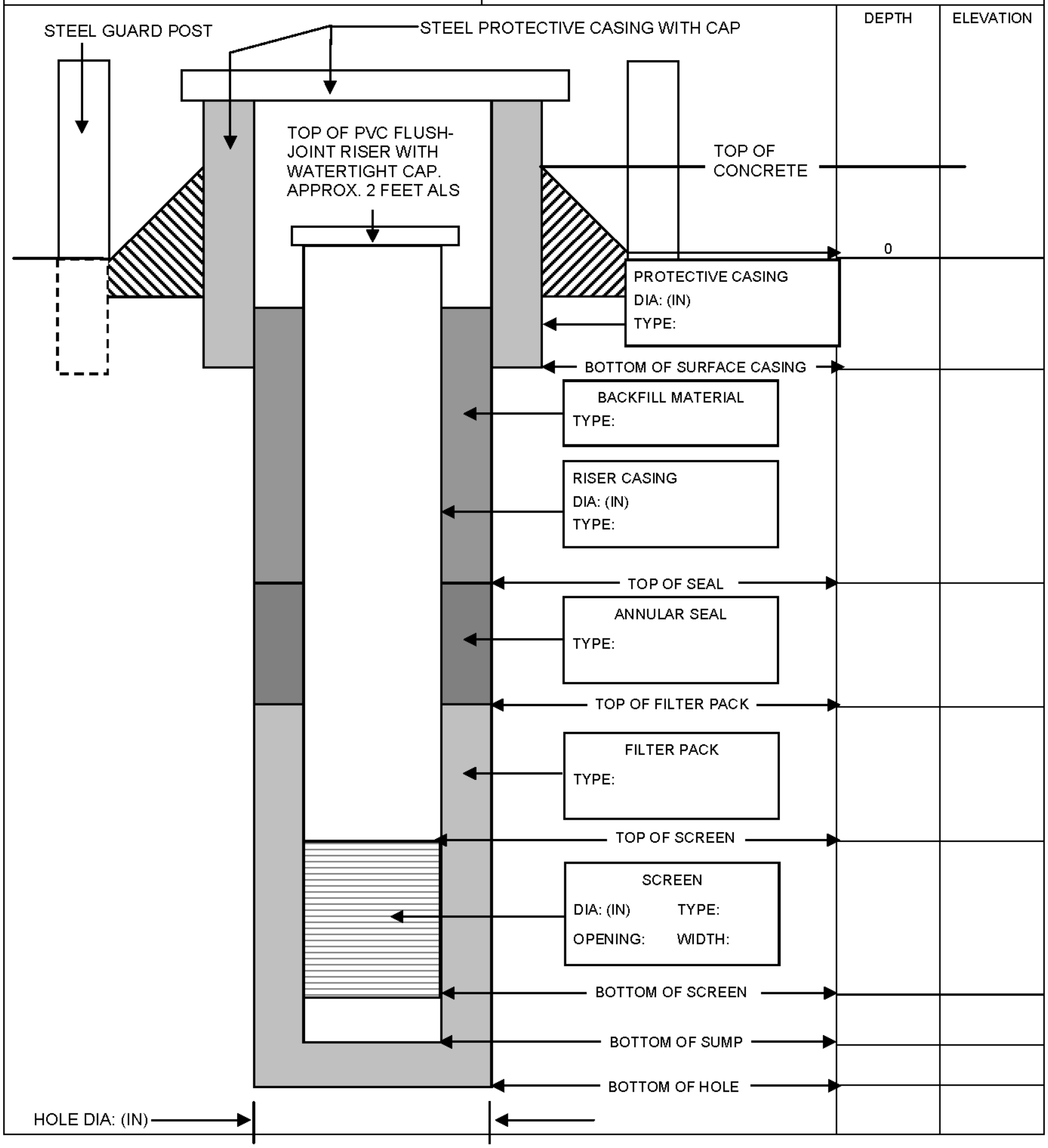
PROJECT	HOLE NO.

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

Figure 5-2. Engineer Form 5056A-R HTRW Drilling Log Continuation Sheet

MONITORING WELL

PROJECT NAME:		**PROJECT NO:**	
WELL NUMBER:	**BEGIN:**	**END:**	
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:**	**MSL**



QA performed by: ______________________

FTP-1215, Revision 1, 11/01/07

Figure 5-3. Well Construction Diagram

BOREHOLE OR WELL PLUGGING/ ABANDONMENT

PROJECT NAME: **PROJECT NUMBER:**

SITE ID NUMBER: ____________ DATE PLUGGED: __/__/__

SITE COORDINATES: N: _____________ DEPTH BLS (feet) ________

E: _____________

TYPE OF CASING: _________

CASING DIAMETER (ID) (inches) _______ GROUND ELEVATION (feet MSL) _____________

SCREENED ELEVATION (feet MSL) ______________________________

GEOLOGIC MATERIAL AT SCREEN ______________________________

AMOUNT OF CASING REMOVED (feet) ______________________________

PLUGGING MATERIAL ______________________________

APPROX. VOLUME OF PLUGGING MATERIAL (cubic feet) ___________

PLUGGING METHOD ______________________________

REMARKS ______________________________

RECORDED BY: ______________________ QC CHECKED BY: ______________________

(Signature) (Signature)

Figure 5-4. Abandonment Record

WELL DEVELOPMENT FORM

PROJECT NAME: ___________________ PROJECT NUMBER: ________________

Date: ______ Time: ______

Task Team Members: ____

Well Number and Location: ____

Development Crew: ____

Driller (if applicable): ____

Water Levels / Time: Initial: _____ / _____ Pumping: _____ / _____

Final _____ / _____

Total Well Depth: Initial: _____ feet BTOC Final: _____ feet BTOC

Date and Time: Begin: _____ / _____ Completed: _____ / _____

Development Method(s): ____

Total Quantity of Water Removed: _____ gallons

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature		
Specific Conductivity		
pH		
Turbidity		

Figure 5-5. Well Purge and Sampling Forms

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SAIC From Science to Solutions

Well Purge and Sampling Form

____

Date (mm/dd/yy): ____/____/____ Sample ID: ____________ Sample Time: ________ Page 1 of ___

Well ID Number: ____________

Purge Method: ☐ Disposable Bailer ☐ Bladder Pump ☐ Other Pump ____________

Inner Casing Type: ________ Inside Diameter: ________ inches

Vapor Monitoring Method: ☐ PID ☐ LEL ☐ Other

Purge Start Date: ____/____/____

Instrument ID Number: ________ ________ ________

Initial Reading: ________ ________ ________

Purge Start Time: ________ End Time: ________

Depth To Water: ________ ft. from measuring point

Well Volume Calculation

Depth To Product: ________ ft. from measuring point

$v = \pi * r^2 * h * 7.42$ (well casing volume in gal) One Well Volume: ________ gallons

Total Depth Of Well: ________ ft. from measuring point

$V = \pi * (R^2 - r^2) * s * .30 * 7.42$ (sandpack volume in gal) One Well Volume = v + V

R = Boring radius in ft r = well radius in ft h = height of water column in ft s = height of saturated sand pack porosity = 30% for sandpack

Date	Time	Total Gallons Removed	Purge Rate ( )	Temp (°C)	pH (Std.Units)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	ORP (mV)	Well Volumes Removed	Comments

Sample Method: ☐ Bladder Pump ☐ Disposable Bailer ☐ Other (specify) ____________

Field Observations/Site Conditions During Purging: ____________

Sampling Procedure Followed: ☐ Yes ☐ No If no, why was deviation necessary: ____________

Recorded By: ____________ (Signature and Date) QA Checked By: ____________ (Signature and Date)

Figure 5-5. Well Purge and Sampling Forms

SAIC
From Science to Solutions

Well Purge and Sampling Form

Date (mm/dd/yy): ____/____/____ Well ID Number: ____________ Sample Time: ________ Page 2 of ___

Date	Time	Total Gallons Removed	Purge Rate ( )	Temp (°C)	pH (Std.Units)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	ORP (mV)	Well Volumes Removed	Comments

Recorded By: ____________________ (Signature and Date)

QA Checked By: ____________________ (Signature and Date)

Figure 5-5. Well Purge and Sampling Forms (Continued)

APPENDIX A

SAIC Field Technical Procedures

SAIC Quality Assurance Administrative Procedures

SAIC Field Technical Procedures (FTPs):

FTP-370	Groundwater Sampling Procedures: Water Level Measurements
FTP-400	Equipment Decontamination
FTP-405	Cleaning and Decontaminating Sample Containers and Sampling Equipment
FTP-525	Soil Sampling Using an Auger
FTP-550	Soil Sampling Using a Spade or a Scoop
FTP-625	Chain of Custody (COC)
FTP-650	Labeling, Packaging, and Shipping of Environmental Field samples
FTP-651	Hazardous Materials/Dangerous Goods Shipping for Field Work
FTP-750	Field Measurement Procedures: Organic Vapor Detection
FTP-752	Field Measurement Procedures: Combustible Gas Detection
FTP-880	Field Measurement Procedures: pH, Temperature and Conductivity
FTP-910	Field Measurement Procedures: Turbidity
FTP-955	Field Measurement Procedures: Dissolved Oxygen
FTP-1215	Field Logbooks and Field Forms
FTP-1220	Documenting and Controlling Field Changes to Approved Work Plans
FTP-1225	Field Demobilization Checklist for Project-Generated Waste

SAIC Quality Assurance Administrative Procedures (QAAPs):

15.1	Control of Non-Conforming Items and Services
16.1	Corrective Action

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-370

Revision Number: **1**

Date Printed: ______

Person Checking the Revision Number: ______

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Groundwater Sampling Procedures: Water Level Measurement			
Procedure No: FTP-370	**Revision: 1**	**Date: 11/18/2008**	**Page 1 of 5**
Business Unit General Manager: **Date:** [signature] 12/8/08		**QA/QC Officer:** **Date:** C. D. Cowart 11/18/2008	

R

1.0 PURPOSE

The purpose of this procedure is to describe methods used to obtain water level measurements in completed wells or piezometers, and to specify limitations of the respective methods.

2.0 SCOPE

This procedure gives overall technical guidance for obtaining piezometric head measurements in wells through the use of conducting probe and a weighted steel or fiberglass tape.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigation Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.1.3 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 400, Equipment Decontamination.

3.2 DEFINITIONS

Piezometric head - The height to which water will rise in a cased well.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring compliance with the Sampling and Analysis Plan (SAP);

4.2.2 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable; and

4.2.3 overall management of field activities.

5.0 GENERAL

5.1 Any deviations from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.4 Refer to the SAP for project/task-specific sampling and analysis requirements.

5.5 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project Manager. R

5.6 Initial monitoring of the well headspace and breathing zone concentrations using a photon ionization detector (PID), flame ionization detector (FID), and combustible gas meters will be evaluated by the H & S Officer to determine required levels of protection.

5.7 All groundwater level measurements are made to the nearest 0.01 foot, and recorded in the field logbook or groundwater sampling form.

5.8 In measuring groundwater levels, there will be a clearly-established reference point of known altitude, which is normally identified by a painted mark at one point on the upper edge of the inner well casing.

5.9 The recorded field notes must clearly describe the reference used.

5.10 After a monitoring or groundwater observation well has been installed and the groundwater level has stabilized, the initial depth to the water is measured and recorded. The date and time of the reading is recorded.

5.11 Information related to precipitation is included in the data.

R

5.12 The total depth of the well is measured and recorded, if possible.

5.13 Cascading water within a borehole can cause false readings with some types of sounding devices. If this condition is observed, it is noted in the logbook.

5.14 Oil layers may cause problems in determining the true water level in a well; if the condition exists, it is noted in the logbook.

5.15 Water level readings are taken regularly, as required by the Field Manager.

5.16 All water level measurements at a site used to develop a groundwater contour map must be made in the shortest time practical.

5.17 Groundwater with dilute ionic content may not conduct enough current between the electrodes of the electronic water level indicator to activate the instrument.

5.18 Measuring tapes usually have a limit of about 100 feet and a weighted end. The weight will be stainless steel or an inert material specified by the SAP.

5.19 Sampling tools and equipment are protected from sources of contamination prior to sampling and decontaminated prior to and between sampling as specified in FTP-400, Equipment Decontamination.

5.20 An optional field checklist is provided as a full size form immediately following this procedure. R

6.0 PROCEDURE

6.1 PREPARATION

6.1.1 Don clean gloves, check the well with organic vapor analyzer (OVA), PID, and/or Rad meters. Unlock and open the well; note the condition of the well.

6.1.2 Record sampling station number, date, time, and any other pertinent information, as is applicable.

6.2 WATER LEVEL MEASUREMENTS

Locate reference mark at top of the inner well casing.

6.2.1 If reference mark is not present, make one on the highest side of the inner well casing.

6.2.2 Make a scratch on the outside edge of the well casing with a file or suitable instrument, being careful that cuttings do not fall into the well casing.

6.2.3 If reference mark is not present, alert Field Manager.

6.3 ELECTRONIC WATER-LEVEL INDICATOR

Collect water level measurements with electronic water-level indicator.

6.3.1 Check battery on decontaminated electronic water-level indicator and on alarm.

6.3.2 Lower an electronic water-level-indicator probe into the well, making sure that the cord or the probe does not scrape the sides of the well casing.

6.3.3 When the alarm sounds and/or the red light illuminates, stop lowering the probe.

6.3.4 Pull up the probe until alarm no longer sounds.

6.3.5 Lower probe again slowly. Stop at the instant the alarm sounds and/or the light illuminates and remains illuminated.

6.3.6 Hold cord to side of casing where reference mark is etched.

6.3.7 Mark cord with thumb where it touches reference mark.

6.3.8 Use a measuring device to determine distance from last marked increment to marked point on cord. The total depth is the distance from top of inner casing to the water level.

6.3.9 Record measurement to within 0.01 feet as Depth to Water in field logbook.

6.3.10 Repeat steps 6.3.2 through 6.3.10, two to three times for consistency. Measurement should remain constant.

6.3.11 Pull electronic water-level indicator from well and decontaminate.

6.3.12 Close and lock the well cap.

R

6.4 STEEL OR FIBERGLASS TAPE

Collect water level measurements with steel or fiberglass tape.

6.4.1 Inspect decontaminated tape and determine any measurement correction required for missing tape.

6.4.2 Chalk one or two feet of tape; lower measuring tape through well.

6.4.3 Listen for the sound of the tape hitting the water. **Note**: reading at measuring point on top of the well. To determine the elevation of the groundwater or the depth below the surface, the elevation of the mark or the stick-up of the mark above the ground surface (respectively) must be known or measured, and subtracted or added as is appropriate.

6.4.4 Remove tape from well and note wet cut on tape.

6.4.5 Subtract wet cut from measuring point reading and record measurement to within 0.01 foot in field logbook.

6.4.6 Repeat steps 6.4.2 through 6.4.5 above. Measurement should remain constant within 0.01 foot.

6.4.7 Pull tape from well and decontaminate as specified in FTP-400. R

6.4.8 Close and lock well cap.

6.4.9 Record information in field logbook in accordance with FTP-1215. R

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None

Field Checklist

- ☐ Electronic Water-Level Indicator (Conducting Probe)
- ☐ Steel or Fiberglass Tape Measure with Raised Markings
- ☐ Keys to Unlock Wells
- ☐ Logbook
- ☐ Black Indelible Pen
- ☐ Appropriate Containers for Waste and Equipment
- ☐ Gloves
- ☐ Safety Shoes
- ☐ Safety Glasses or Monogoggles
- ☐ Health and Safety Plan
- ☐ Decontamination Equipment (As specified in FTP-400)
- ☐ Sampling and Analysis Plan
- ☐ Plastic Sheeting
- ☐ Decontamination Equipment
- ☐ Manufacturer's Calibration and Instrument Manual
- ☐ Monitoring Equipment (PID, OVA, and Rad Meters)

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-400

Revision Number: 2

Date Printed: ____________________

Person Checking the Revision Number: ____________________

R

1.0 PURPOSE

The purpose of this procedure is to describe decontamination methods and related issues involving the physical removal of chemical and radioactive contaminants from equipment.

2.0 SCOPE

This procedure applies only to the decontamination of equipment used in field investigations which may be associated with sampling activities, but which does not directly contact the samples. Sample collection devices, which directly contact the samples, are addressed in Procedure FTP-405, "Cleaning and Decontaminating Sample Containers and Sampling Equipment."
This procedure on Equipment Decontamination includes the following:

a) field test equipment (e.g., flowmeters);
b) equipment to which sample devices may be attached (e.g., drill rig, drill rod);
c) well drilling equipment;
d) miscellaneous field support equipment which may be subjected to incidental exposure to contaminants; and
e) shipping containers.

This procedure does not include the following:

a) chemical analysis equipment, such as the portable gas chromatograph;
b) health and safety equipment;
c) protective clothing; and
d) sample containers and sample collection devices.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual. R

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency.

3.1.3 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 405, Cleaning and Decontaminating Sample Containers and Sampling Equipment.

3.2 DEFINITIONS

3.2.1 Deionized Water - Tap Water treated by passing through a standard deionizing resin column. The deionized water should contain no heavy metals or other inorganic compounds (i.e., at or above analytical detection limits) as defined by a standard Inductively Coupled Plasma Spectrophotometer (or equivalent) scan. Deionized water must be stored in clean glass, stainless steel, or plastic containers that can be closed prior to use. It can be applied from plastic squeeze bottles.

3.2.2 Equipment - Those items (variously referred to as "field equipment" or "sampling equipment") necessary for sampling activities, which do not directly contact the samples.

3.2.3 Laboratory Detergent - A standard brand of phosphate-free laboratory detergent, such as Liquinox, or the equivalent. Laboratory detergent must be kept in clean plastic, metal, or glass containers until used. It will be poured directly from the container during use.

3.2.4 Organic-free Water - Tap water treated with activated carbon and deionizing units or water from a Milli-Q water purification system (or equivalent). This water should contain no detectable pesticides, herbicides, extractable organic compounds, or volatile organic compounds. Organic free water will be stored only in glass, Teflon, or stainless steel containers and dispensed from only Teflon squeeze bottles. R

3.2.5 Sampling Devices - Utensils and other implements used for sample collection and processing that directly contact actual samples.

3.2.6 Solvent - Pesticide grade isopropanol is the standard solvent used for decontamination in most instances. The use of any other solvent must be justified and approved by the responsible project personnel and documented in the field logbooks. Solvent must be stored out of direct sunlight in the unopened original containers until used. They may be applied using a low pressure nitrogen system fitted with a Teflon nozzle or using Teflon squeeze bottles.

3.2.7 Tap Water - This refers to water from a tested and approved water system. Tap water may be stored in clean tanks, hand pressure sprayers, squeeze bottles, or applied directly from a hose.

Note: Hand pump sprayers are generally not acceptable storage or application containers for the above materials (with the exception of tap water). This also applies to stainless steel sprayers. All hand sprayers have internal oil coated gaskets and black rubber seals that may contaminate the solutions. Solvents, laboratory detergent, and rinse water used to clean equipment will not be reused during field decontamination. Use of such equipment should be evaluated to assure that project objectives will not be compromised. R

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual.

4.2 FIELD MANAGER

The Field Manager or designee is responsible for:

4.2.1 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.2 ensuring compliance with the Sampling and Analysis Plan (SAP);

4.2.3 overall management of field activities;

4.2.4 selecting the decontamination method in conformance with SAP guidelines and regulatory requirements; and

4.2.5 ensuring that equipment decontamination is performed safely.

5.0 GENERAL

5.1 Any deviations from specified requirements will be justified and authorized by the Project Manager and/or the relevant Program Manager, and will be documented on the appropriate field change forms.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 As a minimum, safety glasses or goggles, and nitrile or equivalent gloves will be worn while decontaminating equipment. Uncoated Tyvek coveralls, laboratory coat, or splash apron will be worn if justified by contaminant concentration and potential adverse effects. Face shield, heavy duty PVC or equivalent gloves, coated Tyvek or equivalent coveralls will be worn while cleaning with steam or high temperature water. Ground fault circuit interrupters will be used to supply power to any portable electrical equipment in the equipment decontamination area. Solvent rinsing operations will be conducted in an open, well ventilated area or under a fume hood. No eating, smoking, drinking, chewing, or hand to mouth contact will be permitted during decontamination activities. Refer to the site- or project-specific H&S plan for other relevant H&S requirements. A fifteen minute eyewash will be available within 100 feet of corrosive (concentrated acids or base) decontamination fluids being used.

5.4 Refer to the site-, or project/ task-specific SAP for particular decontamination methods and schedules required.

5.5 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained in the procedure to the Program or Project Manager for records purposes.

5.6 Procedures for packaging and disposal of all waste generated during field activities will be described in the project-specific SAP, Waste Management Plan, or other applicable document.

5.7 Contamination control (e.g., use of plastic wrappings, use of strippable or decontaminable coatings) may be used for delicate instruments and materials that are not easily decontaminated (e.g., porous or oddly shaped materials or delicate surfaces.

5.8 Paint or any other coatings must be removed from downhole drilling equipment. After removal of such coating(s), the equipment must then be decontaminated by the appropriate method.

5.9 Decontamination of equipment will be performed in a designated decontamination area, removed from any sampling location. This designated area will also be in a location free of direct exposure to airborne and radiological surface contaminants.

5.10 Decontaminated field equipment will be stored upwind of all decontamination activities. If the equipment is not to be immediately re-used, it will be covered with plastic sheeting, wrapped in aluminum foil or other measures will be used, as appropriate, to prevent re-contamination. The area where the equipment is stored must be free of contamination.

5.11 The objectives of decontamination are: to remove contamination from contaminated surfaces, to minimize the spread of contamination to uncontaminated surfaces, to avoid any cross-contamination of samples, and to minimize personnel exposures. The intent is to accomplish the required level of decontamination while minimizing the generation of additional solid and liquid waste.

5.12 Required decontamination supplies and apparatus are dependent upon the nature of the contaminant and the decontamination method selected.

5.13 For any of the specific decontamination methods that may be used, the substitution of higher grade water is permitted (e.g., the use of organic-free water in place of deionized water). However, it must be noted that deionized water and organic-free water are less effective than tap water in rinsing away the detergent film during the initial rinse.

5.14 When appropriate, it may be required that decontaminated equipment be surveyed, inspected, and tagged by designated personnel.

5.15 Contaminated or dirty equipment will not be stored with clean equipment.

5.16 Documentation of all decontamination activities is to be recorded in the field logbook.

5.17 An optional field checklist is provided as a full size form immediately following this procedure.

6.0 <u>PROCEDURES</u>

6.1 <u>GUIDELINES FOR SELECTING SPECIFIC DECONTAMINATION SCHEDULES AND PROCEDURES</u>

Note: The following is intended only as a general guideline for understanding the relevant concerns pertaining to equipment decontamination. The actual selection of all decontamination methods and schedules must be based on requirements within the site- or project-specific SAP and the discretion of the Field Manager.

6.1.1 Each decontamination task must be individually assessed based on characteristics of equipment to be cleaned:

a) equipment surfaces and materials;
b) size of equipment;
c) fragility of equipment; and
d) equipment use.

6.1.2 Assessment will also be based on the characteristics of the media to be removed by decontamination: oily sludge, heavy clay, etc.

6.1.3 Assessment must take into account potential contaminants of concern (e.g., radioactive versus chemical contaminants), levels of contamination, and related H&S issues.

6.1.4 The Field Manager selects the method deemed most appropriate for a particular task. If results are unsatisfactory, proceed step-by-step in selecting a more extensive method, as required, to successfully complete the decontamination. Deviation from plan will be documented in an appropriate field logbook and by a field change process appropriate to the project.

6.1.5 If the item has not been successfully decontaminated or cannot be monitored due to its shape (such as the inside of a pipe), a decision as to further decontamination measures is made by the Field Manager.

6.1.6 As a general guideline for selecting decontamination schedules and procedures, it is helpful to discriminate among three categories of field equipment. These three categories of equipment can be distinguished by the degree to which they may come into contact with contaminated media and their potential to indirectly affect sample integrity. Consequently, each of these three categories will usually require different consideration in terms of decontamination schedules and methods used:

a) The first category includes equipment that should not contact the sample, should not affect sample integrity, and need not contact the contaminated media. The need to decontaminate this equipment can generally be avoided by keeping it away from incidental contact with contaminated media (e.g., placing equipment on clean plastic drop cloths). Following incidental contamination of this equipment, it would require decontamination in order to minimize the spread of contamination off-site and to minimize personnel exposures, and not out of concern for sample integrity.

   Examples of equipment within this category include: ambient air thermometers and certain other air monitoring instruments, emergency equipment, and other miscellaneous field support equipment.

b) The second category includes equipment that will contact the contaminated media, but need not contact the sample, nor affect sample integrity. This equipment would require decontamination in order to minimize the spread of contaminants to uncontaminated surfaces and to minimize personnel exposures, not out of concern for sample integrity. This category of equipment generally is decontaminated between sample locations and decontaminated or packaged before being removed from the site.

An example can be found in the use of flowmeters used in conjunction with surface water sampling. For ongoing use in the field, when moving from sample location to sample location, the flowmeter would generally require only a tap water rinse. This would be acceptable, since use of the flowmeter downstream from each sample location would remove any chance of cross-contaminating samples. When finished using this equipment, the flowmeter would then require more extensive decontamination prior to transporting it off-site.

c) The third category includes equipment that may have an impact on sample integrity due to its function in close proximity to the sample before and during sample collection. This type of equipment generally requires more extensive decontamination procedures and usually requires decontamination to be scheduled prior to arriving on-site, between each sample location, and more often if deemed necessary to prevent cross-contamination (e.g., when drilling or digging through a contaminated area into an uncontaminated area).

Examples of this category of equipment can be found in the use of a drill rig, drill rods and auger flights used in drilling the borehole to sample depth prior to soil sample collection.

6.1.7 Other factors influencing selection of decontamination procedures and schedules include:

a) Consideration must be given to the effect of various decontamination solutions on the material(s) of which the equipment is composed (see Attachment I). Before selecting a cleaning method for specific field test equipment/instrumentation, consult the manufacturer's instructions in order to avoid the possibility of damage to instrument components.

b) For the first two basic categories of equipment (described in 6.1.6 a & 6.1.6 b), a distinction should be made between requirements for decontamination in the field between sample locations and the requirements prior to storage off-site. For the first two categories of equipment, in most instances, there will be a need for more extensive decontamination procedures before equipment is stored off-site.

6.2 CHEMICAL DECONTAMINATION

Equipment and materials that come into contact with known or suspected chemical contaminants are considered chemically contaminated. The item is released for unrestricted use if, after decontamination, it is free of visible contamination. If organic contamination is a concern, the equipment will be scanned with appropriate instruments (e.g., PID or FID) before release off-site.

6.3 RADIOACTIVE DECONTAMINATION

6.3.1 The method for decontamination of equipment, tools, and materials is based on the material contaminated (e.g., mud, grease), the radiation levels, and the specific radionuclides to be removed.

6.3.2 Criteria for releasing decontaminated equipment for unrestricted use is contained in site specific criteria found in the SAP. See Attachment II for an example of standard criteria for release of equipment exposed to surface radioactive contamination.

6.3.3 Porous materials (e.g., aged wood, hollow concrete block, rubberized coatings, etc.), and equipment and materials which have surfaces inaccessible to the surveyor (e.g., electric motors, small diameter pipes, etc.), and items with surface coatings that could bind or cover the contamination (e.g., mud, grease, strip-coat paints, etc.) are considered on a case-by-case basis and released on authorization from the field H&S Officer or authorized designee.

6.4 MISCELLANEOUS EQUIPMENT DECONTAMINATION PROCEDURES

6.4.1 Well Sounders or Tapes Used to Measure Ground Water Levels

a) Wash with laboratory detergent and tap water.
b) Rinse with tap water.
c) Rinse with deionized water.
d) Allow to air dry overnight. (doesn't apply to field cleaning)
e) Wrap equipment in aluminum foil with the shiny side of the foil facing outward (with tab for easy removal), seal in plastic, and date.

6.4.2 Submersible Pumps and Hoses Used to Purge Ground Water Wells

a) Pump a sufficient amount of soapy water through the hose to flush out any residual purge water.
b) Using a brush, scrub the exterior of the contaminated hose and pump with soapy water. Rinse the soap from the outside of the

hose with tap water. Next rinse the hose with deionized water and recoil onto the spool.

c) Pump a sufficient amount of tap water through the hose to flush out soapy water (approximately one gallon).
d) Pump a sufficient amount of deionized water through the hose to flush out the tap water, then purge with the pump in reverse mode.
e) Rinse the outside of the pump housing and hose with deionized water (approximately 1/4 gal.)
f) Equipment will be placed in a polyethylene bag or wrapped with polyethylene film to prevent contamination during storage or transit. Ensure that a set of rotors, fuses, and cables are attached to each cleaned pump.

The same procedure applies whether this equipment is cleaned in the field equipment warehouse or in the field.

6.4.3 Portable Power Augers such as the Little Beaver

a) The engine and power head will be cleaned with a power washer, steam jenny, or hand washed with a brush using detergent (does not have to be laboratory detergent but should not be a degreaser) to remove oil, grease, and hydraulic fluid from the exterior of the unit. These units will be rinsed thoroughly with tap water.
b) All auger flights and bits will be cleaned utilizing the procedures outlined in 6.4.7.

6.4.4 Miscellaneous Flow Measuring Equipment

a) Before being stored, miscellaneous flow measuring equipment will be washed with laboratory detergent, rinsed with tap water, followed by a thorough deionized water rinse.
b) Allow to air dry.
c) Wrap equipment in aluminum foil with the shiny side facing outward.

6.4.5 ISCO Flow Meters, Field Analytical Equipment, and Other Field Instrumentation

The exterior of sealed, watertight equipment such as ISCO flow meters will be washed with a mild detergent (for example, liquid dishwashing detergent) and rinsed with tap water before storage. The interior of such equipment may be wiped with a damp cloth if necessary. For ongoing use in the field, flow measuring equipment such as weirs, staff gages, and velocity meters may be cleaned with tap water after use between measuring locations, if necessary.

Other field instrumentation will be wiped with a clean, damp cloth. pH meter probes, conductivity probes, DO meter probes, etc., will be rinsed with deionized water before storage. Before selecting a cleaning method for specific field instruments, consult the manufacturer's instructions in order to avoid the possibility of damage to instrument components.

The desiccant in flow meters and other equipment will be checked and replaced if necessary each time the equipment is cleaned.

6.4.6 Ice Chests and Shipping Containers

All ice chests and reusable containers will be washed with laboratory detergent (interior and exterior), rinsed with tap water and air dried before storage. In the event that an ice chest becomes severely contaminated, in the opinion of the field investigator, with concentrated waste or other toxic material, it will be cleaned as thoroughly as possible, rendered unusable, and properly disposed.

6.4.7 Large Soil Boring and Drilling Rigs and Associated Equipment

a) All drilling rigs, drilling equipment, backhoes, and all other associated equipment involved in the drilling activities (auger flights and bits)
will be cleaned and decontaminated before entering the designated drill site.
b) The drill rig and/or other equipment associated with the drilling and sampling activities will be inspected to insure that all oil, grease, hydraulic fluid, etc., has been removed, that all seals and gaskets are intact and that there are no fluid leaks.
c) Any portion of the drill rig, backhoe, etc., that is over the borehole (kelly bar or mast, backhoe buckets, drilling platform, hoist or chain pulldowns, spindles, cathead, etc.) will be steam cleaned and wire brushed before being brought on the site to remove all rust, soil, and other material which may have come from other hazardous waste sites.
d) No oils or grease will be used to lubricate drill stem threads or any other drilling equipment being used over the borehole or in the borehole without client approval.
e) If drill stems have a tendency to tighten during drilling, Teflon string can be used on the drill stem threads.
f) The drill rig(s) may be steam cleaned prior to drilling each borehole when required.
g) In addition, all downhole drilling and associated equipment that will come into contact with the downhole equipment and sample

medium will be cleaned and decontaminated by the following procedures.

- Clean with tap water and laboratory grade, phosphate-free detergent, using a brush, if necessary, to remove particulate matter and surface films. Steam cleaning and/or high pressure hot water washing may be necessary to remove matter that is difficult to remove with the brush. Auger flights and drill rods that are used to drill down in preparation for sample collection must be decontaminated thoroughly both on the outside and the inside, if applicable. The steam cleaner and/or high pressure hot water washer will be capable of generating a pressure of at least 2500 PSI and producing hot water and/or steam (200 deg F plus).
- Rinse thoroughly with tap water (potable). Tap water may be applied with a pump sprayer. All other decontamination liquids (deionized water, organic-free water, and solvents), however, must be applied with non-interfering containers. These containers will be made of glass, Teflon, or stainless steel. This aspect of the decontamination procedures used by the driller will be inspected by the site geologist and/or other responsible person prior to beginning of operations. Remove from the decontamination pad and cover with clean, unused plastic. If stored overnight, the plastic should be secured to ensure that it stays in place.
- All downhole augering, drilling, and sampling equipment will be sandblasted before Step #1 if painted, and/or if there is a buildup of rust, hard or caked matter, etc., that can not be removed by steam and/or high pressure cleaning. All sandblasting will be performed prior to arrival on site.
- All well casing, tremie tubing, etc., that arrive on-site with printing and/ or writing on them will have the printing and/or writing removed before Step #1. Printing and/or writing that occurs on materials within and below the bentonite seal will be removed to prevent potential cross-contamination from water soluble ink. Emery cloth or sand paper can be used to remove the printing and/or writing. Most well material suppliers can supply materials without the printing and/or writing if specified when materials are ordered.
- Well casing, tremie tubing, etc., that are made of plastic (PVC) will not be solvent rinsed during the cleaning and decontamination process. Used plastic materials that cannot be cleaned are not acceptable and will be discarded.
- Cleaning and decontamination of all equipment will occur at a designated area on the site, downgradient, and downwind from the clean equipment drying and storage area in a

location believed to be free of surface contamination. The cleaning and decontamination area will contain a wash water and/or waste pit. The pit and surrounding area will be lined with heavy duty plastic sheeting and designed to promote runoff of the wash/rinse water into the pit. If a pit cannot be excavated, a catch basin can be constructed out of wood and lined with plastic to contain the waste/rinse water until it can be containerized. All cleaning of drill rods, auger flights, well screen, and casing, etc., will be conducted above the plastic sheeting using saw horses or other appropriate means. Sawhorses or racks will be high enough above the ground to prevent equipment from being splashed. At the completion of the drilling activities, the pit will be backfilled with the appropriate material designated by the site project leader, but only after the pit has been sampled, and the waste/ rinse water has been pumped into 55-gallon drums for disposal. No solvent rinsates will be placed in the pit unless prior approval is granted. All solvent rinsates will be collected in separate containers for proper disposal.

- Tap water (potable) brought on the site for drilling and cleaning purposes will be contained in a pre-cleaned tank of sufficient size so that drilling activities can proceed without having to stop and haul water.

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

8.1 Attachment I - Summaries of Additional Decontamination Methods

8.2 Attachment II - Surface Radioactivity Guides

Attachment I

Summaries of Additional Decontamination Methods (page 1 of 4)

Method*	Surface	Action	Technique	Advantages	Disadvantages
Vacuum Cleaning	Dry surface	Removes contaminated dust by suction.	Use conventional vacuum techniques with efficient filter.	Good on dry, porous surfaces. Avoids water reactions.	All dust must be filtered out of exhaust. Machine is contaminated
Water	All nonporous surfaces (metal, painted, plastic, etc.)	Dissolves and erodes.	For large surfaces-Hose with high-pressure water at an optimum distance of 15 to 20 feet. Spray vertical surfaces at an angle of incidence of 30° to 40°; work from top to bottom to avoid recontamination. Work upwind to avoid spray. Determine cleaning rate experimentally, if possible; otherwise, use a rate of 4 square feet per minute.	All water equipment may be utilized. Allows operation to be carried out from a distance. Contamination may be reduced by 50%. Water equipment may be used for solutions of other decontaminating agents.	Drainage must be controlled. Not suitable for porous materials. Dried surfaces cannot be decontaminated. Not applicable on dry contaminated surfaces (use vacuum); not applicable on porous surfaces such as wood, concrete, canvas, etc. Spray will be contaminated.
	All surfaces	Dissolves and erodes.	For small surfaces-Blot liquid and hand-wipe with water and appropriate commercial detergent.	Extremely effective if done immediately after spill and on non-porous surfaces.	Of little value in the decontamination of large areas, long-standing contaminants, and porous surfaces.
Steam	Nonporous surfaces (especially painted or oiled surfaces)	Dissolves and erodes.	Work from top to bottom and from upwind. Clean surface at a rate of 4 square feet per minute. The cleaning efficiency of steam will be greatly increased by using detergents.	Contamination may be reduced approximately 90% on painted surfaces.	Steam subject to same limitations as water. Spray hazard makes the wearing of waterproof outfits necessary.

Attachment I

Summaries of Additional Decontamination Methods (page 2 of 4)

Method*	Surface	Action	Technique	Advantages	Disadvantages
Detergents	Nonporous surfaces (metal, painted, glass, plastic, etc.)	Emulsifies contaminant and increases wetting power of water and cleaning efficiency of steam.	Rub surface 1 minute with a rag moistened with detergent solution, then wipe with dry rag; use clean surface of the rag for each application. Use a power rotary brush with pressure feed for more efficient cleaning. Apply solution from a distance with a pressure proportioner. Do not allow solution to drip onto other surfaces. Mist application is all that is necessary.	Dissolves industrial film and other materials which hold contamination. Contamination may be reduced by 90%	May require personal contact with surface. May not be efficient on longstanding contamination.
Complexing Agents	Nonporous surfaces (especially unweathered surfaces; i.e., no rust or calcareous growth)	Forms soluble complexes with contaminated material.	Complexing agent solution should contain 3% (by weight) of agent. Spray surface with solution. Keep surface moist 30 minutes by spraying with solution periodically. After 30 minutes, flush material off with water. Complexing agents may be used on vertical and overhead surfaces by adding chemical foam (sodium carbonate or aluminum sulfate).	Holds contamination in solution. Contamination may be reduced by 75% in 4 minutes on unweathered surfaces. Easily stored; carbonates and citrates are nontoxic, noncorrosive.	Requires application for 5 to 30 minutes. Little penetrating power; of small value on weathered surfaces.
Organic Solvents	**Nonporous surfaces (greasy or coated surfaces, paint or plastic finishes, etc.)**	Dissolves organic materials (oil, paint, etc.).	Immerse entire unit in solvent or apply by wiping procedure (see "Detergents").	Quick dissolving action. Recovery of solvent possible by distillation.	Requires good ventilation and fire precautions. Toxic to personnel. Material bulk .

Attachment I

Summaries of Additional Decontamination Methods (page 3 of 4)

Method*	Surface	Action	Technique	Advantages	Disadvantages
Inorganic Acids	Metal surfaces (especially with porous deposits; i.e., rust or calcareous growth); circulatory pipe systems	Dissolves porous deposits.	Use dip-bath procedure for movable items. Acid should be kept at a concentrate of 1 to 2 normal (9 to 18% hydrochloric, 3 to 6% sulfuric acid). Leave on weathered surfaces for 1 hour. Flush surface with water, scrub with a water-detergent solution, and rinse. Leave in pipe circulatory system 2 to 4 hours; flush with plain water, a water-detergent solution, then again with plain water.	Corrosive action on metal and porous deposits. Corrosive action may be moderated by addition of corrosion inhibitors to solution.	Personal hazard. Wear goggles, rubber boots, gloves, and aprons. Good ventilation required because of toxicity and explosive gases. Acid mixtures should not be heated. Possibility of excessive corrosion if used without inhibitors. Sulfuric acid not effective on calcareous deposits.
Acid Mixtures: hydrochloric, sulfuric, acetic, citric acids, acetates, citrates	Nonporous surfaces (especially with porous deposits); circulatory pipe systems	Dissolves porous deposits.	Same as for inorganic acids. A typical mixture consist of 0.1 gal. hydrochloric acid, 0.2 lb. sodium acetate and 1 gal. water.	Contamination may reduce by 90% in 1 hour (unweathered surfaces). More easily handled than inorganic acid solution.	Weathered surfaces may require pretreatment. Same safety precautions as required for inorganic acids.
Caustics: lye (sodium hydroxide), calcium hydroxide, potassium hydroxide	Painted surfaces (horizontal)	Softens paint (harsh method).	Allow paint-remover solution to remain on surface until paint is softened to the point where it may be washed off with water. Remove remaining paint with long-handled scrapers. Typical paint remover solution: 10 gal. water, 4 lb. lye, 6 lb. boiler compound, 0.75 lb cornstarch.	Minimum contact with contaminated surfaces. Easily stored.	Personal hazard (will cause burns). Reaction slow; thus, it is not efficient on vertical or overhead surfaces. Should not be used on aluminum or magnesium.

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Attachment I

Summaries of Additional Decontamination Methods (page 4 of 4)

Method*	Surface	Action	Technique	Advantages	Disadvantages
Trisodium Phosphate	Painted surfaces (vertical, overhead)	Softens paint (mild method).	Apply hot 10% solution by rubbing and wiping procedure (see "Detergent").	Contamination may be reduced to tolerance in one or two applications.	Destructive effect on paint. Should not be used on aluminum or magnesium.
Abrasion	Nonporous surfaces	Removes surfaces.	Use conventional procedures, such as sanding, filing, and chipping; keep surface damp to avoid dust hazard	Contamination may be reduced to as low a level as desired.	Impracticable for porous surfaces because of penetration by moisture
Sandblasting	Nonporous surfaces	Removes surfaces.	Keep sand wet to lessen spread of contamination. Collect used abrasive or flush away with water.	Practical for large surface areas.	Contamination spread over area must be removed. Contamination dust is personnel hazard.
Vacuum Blasting	Porous and non-porous surfaces	Removes surfaces; traps and controls contaminated waste.	Hold tool flush to surface to prevent escape of contamination.	Contaminated waste ready for disposal. Safest abrasion method.	Contamination of equipment.

Attachment II
Surface Radioactivity Guides

Nuclide	Average[b,c] (dpm/100 cm^2)	Maximum [b, d] (dpm/100 cm^2)	Removeable [b, e] (dpm/100 cm^2)
U-nat, U-235, U-238, and associated decay products	5,000 alpha	15,000 alpha	1,000 alpha
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-nat, Th-232, Sr-90,Ra-223, Ra-234, U-232, I-126, I-131, I-133	1,000	3,000	200
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5,000 beta-gamma	15,000 beta-gamma	1,000 beta-gamma

a Where surface contamination by both alpha- and beta-gamma emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

d The maximum contamination level applies to an area of not more than 100 cm^2.

e The amount of removable radioactive contamination per 100 cm^2 of the surface area should be determined by wiping the area with dry filter paper or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface area should be wiped.

Source: US NRC Regulatory Guide 1.86, June 1974.

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

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R

1.0 PURPOSE

The purpose of this procedure is to describe decontamination methods and related issues involving the physical removal of chemical and radioactive contaminants from sample containers and sampling equipment.

2.0 SCOPE

This procedure is specifically applicable to the decontamination of the surfaces of sample containers and equipment that come in direct contact with actual samples during sample collection and processing. FTP-400 addresses the decontamination of sampling and field equipment that does not directly contact samples.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.1.3 Science Applications International Corporation, Field Technical Procedure (SAIC FTP) 400, Equipment Decontamination.

3.2 DEFINITIONS

3.2.1 Deionized Water - Tap water treated by passing through a standard deionizing resin column. The deionized water should contain no heavy metals or other inorganic compounds (i.e., at or above analytical detection limits) as defined by a standard Inductively Coupled Argon Plasma Spectrophotometer scan.

3.2.2 Equipment Those items (variously referred to a "field equipment" or "sample equipment") necessary for sampling activities which do not directly contact the samples.

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3.2.3 Laboratory Detergent - A standard brand of phosphate-free laboratory detergent, such as Liquinox, or the equivalent.

3.2.4 Organic-free Water - Tap water treated with activated carbon and deionizing units or water from a Milli-Q water purification system (or equivalent). This water should not contain pesticides, herbicides, extractable organic compounds, and less than 50 µg/l of purgeable organic compounds as measured by a low-level GC/MS scan. Organic free water should be stored only in glass or Teflon containers and dispensed from only glass, Teflon, or stainless steel containers. R

3.2.5 Sampling Devices - Utensils and other implements used for sample collection and processing that directly contact actual samples.

3.2.6 Solvent - Pesticide grade isopropanol is the standard solvent used for decontamination in most instances. The use of any other solvent must be justified and approved by the responsible project personnel and documented in the field logbooks.

3.2.7 Tap Water - This refers to tap water from a tested and approved water system.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager or designee is responsible for:

4.2.1 ensuring compliance with the Sampling and Analysis Plan (SAP);

4.2.2 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.3 overall management of field activities; and

4.2.4 ensuring that decontamination activities are performed safely.

5.0 GENERAL

5.1 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.2 Refer to the site- or project-specific Health and Safety (H&S) plan for relevant H&S requirements. R

5.3 Refer to the SAP for project/task-specific sampling and analysis requirements.

5.4 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained in the procedure to the Program or Project Manager for records purposes.

5.5 The objectives of decontamination are: to remove contamination from contaminated surfaces; to minimize the spread of contamination to uncontaminated surfaces; to avoid any cross-contamination of samples; and to minimize personnel exposures. The intent is to accomplish the required level of decontamination while minimizing the generation of additional solid and liquid waste.

5.6 As a minimum, safety glasses or goggles, and nitrile or equivalent gloves will be worn while decontaminating equipment. Uncoated Tyvek coveralls, laboratory coat, or splash apron will be worn if justified by contaminant concentration and potential adverse effects. Face shield, heavy duty PVC or equivalent gloves, coated Tyvek or equivalent coveralls will be worn while cleaning with steam or high temperature water. Ground fault circuit interrupters will be used to supply power to any portable electrical equipment in the equipment decontamination area. Solvent rinsing will be conducted in an open, well ventilated area or under a fume hood. No eating, smoking, drinking, chewing, or hand to mouth contact will be permitted during decontamination activities. Refer to the site- or project-specific H&S plan for other relevant H&S requirements. A fifteen minute eyewash will be available within 100 feet of corrosive (concentrated acids or bases) decontamination fluids are used.

5.7 Refer to the SAP for project specific decontamination methods and schedules.

5.8 Procedures for packaging and disposal of all waste generated during field activities will be described in the project-specific SAP, Waste Management Plan (WMP), or other applicable guidelines.

5.9 Decontamination of sampling devices will be performed in a designated decontamination area, removed from any sampling location. This designated area must also be in a location free of direct exposure to airborne and radiological surface contaminants.

5.10 Decontamination activities will be conducted downwind of the location where clean field equipment, clean sample devices, and sample containers are stored.

5.11 Contaminated or dirty sampling devices/sample containers are not stored with clean (decontaminated) sampling devices/sample containers.

5.12 Sample containers and sampling devices are segregated from all other equipment and supplies.

5.13 Paint or any other coatings must be removed from any part of a sampling device which may either contact a sample or which may otherwise affect sample integrity. After removal of such coatings, the sampling device will then require decontamination by the appropriate method.

5.14 The brushes used to clean sampling devices must not be of the wire-wrapped type.

5.15 For any of the specific decontamination methods that may be used, the substitution of a higher grade water is permitted (e.g., the use of organic-free water in place of deionized water). However, it must be noted that deionized water and organic-free water are less effective than tap water in rinsing away the detergent during the initial rinse.

5.16 When appropriate, it may be required that decontaminated equipment be surveyed, inspected, and tagged by designated personnel.

5.17 Decontaminated sampling devices and all filled and empty sample containers will be stored in locations that are protected from exposure to any contaminant.

5.18 The method for decontamination of sampling devices and the exterior of sample containers which have been exposed to radioactive material is based on the material contaminated, the sample medium, the radiation levels, and the specific radionuclides to be removed.

5.19 In reference to decontaminated sampling devices and sample containers, their release for unrestricted use is based on site-specific criteria. These site-specific criteria should be found in the project work plans.

5.20 Rags used during decontamination may become a hazardous waste and require segregation. Refer to the project work plans for hazardous waste requirements.

5.21 An optional field equipment checklist is provided as a full size form immediately following this procedure.

6.0 PROCEDURE

6.1 DECONTAMINATION SCHEDULES

6.1.1 Sampling devices must be decontaminated prior to being used in the field, in order to prevent potential contamination of a sample.

6.1.2 Sampling devices must be decontaminated between samples to prevent cross-contamination.

6.1.3 Sampling devices must be decontaminated on site or brought to a designated off-site decontamination area in a properly marked and sealed container for decontamination prior to being released from the site. R

6.1.4 An acceptable alternative to cleaning and decontaminating sampling devices is the use of items cleaned or sterilized by the manufacturer that are discarded after use. Care must be exercised to ensure such previously cleaned or sterilized items do not retain residues of chemical or radioactive sterilizing agents that might interfere with analytical techniques.

6.1.5 Whenever visible dirt, droplets of liquid, stains, or other extraneous materials are detected on the exterior of a sample container, the exterior surfaces must be decontaminated. This should be done before placing in a sample cooler or shipping container.

6.1.6 For sample containers used in controlled access areas, a more rigorous cleaning and/or radiation monitoring may be required before removal from the site. Refer to the project-specific work plan for details.

6.2 DECONTAMINATION METHODS

The following decontamination methods are examples of some of those most commonly used in field investigations. For the specific procedural requirements for any one project, task, or site, refer to the appropriate SAP.

Note: The decontamination methods described in this section are for guidance only; the Field Operations Manager will adjust decontamination practices to fit the sampling situation and applicable requirements.

6.2.1 Decontaminating the Exterior of Sample Containers in Use

6.2.1.1 Wipe the exterior surfaces of the sample container with disposable rags/toweling or rinse with deionized water.

R

6.2.1.2 If rinsing with deionized water, then the exterior of the sample container must be wiped dry with disposable rags/ toweling.

6.2.1.3 All visible dirt, droplets of liquid, or other extraneous materials must be removed.

6.2.1.4 For containers used in controlled access areas or where the sample media is difficult to remove (e.g., sludge), a more rigorous cleaning and/or radiation monitoring may be required. Refer to the project-, task-, or site-specific Work Plan for details.

6.2.1.5 This decontamination procedure will be performed at the sample location before placing the sample container in the sample cooler or shipping container.

6.2.2 Decontaminating Stainless Steel, Teflon, or Metal Sampling Devices Used to Collect Samples for Trace Organic Compounds and /or Metals Analyses.

6.2.2.1 Clean with a tap water and laboratory detergent solution. Use phosphate-free detergent, such as Liquinox, or equivalent. Use a brush to remove particulate matter and surface film.

6.2.2.2 Rinse thoroughly with organic-free water.

6.2.2.3 Rinse twice with solvent (pesticide-grade isopropanol).

6.2.2.4 Allow to air dry for 24 hours, if possible.

6.2.2.5 If it is not possible to air dry for 24 hours, then rinse twice with organic-free water and allow to air dry as long as possible.

6.2.2.6 Wrap sampling devices with aluminum foil (with shiny side facing outward). This is done to prevent contamination of sampling devices during transport and storage.

6.2.2.7 When a sampling device is used to collect samples that contain oil, grease, or other hard to remove materials, it may be necessary to rinse the device several times with an approved solvent (one which meets the requirements of the SAP) before initiating decontamination. In extreme cases it may be necessary to steam clean, wire brush, or sandblast the sampling device prior to using this decontamination method. If the sampling device cannot be adequately cleaned utilizing the above means, it must be discarded.

6.2.3 Decontaminating Glass Sampling Devices Used for the Collection of Samples for Trace Organic Compounds and/or Metals Analyses.

6.2.3.1 Glass sampling devices will be washed thoroughly with laboratory detergent and hot water using a brush to remove any particulate matter or surface film.

6.2.3.2 Rinse thoroughly with hot tap water.

6.2.3.3 Rinse thoroughly with tap water.

6.2.3.4 Rinse twice with solvent and allow to air dry for at least 24 hours.

6.2.3.5 Wrap with aluminum foil (with shiny side facing outward). This is done to prevent contamination during storage and/ or transport to the field.

Note: When a sampling device is used to collect samples that contain oil, grease, or other hard to remove materials, it may be necessary to rinse the device several times with an approved solvent (one which meets the requirements of the SAP) before initiating decontamination. In extreme cases it may be necessary to steam clean, wire brush, or sandblast the sampling device prior to using this decontamination method. If the sampling device cannot be adequately cleaned utilizing the above means, it must be discarded.

6.2.4 Decontamination of Silastic Rubber Pump Tubing Used in Automatic Samplers and Other Peristaltic Pumps.

New cleaned tubing must be used for each automatic sampler set-up. The silastic rubber pump tubing need not be replaced in peristaltic pumps where the sample does not contact the tubing or where the pump is being used for purging purposes (i.e., not being used to collect samples).

Note: New tubing (certified clean by the manufacturer, or medical grade) may be used in lieve of cleaning. New tubing may be dedicated to a well or new tubing used for each sampling event or location.

6.2.4.1 Flush tubing with hot tap water and phosphate-free laboratory detergent.

6.2.4.2 Rinse tubing thoroughly with hot tap water.

6.2.4.3 Rinse tubing with deionized water.

6.2.4.4 Install tubing in automatic sampler or peristaltic pump.

6.2.5 Decontamination of Teflon Sample Tubing.

Use only new Teflon tubing decontaminated as follows for collection of samples for organic compounds analyses:

6.2.5.1 Teflon tubing may be pre-cut in convenient lengths before cleaning to simplify handling.

6.2.5.2 Rinse outside of tubing with solvent.

6.2.5.3 Flush interior of tubing with solvent.

6.2.5.4 Dry overnight using a drying oven, if applicable.

6.2.5.5 Wrap tubing and cap ends with aluminum foil, or store in a plastic bag to prevent contamination during storage.

6.2.6 Decontamination of Polyvinyl Chloride (PVC) Sample Tubing

Use only new tubing

6.2.6.1 Polyvinyl chloride tubing will be used selectively where organic compounds are not of concern.

6.2.6.2 Tubing will be stored in its original container and not removed from this container until needed.

6.2.6.3 The tubing will be flushed immediately before use to remove any residues from the manufacturing or extruding process.

6.2.6.4 Discard tubing after use in sampling.

6.2.7 Decontamination of Stainless Steel Tubing

6.2.7.1 Wash with laboratory detergent and water using a long, narrow, bottle brush. Use hot water, if available.

6.2.7.2 Rinse thoroughly with tap water. Use hot water, if available.

R

6.2.7.3 Rinse thoroughly with deionized water.

6.2.7.4 Rinse twice with solvent.

6.2.7.5 Allow to air dry for 24 hours, if possible.

6.2.7.6 If it is not possible to air dry for 24 hours, then rinse thoroughly with organic-free water and allow to dry for as long as possible.

6.2.7.7 Wrap with aluminum foil (with the shiny side facing outward). This is done to prevent contamination of tubing during transport and storage.

Note: When the tubing is used to collect samples that contain oil, grease, or other hard to remove materials, it may be necessary to rinse it several times with an approved solvent before initiating decontamination. In extreme cases, it may be necessary to steam clean, wire brush, or sandblast the tubing prior to using this decontamination method. If it cannot be adequately cleaned utilizing the above means, it must be discarded.

6.2.8 Decontamination of Glass Tubing

Use only new glass tubing, decontaminated as follows prior to use:

6.2.8.1 Rinse thoroughly with approved solvent.

6.2.8.2 Air dry for at least 24 hours.

6.2.8.3 Wrap tubing with aluminum foil (with shiny side facing outward) to prevent contamination during storage.

6.2.8.4 Discard tubing after use in sampling.

6.2.9 Decontamination of stainless steel and metal sampling devices use to collect samples of radioactive materials.

6.2.9.1 Clean with tap water and detergent solution. Use phosphate-free detergent, such as Liquinox or equivalent. Use brush to remove particulate matter and surface file, as necessary. R

6.2.9.2 Rinse with tap water.

6.2.9.3 Dry sampling devices prior to reuse.

R

6.3 QUALITY CONTROL

6.3.1 The quality of the deionized and organic-free water used may be monitored by collecting samples in standard precleaned, sample containers and submitting them to the laboratory for a standard ICP scan. Organic-free water should be submitted for low-level pesticide, herbicide, extractable, or purgeable compounds analyses, as appropriate.

6.3.2 Effectiveness of the decontamination procedures is monitored by submitting rinse water to the laboratory for low-level analysis of the parameters of interest. An attempt should be made to select different sampling devices, each time devices are washed, so that a representative sampling of all devices is obtained over the length of the project. Note in the field logbook the devices being used for the QC rinsate.

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

8.1 Attachment I - Allowable Residual Surface Contamination Limits for Unrestricted Release

Attachment I
Allowable Residual Surface Contamination Limits for Unrestricted Release

Nuclide	Average[b,c] (dpm/100 cm^2)	Maximum [b, d] (dpm/100 cm^2)	Removeable [b, e] (dpm/100 cm^2)
U-nat, U-235, U-238, and associated decay products	5,000 alpha	15,000 alpha	1,000 alpha
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231	100	300	20
Ac-227, I-125, I-129, Th-nat, Th-232, Sr-90, Ra-223, Ra-234, U-232, I-126, I-131, I-133	1,000	3,000	200
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above.	5,000 beta-gamma	15,000 beta-gamma	1,000 beta-gamma

a Where surface contamination by both alpha- and beta-gamma emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

d The maximum contamination level applies to an area of not more than 100 cm^2.

e The amount of removable radioactive contamination per 100 cm^2 of the surface area should be determined by wiping the area with dry filter paper or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface area should be wiped.

Source: US NRC Regulatory Guide 1.86, June 1974.

Field Checklist

- ☐ Logbook
- ☐ Safety Glasses or Monogoggles
- ☐ Gloves
- ☐ Safety Shoes
- ☐ Black, Indelible Pen
- ☐ Plastic Sheets
- ☐ Decontamination Equipment
- ☐ Health and Safety Plan
- ☐ Sampling and Analysis Plan
- ☐ Appropriate Containers for Waste and Equipment
- ☐ Monitoring Instruments

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-525

Revision Number: **2**

Date Printed: ______________________

Person Checking the Revision Number: ______________________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Soil Sampling using an Auger			
Procedure No: FTP-525	**Revision: 2**	**Date: 11/18/2008**	**Page 1 of 4**
Business Unit General Manager: Date: [illegible signature] 12/8/08		**QA/QC Officer: Date:** C. J. Covant 11/18/2008	

R

1.0 PURPOSE

The purpose of this procedure is to describe the standard method and equipment used to collect soil samples at the surface or in shallow excavations using an auger.

2.0 SCOPE

This procedure provides a disturbed sample. This procedure applies to a wide variety of soil types including sands, clays, and silts. The use of an auger is of limited value in rocky soil.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.1.3 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 650, Labeling, Packaging and Shipping of Environmental Field Samples.

3.1.4 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 625, Chain-of-Custody.

3.1.5 Science Applications International Corporation Field Technical Procedures (SAIC FTP) 691, Composite Procedures.

3.2 DEFINITIONS

3.2.1 Hand-Operated Auger - A small, lightweight, metal auger. Diameters typically range between 1 and 4 inches. Augers normally are used in conjunction with 3 to 4 foot long metal shafts and T-handles.

3.2.2 Motor-Operated Auger - A metal auger attached to a shaft and powered by an internal combustion or electric motor. Typical auger diameters range from 1 to 48 inches. This auger may be hand held.

R

4.0 RESPONSIBILITIES

R

4.1 See Common Responsibilities at the front of the FTP Manual.

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.2 ensuring compliance with the Sampling and Analysis Plan (SAP); and

4.2.3 overall management of field activities.

5.0 GENERAL

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5.1 Any deviations from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.4 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project Manager for records purposes.

5.5 This procedure is not appropriate for taking samples at a discrete depth, but may be used to take samples at an approximate depth.

5.6 Sampling tools and equipment are protected from sources of contamination prior to sampling and decontaminated prior to, and between sampling, as specified in FTP-400, Equipment Decontamination.

5.7 The equipment required may include hand-operated, spiral-type, ship-type, open tubular, orchard-barrel, open spiral, closed spiral, post hole, clam shell, or machine-operated augers.

5.8 Augers plated with chrome or other materials, except Teflon, must be cleaned of those materials prior to use. Stainless steel is preferred.

5.9 An optional field equipment checklist is provided as a full size form immediately following this procedure. R

6.0 PROCEDURE

6.1 SOIL SAMPLING USING AN AUGER

6.1.1 Don clean gloves and using a stainless steel spoon, or other approved utensil, remove surface vegetation and debris from the immediate area around the marked sampling point.

6.1.2 Use plastic sheeting around work area, as necessary, to prevent equipment from coming in contact with potentially-contaminated surfaces.

6.1.3 Record the appropriate information and observations about the sample location in the field logbook.

6.1.4 Assemble decontaminated auger, extension, and T-handle, if necessary, and advance the auger into the soil to the desired depth.

6.1.5 Withdraw the auger from the soil.

6.1.6 If a sample is not desired, remove the soil from the auger and repeat steps 6.1.3 & 6.1.4. If a sample is to be taken in the next boring, replace the auger bucket with a decontaminated bucket and repeat steps 6.1.2 through 6.1.4.

6.1.7 Perform any H&S measurements as specified in the H&S plan.

6.1.8 Using a stainless steel Teflon spoon, spatula, or disposable scoop remove soil from the auger and place in a stainless steel bowl on a polyethylene sheet or a glass tray. The top two or three inches of soil in the auger are discarded. Remove aliquot for volatile organic analysis. Mix or composite soil in accordance with FTP-691, Composite Procedures and the project-specific SAP. Using a spoon or other approved utensil, remove any large rocks or other organic material (i.e., worms, grass, leaves, roots, etc.).

6.1.9 Using a decontaminated stainless steel or Teflon spoon, spatula, or disposable scoop, as appropriate, place soil samples in compatible containers. Packaging, labeling, and preparation for shipment are implemented in accordance with FTP-650, Labeling, Packaging and Shipping of Environmental Field Samples.

R

6.1.10 Samples are placed in containers defined according to analytical needs specified in the SAP, and then, when appropriate, packed in ice as soon as possible.

6.1.11 If changes in lithology are observed, consult the sampling and analysis plan.

6.1.12 Complete the field logbook and chain-of-custody forms in accordance with procedures, FTP-1215, Field Logbooks and Field Forms and FTP-625, Chain-of-Custody. R

6.1.13 The hole is filled with materials prescribed in the SAP, Waste Management Plan or other applicable guidelines to avoid future safety problems. Excavated materials are placed in containers for disposal or dealt with as specified.

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None.

Field Checklist

- ☐ Auger
- ☐ Auger Shafts and Handles
- ☐ Wrench
- ☐ Logbook
- ☐ Sample Containers with Lids
- ☐ Safety Glasses or Monogoggles
- ☐ Gloves
- ☐ Safety Shoes
- ☐ Ice/Cooler, as required
- ☐ Black, Indelible Pen
- ☐ Bowls
- ☐ Labels and Tags
- ☐ Plastic Sheets
- ☐ Lab Wipes
- ☐ Decontamination Equipment
- ☐ Chain-of-Custody Forms
- ☐ Custody Seals or Evidence Tape
- ☐ Sampling and Analysis Plan
- ☐ Health and Safety Plan
- ☐ Appropriate Containers for Waste and Equipment
- ☐ Monitoring Instruments
- ☐ Spoons, Scoops, etc.

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-550

Revision Number: **2**

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SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Soil Sampling Using a Spade or Scoop			
Procedure No: FTP-550	**Revision: 2**	**Date: 11/18/2008**	**Page 1 of 4**
Business Unit General Manager: Date: [signature] 12/8/08		**QA/QC Officer: Date:** C. D. Cowart 11/18/2008	

R

1.0 PURPOSE

The purpose of this procedure is to describe the standard method and equipment used to collect surface and near-surface soil samples using a spade or scoop.

2.0 SCOPE

This procedure is applicable for collection of disturbed soil samples up to a depth of approximately 20 inches, or from the sides and bottoms of larger excavations and trenches.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual. R

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency.

3.1.3 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 400, Equipment Decontamination.

3.1.4 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 625, Chain -of- Custody. R

3.1.5 Science Applications International Corporation Field Technical Procedures (SAIC FTP) 691, Composite Procedures.

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

R

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.2 ensuring compliance with the Sampling and Analysis Plan (SAP);

4.2.3 overall management of field activities;

4.2.4 classifying soil and rock samples, as required in the SAP (all classification must be performed by a geologist or soil scientist); and R

4.2.5 directing the packing and sealing of soil and rock samples.

5.0 GENERAL

5.1 Any deviations from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.4 Refer to the site or project/task-specific SAP for relevant sampling and analysis requirements.

5.5 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project Manager for retention as permanent records.

5.6 Sampling tools and equipment are protected from sources of contamination prior to sampling, and decontaminated prior to and between sampling, as specified in FTP-400, Equipment Decontamination.

5.7 A stainless steel, decontaminated garden spade is used to remove the top layers of soil to the required sample depth.

5.8 The stainless steel or Teflon-lined decontaminated scoop is used to collect the actual soil sample.

5.9 Use only stainless steel or Teflon-lined spades. Spades plated with chrome or other materials are not used.

5.10 Disposable scoops may be used, if appropriate, for specified media and analytical parameters, in accordance with the SAP.

5.11 A stainless steel spoon may be substituted for the scoop.

5.12 An optional field equipment checklist is provided as a full size form immediately following this procedure.

6.0 PROCEDURE

6.1 Use plastic sheeting, as necessary, to prevent equipment from coming in contact with potentially contaminated surfaces.

6.2 Record the appropriate information and observations about the sample location in the field logbook.

6.3 Don clean gloves and use a decontaminated spade to remove all vegetation and surface material from immediate area around marked sampling point.

6.4 Use the decontaminated spade to remove soil down to the level specified in the SAP.

6.5 Measure and record the depth to the sample with a ruler or tape measure.

6.6 Use a decontaminated scoop or spoon to remove a thin layer, if necessary, of soil that may have been in contact with the spade and discard. Take care that the scoop or spoon does not contact the layer.

6.7 Obtain an appropriate volume of sample with a separate decontaminated scoop or spoon. Use the spade or scoop to remove and discard any large rocks or other organic material (i.e., roots, twigs, insects, worms, etc.) from soil sample. Remove volatile organic compound sample, then homogenize sample thoroughly in accordance with FTP-691, Composite Procedures, and the project-specific SAP. Fill sample jar to volume specified.

6.8 Fill out sample tag or label, put tag or label on jar, and apply custody seal, as specified in the SAP. As soon as possible, store samples in ice.

6.9 An H&S representative will take the field measurements required by the H&S Plan.

6.10 Use a new scoop or spoon for each sample taken. Don new clean gloves prior to beginning sampling activities at next sampling point.

6.11 Complete the field logbook and chain-of-custody forms in accordance with procedures FTP-1215, Field Logbooks, and Field Forms and FTP-625, Chain-of-Custody. R

6.12 To avoid safety problems, fill the hole is filled with material in accordance with the SAP. Excavated materials are handled/disposed of as specified in the SAP, Waste Management Plan or other applicable guidelines.

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None.

Field Checklist

- ☐ Spade
- ☐ Backhoe or Hand Tools
- ☐ Scoop
- ☐ Ruler or Tape
- ☐ Logbook
- ☐ Sample Containers, with Lids
- ☐ Safety Glasses or Monogoggles
- ☐ Ice/Cooler, as required
- ☐ Gloves
- ☐ Safety Shoes
- ☐ Black, Indelible Pen
- ☐ Monitoring Instruments
- ☐ Labels and Tags
- ☐ Plastic Groundsheets
- ☐ Lab Wipes
- ☐ Health and Safety Plan
- ☐ Decontamination Equipment
- ☐ Chain of Custody Forms
- ☐ Custody Seals or Evidence Tape
- ☐ Sampling and Analysis Plan
- ☐ Appropriate Containers for Waste and Equipment

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-625

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<table>
<tr><td colspan="4">SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE</td></tr>
<tr><td colspan="4">Title: Chain-of-Custody</td></tr>
<tr><td>Procedure No: FTP-625</td><td>Revision: 2</td><td>Date: 11/18/2008</td><td>Page 1 of 9</td></tr>
<tr><td colspan="2">Business Unit General Manager: Date:
[signature] 12/8/08</td><td colspan="2">QA/QC Officer: Date:
C. G. Cowart 11/18/2008</td></tr>
</table>

R

1.0 PURPOSE

The purpose of this procedure is to outline methods to ensure the integrity of environmental samples, from collection to final disposition, by documenting possession. The documentation traces possession of samples from their collection through all transfers of custody until final disposition, including archiving, when required.

2.0 SCOPE

This procedure applies to all sampling activities in which the samples leave the sampler's possession.

3.0 REFERENCES AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.2 DEFINITIONS

3.2.1 Chain-of-Custody Form - A form (usually pressure sensitive and duplicate or triplicate) used to document all transfers of possession of an environmental sample from time of collection until final disposition. A chain-of-custody form is identified by a unique number printed or entered on the form.

3.2.2 Field Logbook - A bound book with sequentially numbered pages that is used to create a permanent, real-time record of activities and conditions, significant events, observations, and measurements which occur during each day of field activities.

3.2.3 Sample Container - Either an individual sample container, such as a bottle, or a shipping container, such as an ice chest, which may have or require an associated certification lot number.

3.2.4 Sample Container Label - A waterproof paper or plastic, pressure-sensitive, gummed label placed on the sample container bottle. Information regarding the sampling activity is recorded on the label, and the label is attached to the appropriate bottle.

3.2.5 Sample Identification (ID) Number - A unique number assigned to a sample that is used to trace the sample from its origin to final reporting of data. Features of the ID may be used to identify the sampling location, installation type, sequential sample number, the media (air, water, or soil) sampled, or other pertinent descriptive information.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.2 ensuring compliance with the Sampling and Analysis Plan (SAP);

4.2.3 overall management of field activities;

4.2.4 assuming custody of the collected samples in the field (if appropriate) until he or she properly transfers them to a Sample Manager, to a courier, or directly to the laboratory; and

4.2.5 ensuring that sample custody is maintained from the time of sample collection until release to a courier or a laboratory.

4.2.6 ensuring that field chain-of-custody forms are provided to data management personnel. R

5.0 GENERAL

5.1 Any deviations from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager and will be documented on the appropriate field change forms.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.4 Refer to the site or project/task-specific SAP for relevant sampling and analysis requirements.

5.5 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project manager for records purposes.

5.6 All field team members entering data will use indelible black ink. All entries must be legible. If an error is made, the field team member draws one line through the incorrect entry so that data is not obliterated, and initials and dates each correction. Dates and times are recorded using the format “mm/dd/yy” for the date and the military or 24-hour clock to record the time. Zeros in the sample identification number will be recorded with a slash (/) to distinguish them from the letter "O".

6.0 PROCEDURE

6.1 SAMPLES UNDER CUSTODY

6.1.1 A sample is considered to be under a specific person’s custody if any of the following conditions are met:

a) the sample is in the person’s physical possession;
b) the sample is in line of sight of the person after he/she has taken possession;
c) the sample is secured by that person so any tampering can be detected; and
d) a sample is secured by the person in possession, in an area which only authorized personnel can enter.

6.1.2 Chain-of-custody requirements are necessary whenever a sample leaves the sampling team’s custody or when samples are collected and archived.

6.2 SAMPLE LABELS

6.2.1 Sample container labels are completed by entering the required information.

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6.2.2 Sample containers shall be labeled (e.g.,) marked) using printed labels or by marking directly on sample containers prior to or at the time of sampling. To the extent practicable, sample bottles are labeled prior to filling. R

6.2.3 Labels are completed with black indelible ink and typically include the following information:

a) unique field study or sampling activity name and/or number;
b) unique sample identification number;
c) sample location (station) or appropriate identification as identified in the sampling program;
d) sample preservation used;
e) media sampled;
f) sample type;
g) analyses requested;
h) destination laboratory name;
i) sampling date and time;
j) collector's name; and
k) comments and special precautions as needed.

6.2.4 Labels may be preprinted with most of the information. It is suggested that after sample labels are filled out and affixed to the sample container, the label will be covered with wide clear tape to preserve the label during shipment, if water proof labels are not used.

6.3 SAMPLE SEALS

6.3.1 Sample seals are used to detect tampering following sample collection and prior to the time of analysis.

6.3.2 The seal is attached in such a way that it is necessary to break the seal in order to open the sample container. ("Sample containers" may refer to either individual sample containers or a shipping container such as an ice chest.)

6.3.3 Seals are affixed to the containers as soon as possible following collection, before they leave the custody of the sampling personnel.

6.3.4 Sample seals will be waterproof paper or plastic with gummed backs.

6.3.5 All samples designated for shipment which leave the sampler's custody will have a sample seal affixed which includes the date the sample was collected and the initials of the person who collected the samples.

6.3.6 Alternately, evidence tape with collector's initials and date may be used.

6.4 FIELD LOGBOOKS

6.4.1 A field logbook entry is made at the time the chain-of-custody is generated when the sample is taken to record the chain-of-custody number. R

6.4.2 Any additional chain-of-custody information required by the project-specific SAP or QAPjP is also entered in the field logbook as required.

6.5 CHAIN-OF-CUSTODY FORMS

6.5.1 The chain-of-custody form is completed by the sampling personnel at the time of the sampling event.

6.5.2 The chain-of-custody form includes the following information:

a) unique field study or sampling activity name and/or number;
b) sampling personnel signatures and printed names;
c) unique sample identification number(s);
d) analyses required for each sample;
e) date and time the sample was collected;
f) sample media;
g) comments regarding the sampling event;
h) shipping information including (1) number of shipping containers; (2) method of shipment; and (3) special handling requirements, if any.
i) number of bottles/vials for each sample number/analysis;
j) signatures of person relinquishing custody and person accepting custody each time custody is transferred from one individual to another; and
k) date and time of each transfer.

6.5.3 One sample is entered on each line and a sample is not split on multiple lines.

6.5.4 If QA samples are provided to another laboratory facility or government agency, a separate chain-of-custody form will be filled out in the field by a sampling team member when the sample is taken.

6.5.5 Copies of chain-of-custody forms will be maintained by the Field Manager and/ or Data Management.

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6.6 DELIVERY OF SAMPLES TO THE LABORATORY

6.6.1 The field sampling team member places the sample in an identified container for storage until all samples have been collected for that sampling activity.

6.6.2 A Shipping Coordinator, Field Sampling Leader, or field sampling team member who ships samples from the field to the laboratory completes the chain-of-custody form, including referencing all QC samples, signs the form, and notes the date and time of shipment.

6.6.3 A field sampling team member inspects the form for completeness and accuracy. He or she makes any needed corrections.

6.6.4 A field sampling team member detaches the proper copies of the form or makes copies as appropriate. R

6.6.5 A field sampling team member places the chain-of-custody form in a reclosable plastic bag and tapes it to the inside of the cooler lid. The sample shipping container is then sealed, and custody seals are placed on the container so that it cannot be opened without breaking the seals. The seal must be signed and dated.

6.6.6 The person who is going to deliver the samples to a courier takes custody of the samples.

6.6.7 If the samples must be shipped to a distant laboratory, the Shipping Coordinator or field sampling team member arranges by phone for a courier pickup or transports the sealed containers to a commercial air courier for overnight delivery to the laboratory. He or she records the airbill number and signs his or her name and records the company name, date, and time in the relinquished block on the chain-of-custody form. He or she writes in the name of the courier company, date, and time in the received by block. The airbill is retained as part of the chain-of-custody documentation.

6.6.8 If a local laboratory will perform analysis, the Field Sampling Leader, Shipping Coordinator, or a field team member may transport the samples to the laboratory facility directly from the field either throughout the day or at the end of each day's sampling effort. The Field Sampling Leader, Shipping Coordinator, or field team member delivering the samples to a local laboratory will relinquish custody to the laboratory and sign, and write in the date and time of the transfer in the appropriate box on the chain-of-custody form.

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6.6.9 If samples are not immediately transported to the analytical laboratory, they remain in the custody of the Shipping Coordinator or the Field Sampling Leader. Samples with the need for temperature controls are stored under refrigeration with a custody seal affixed. Samples with no need for temperature controls are kept in a dry location with a custody seal affixed. R

6.7 LABORATORY RECEIPT

6.7.1 Upon receipt of the samples at the laboratory, the laboratory receiving staff member signs his or her name, company name, date, and time in the received by block of the chain-of-custody form.

6.7.2 On the chain-of-custody form, the laboratory sample receiving personnel document the condition of the samples in regard to temperature, integrity of chain-of-custody seals, and proper preservation.

6.7.3 The laboratory personnel verify that information on the chain-of-custody form and labels is complete and accurate.

6.7.4 The laboratory follows chain-of-custody procedures as required by its Quality Assurance Plan. The laboratory may initiate a laboratory internal chain-of-custody form to track the sample throughout the laboratory process.

6.7.5 If problems are identified, the laboratory contacts the designated SAIC contact to inform them of the type of problem and actions to prevent recurrence.

6.7.6 The laboratory provides a receiving report to the Project Manager or designee, which contains the information specified in the laboratory's Statement of Work or in the Sampling and Analysis Plan (SAP).

7.0 RECORDS

As noted in this procedure, there are several items that are part of the system for documenting chain-of-custody. The following is a listing of all items that must be used to document chain-of-custody:

a) chain-of-custody forms tracing possession of samples from their collection to final disposition;
b) field logbooks documenting information pertaining to the actual sample collection event; and
c) laboratory receiving report verifying receipt of samples and their requested analysis.

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Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

8.1 Attachment I - Chain-of-Custody Form (Example)

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An Employee-Owned Company
Science Applications International Corporation
151 Lafayette Drive Oak Ridge, TN 37830 (865) 481-4600

CHAIN OF CUSTODY RECORD

COC NO.:

PROJECT NAME:	REQUESTED PARAMETERS	LABORATORY NAME:
PROJECT NUMBER:		LABORATORY ADDRESS:
PROJECT MANAGER:		
Sampler (Signature) (Printed Name)		PHONE NO:

Sample ID	Date Collected	Time Collected	Matrix	Toxicology Test (10 day Hyalella)																			No. of Bottles/Vials	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time	TOTAL NUMBER OF CONTAINERS:	Cooler Temperature:
COMPANY NAME:		COMPANY NAME:		Cooler ID:	FEDEX NUMBER:
RECEIVED BY:	Date/Time	RELINQUISHED BY:	Date/Time		
COMPANY NAME:		COMPANY NAME:			
RELINQUISHED BY:	Date/Time	RECEIVED BY:	Date/Time		
COMPANY NAME:		COMPANY NAME:			

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-650

Revision Number: **3**

Date Printed: ____________________

Person Checking the Revision Number: ____________________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Labeling, Packaging and Shipping of Environmental Field Samples			
Procedure No: FTP-650	Revision: 3	Date: 5/29/2009	Page 1 of 10
Business Unit General Manager: Date: [signature] 6/1/09		QA/QC Officer: Date: C. A. Cowart 5/29/2009	

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1.0 PURPOSE

The purpose of this procedure is to describe the minimum requirements to properly label and package containers of samples for transport.

2.0 SCOPE

This procedure applies to samples collected in the course of environmental field investigations and monitoring activities.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Code of Federal Regulations, Title 40, Protection of Environment.

3.1.3 Code of Federal Regulations, Title 49, Transportation.

3.1.4 Dangerous Goods Regulations, International Air Transport Association (IATA), latest revision.

3.1.5 Science Applications International Corporation, Field Technical Procedure (SAIC FTP) 405, Cleaning and Decontaminating Sample Containers and Sample Equipment.

3.1.6 Science Applications International Corporation, Field Technical Procedures (SAIC FTP) 625, Chain of Custody.

3.1.7 Science Applications International Corporation, Field Technical Procedures (SAIC FTP) 651, Hazardous Materials/ Dangerous Goods Shipping R

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual.

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.2 ensuring compliance with the Sampling and Analysis Plan (SAP);

4.2.3 overall management of field activities; and

4.2.4 ensuring that sample packaging and shipping is performed safely.

5.0 GENERAL

5.1 Any deviations from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements.

5.4 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project Manager.

5.5 Receivers and carriers should be contacted prior to packaging to ascertain any specific restrictions, such as weight limits, delivery and pick up schedules, receiving hours, or sample disposal terms.

5.6 A unique sample identification will be assigned to each sample. The identification scheme will be presented and approved in the Sampling and Analysis Plan. The identification scheme will be designed such that at a minimum the site, sample location within the site, sample matrix, sample interval, and sample type (i.e. environmental, duplicate, split, etc.) can be ascertained from the sample identification. Frequently you cannot include all of this information in a sample number. Some programs may have requirements for sample numbers that must be followed. The requested analysis, sample date and time, and preservative will also be presented on the sample label.

5.7 Individual sample containers are checked against accompanying chain-of-custody and analytical request forms prior to signing for receipt from sample collection personnel.

5.8 Site samples are placed in strong exterior shipping packages and surrounded with compatible cushioning/absorbent material, if necessary.

5.9 The shipping package is labelled and marked in accordance with U.S. Department of Transportation (DOT) and/ or International Air Transport Association (IATA) regulations and carrier or receiver-specific instructions. DOT applies primarily to ground transport and IATA applies to air cargo transport.

5.10 The chain-of-custody form must accompany the package as specified in the approved Chain-of-Custody procedure. The package is closed and sealed, as appropriate, and any required shipping papers prepared.

5.11 An example (non-mandatory) Cooler Shipping Description Log is provided as Attachment III, which may be useful for projects which require detailed cooler contents information in a logbook.

6.0 PROCEDURE

6.1 SAMPLE CLASSIFICATION

The sample team leader classifies each sample as environmental or one of several categories of hazardous material/ dangerous goods as defined by the DOT (49 CFR) and the IATA Dangerous Goods Regulations.

6.1.1 Environmental Samples

A sample that does not meet the criteria for any of the nine hazard classes identified in this section is an environmental sample.

Note: The vast majority of soil, groundwater, and surface water samples are environmental samples.

6.1.2 Hazardous Materials/ Dangerous Goods

A sample that meets the criteria for one or more of the following classes of hazardous materials/ dangerous goods must be shipped per the requirements of 49 CFR if a surface shipment or by the

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requirements of the IATA Dangerous Goods regulations if an air shipment.
Note: There are additional requirements beyond the mechanics of shipping including hazardous materials awareness, safety, and function specific training every two years.

Class 1. Explosives- any substance or article which is designed to explode or capable of exploding. If the sample team leader has knowledge that a sample contains a sufficient quantity/ concentration of explosive compound(s) to meet this criterion, the sample must be shipped as an explosive.
Note: Notification must be made to the Project Manager and Group H&S Officer prior to shipment or handling. Under no circumstances ship or otherwise handle explosive devices.

Class 2. Gases- cylinders of compressed gasses such as acetylene, nitrogen, air, oxygen, etc.
Note: Field samples do not normally include compressed gases.

Class 3. Flammable liquids- liquids with flash points less than 140°F such as gasoline, toluene, isopropyl alcohol, or a mixture known to contain more than 1% (10,000 ppm) of a flammable liquid [49 CFR 173.120(ii)].
Note: A useful field indicator that a sample may be a flammable liquid is a reading with a combustible gas indicator greater than 20% LEL in the head space of the sample container.

Class 4. Flammable solids- substances liable to spontaneous combustion, substances which, in contact with water, emit flammable gases- wetted explosives, self reactive materials, readily and spontaneously combustible materials. If the sample team leader has knowledge that a sample contains a sufficient quantity/ concentration of such materials to meet any of these criteria, the sample must be shipped as Class 4.
Note: These are highly reactive materials and will generally not be encountered in an unreacted state during environmental sampling unless samples are collected from intact containers. Notification must be made to the Project Manager and Group H&S Officer prior to shipment or handling.

Class 5. Oxidizing substances and organic peroxides- materials such as swimming pool chlorine, that will release oxygen in contact with organic materials and organic compounds containing the -O-O- structure which may be considered as derivatives of hydrogen peroxide (at greater than 1% concentration). If the sample team leader has

knowledge that a sample contains a sufficient quantity/ concentration of such materials to meet either of these criteria, and has not previously reacted with materials in the immediate environment, the sample must be shipped as Class 5.
Note: These are highly reactive materials and will not generally be encountered in an unreacted state in environmental sampling unless samples are collected from intact containers. Notification must be made to the Project Manager and Group H&S Officer prior to shipment or handling.

Class 6. Poisonous and infectious substances- materials with an acute oral LD_{50} of not more than 500 mg/kg (liquid) or 200 mg/kg (solid) or a viable organism that causes or may cause disease in humans or animals.
Note: Potentially poisonous samples are samples known to contain percent (not ppm) concentrations of mercury, tetrachloroethane, or other DOT defined poisonous materials. Potentially infectious substances are hospital (and related) wastes, and biological warfare agents.

Class 7. Radioactive materials- a material with > 0.002 µCi/ gram.
Note: A sample may meet the definition of radioactive material if it produces a radiological survey instrument reading (in counts per minute) in excess of 200% of regional background readings. Note that this is a conservative number and should be considered as a flag indicating the need for further investigation. Notification must be made to the Project Manager and Group H&S Officer prior to shipment.

Class 8. Corrosive material- materials capable of causing destruction or irreversible skin damage from a contact period of four hours or less.
Note: Generally, this applies to materials with a pH of less than 2 or more than 12. Preservation of samples of water with corrosive materials does not make those water sample DOT regulated corrosive materials. DOT letters of interpretation specifically exclude preserved water samples from this class if the samples are preserved per EPA method. R

Class 9. Miscellaneous Hazardous Material- a material that has a property that would impair the performance of an aircraft crew member, a hazardous waste requiring a manifest, a hazardous substance that exceeds the reportable quantity in one package, and dry ice, among many other things.
Note: A soil or water sample containing unknown concentrations of contaminants does not meet this definition. Samples of a material that is known (identified) as hazardous waste do meet this definition. A sample preserved with dry ice also fits this class.

6.2 SAMPLE PACKAGING, LABELING, AND MARKING

6.2.1 Environmental Samples

Samples shipped to a laboratory for the purpose of testing are exempt from the requirements of 40 CFR 261 through 268 or Part 270 or Part 124 or the notification requirements of section 3010 of the Resource Conservation and Recovery Act (RCRA). Environmental samples will be packaged as follows:

a) Verify all sample containers contain the correct preservative and are of appropriate type and volume;
b) Clean the exterior of filled sampled container (See FTP-405);
c) Attach a label with unique sample identification(completed with indelible black ink) to the sample bottle;
d) Seal the tops of bottles, except VOA vials, with appropriate tape or other secure fastening;
e) Apply custody seals;
f) Place each sample bottle in a plastic bag, squeeze as much air as possible from the bag, seal the bag;
g) Wrap glass containers in bubble wrap;
h) Prepare the shipping container (cooler) by taping the drain plug shut from the inside and outside, lining the cooler with a large heavy-duty plastic bag, and placing approximately 1 inch of packing material such as vermiculite, perlite, or bubble wrap in the bottom of the bag liner;
i) Place the sample containers upright in the cooler, do not stack sample containers;
j) Add sufficient ice to maintain the samples at the required temperature and include a temperature blank, at a minimum, all containers are covered with ice. Ice should be placed inside two zip-seal bags to prevent breaking, when required;
k) Fill the cooler with appropriate sorbent/ padding, not required if containers are wrapped in bubble wrap;
l) Tape the liner shut;
m) Seal the laboratory paperwork inside a plastic bag and tape it to the inside of the cooler lid;
n) Tape the lid of the cooler with duct tape, apply around the seam. Strapping tape should be wrapped around the cooler in two locations, if samples are shipped via commercial carrier;
o) Place signed custody seals on the front and back of the cooler; and

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p) Assure that the following information accompanies the samples: sample collector's name, mailing address, and telephone number, laboratory's name, mailing address, and telephone number, quantity of sample, date of shipment, and description of the samples.

Note: The steps described in a) through o) above are typical, but may be modified by the Field Operations Manager in accordance with a project-specific Sampling and Analysis Plan.

6.2.2 Hazardous Materials/ Dangerous Goods/ Radioactive Materials

Packaging for samples of hazardous materials/ dangerous goods/ radioactive materials must meet the requirements for environmental samples as well as additional requirements of DOT and IATA (if the sample will be shipped by air).

Note: This procedure cannot address all the requirements of the regulations. Expert advice must be obtained prior to shipping hazardous materials/ dangerous goods. Shipping firms such as Federal Express and UPS have hazardous materials/ dangerous goods departments which can provide specific guidance on packaging and other shipping requirements. Refer to FTP-651 for additional information. R

6.3 <u>ASSOCIATED DOCUMENTATION</u>

6.3.1 Environmental Samples

Chain of Custody Record (See FTP-625)
Custody Seal (See Attachment I)
Sample Label (See Attachment II)

6.3.2 Hazardous Materials/ Dangerous Goods

See FTP-651 R

7.0 <u>RECORDS</u>

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP.

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8.0 ATTACHMENTS

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8.1 Attachment I - Custody Seal and Sample Label (Examples)

8.2 Attachment II- Cooler Shipping Description Log (Example)

Attachment I

Sample Label (Example)

Lab: Southwest Laboratory of

—— 9 6 Ø Ø 9 2 9

Sample ID: B12ss-ØØ1-Ø378-SO
Area: Building 12ØØ
Station: B12ss-ØØ1
Media: Surface Soil
Type: Grab Composite
Analysis: SVOC,Pest/PCB,Explosives
Preserv: Cool,4C

Rad Screen: ____________________
Collection Date/Time: _______________
Comment: ____________________
Collected by: ____________________

Custody Seal (Example)

SECURITY SEAL	DATE________________
DO NOT TAMPER	INITIALS______________

Attachment II
(Example)

COOLER SHIPPING DESTRIPTION LOG

PROJECT NAME:________________________ PROJECT NO: ________

LER NO: __________ AIR BILL NO: ________________________ DATE:______________________

COOLER CONTENT INFORMATION

AL NUMBER OF SAMPLES IN COOLER:______________________

SAMPLES CLASSIFIED AS ENVIRONMENTAL: YES________ NO_________

D, NUMBER OF SAMPLES IN THE FOLLOWING CATEGORIES:

mable liquid- DOT/IATA Class 3 ____________________________

onous material - DOT/IATA Class 6 ____________________________

oactive material - DOT/IATA Class 7 ____________________________

osive material - DOT/IATA Class 8 ____________________________

ardous waste/ substance - DOT/IATA Class 9 ____________________________

ROVAL TO SHIP: YES ___ NO ___

SIGNATURE ______________________________
(Shipper)

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-651

Revision Number: 3

Date Printed: ____________________

Person Checking the Revision Number: ____________________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Hazardous Materials/ Dangerous Goods Shipping			
Procedure No: FTP-651	Revision: 3	Date: 11/18/2008	Page 1 of 34
Business Unit General Manager: Date: [signature] 12/8/08		QA/QC Officer: Date: C. D. Conrad 11/18/2008	

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1.0 PURPOSE

The purpose of this procedure is to establish the minimum requirements for shipping hazardous materials in compliance with Department of Transportation (DOT) and International Air Transport Association (IATA) requirements.

2.0 SCOPE

This procedure applies to the receiving, preparing for shipment, and shipment of certain hazardous materials by SAIC employees or subcontractors. It is limited to the types of shipping activities associated with the Energy, Environment and Infrastructure Business Unit's (E2I BUs) offices and environmental field projects and specifically addresses shipment and driving to/from site of sampling materials, field supplies, and samples. This procedure does not address all DOT-regulated activities and the responsible manager must ensure that supplemental practices are implemented and documented for DOT-regulated activities that are not addressed in this procedure. R

3.0 REFERENCES AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual. R

3.1.2 Title 49, Subtitle B, Chapter 1, Subchapter C, Hazardous Materials Regulations (HMR).

3.1.3 Dangerous Goods Regulations, International Air Transport Association.

3.1.4 Emergency Response Guidebook, Transport Canada, U.S. Department of Transportation, and Secretariat of Transport and Communications of Mexico.

3.1.5 EC&HS Procedure 25, Management of Investigation- Derived Waste.

3.1.6 EC&HS Procedure 28, Hazardous Material Transportation.

3.1.7 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 650, Labeling, Packaging and Shipping of Environmental Field Samples.

3.2 DEFINITIONS

3.2.1 Hazardous Material (DOT): A substance or material, including a hazardous substance, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated.

3.2.2 Dangerous Goods (IATA): Articles or substances which are capable of posing a significant risk to health, safety or to property when transported by air and which are classified according to Section 3 of IATA. (Note: In nearly all cases, the terms dangerous goods and hazardous materials are synonymous and will be used interchangeably in this procedure.)

3.2.3 Small quantity exception (DOT): Allows small quantities of certain hazardous materials (Class 3, Division 4.1, Division 4.2, Division 4.3, Division 5.1 and 5.2, Division 6.1, Class 7, Class 8, and Class 9) to be shipped without having to comply with full HMR.

3.2.4 Excepted quantity (IATA): Small quantities of some dangerous goods can be shipped without using UN specification packaging. For example, a Packing group II corrosive can be shipped as an excepted quantity shipment if each inner package contains no more than 30 mL and the outer package holds no more than 500 mL total. The packaging must still meet performance tests, which can be conducted by the shipper (Note: In nearly all cases, the terms small quantity and excepted quantity are synonymous.)

3.2.5 Limited quantity exception (DOT and IATA): When specified as such in a section applicable to a particular material, means the maximum amount of a hazardous material for which there is a specific packaging exception.

3.2.6 Materials of Trade exception (DOT): Materials of Trade means a hazardous material, other than a hazardous waste, that is carried on a motor vehicle in direct support of our work. This would include limited quantities of hazardous materials like pre-preserved sample containers, calibration gases, decontamination chemicals and any other hazardous material that we use in our work. When carrying these limited quantities of hazardous materials SAIC has reduced requirements under DOT and is not required to carry a bill of lading or placard the vehicle. Packaging requirements and labeling are reduced from those required for shipping.

3.2.7 Hazardous Material Employee: A hazardous material (hazmat) employee means a person who is employed by a hazmat employer and who in the course of employment directly affects hazardous materials transportation safety. This term includes an owner-operator of a motor vehicle, which transports hazardous materials in commerce. This term includes an individual, including a self-employed individual, employed by a hazmat employer who, during the course of employment:
(1) Loads, unloads, or handles hazardous materials;
(2) Manufactures, tests, reconditions, repairs, modifies, marks, or otherwise represents containers, drums, or packagings as qualified for use in the transportation of hazardous materials;
(3) Prepares hazardous materials for transportation;
(4) Is responsible for safety of transporting hazardous materials; or
(5) Operates a vehicle used to transport hazardous materials.

3.2.8 Environmental sample: A sample of soil, air, or water that may be contaminated. An environmental sample should not be shipped as a hazardous material or dangerous good unless it is known or expected to present a hazard as specified in one of the nine DOT hazard classes. Preservation of a water sample, with nitric acid, sulfuric acid, hydrochloric acid or sodium hydroxide, by an EPA method, does not make the sample a hazardous material. See DOT interpretation dated February 13, 2003, Reference No.: 02-0093 for additional information.

3.2.9 Class 1 - Explosive materials: Materials that will detonate like a bomb, firecracker, etc. An example of an explosive that might be shipped by SAIC is the ammunition for a seismic gun.

3.2.10 Class 2 - Compressed gas: The definition includes cylinders of compressed gasses like acetylene, nitrogen, air, oxygen, etc. Bottles of calibration gasses for PIDs and OVAs and gasses for oxyacetylene cutting fall in this class.

3.2.11 Class 3 - Flammable liquid: Liquids or liquid mixtures with flash points ≤ 141 degrees Fahrenheit such as ethyl alcohol, gasoline, toluene, or isopropyl alcohol [49 CFR 173.120(a)]. Examples of flammable liquids shipped by SAIC are isopropyl alcohol to be used for equipment decontamination, samples of flammable waste taken from a container such as a fuel tank, biological samples preserved with ethanol, and soil samples preserved with methanol.

3.2.12 Class 4- Flammable solid: The definition includes wetted explosives, self-reactive materials, readily combustible solids, and spontaneously combustible material.

3.2.13 Class 5 - Oxidizer: Materials such as hydrogen peroxide, which will release oxygen in contact with organic materials and initiate or promote a fire. Some products that SAIC might use to treat groundwater, such as hydrogen peroxide, are oxidizers.

3.2.14 Class 6 - Poisonous material: Materials with an acute oral LD_{50} of not more than 500mg/kg (liquid) or 200 mg/kg (solid) and infections substances. The definition of an infectious substance is a viable organism that causes or may cause disease in humans or animals.

3.2.15 Class 7 - Radioactive materials: *Radioactive material* means any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in the table in 49 CFR 173.436 or values derived according to the instructions in 49 CFR 173.433. Exempt material activity concentrations and exempt consignment activity limits for radionuclides for specific radionuclides are found at 49 CFR 173.436. Examples of radioactive materials associated with field work include; soil density gauges and calibration sources for radiation measuring instruments. A soil sample may meet the DOT definition of radioactive material if it is taken from an area that is heavily contaminated with radioactive material.

3.2.16 Class 8 - Corrosive material: Materials that cause steel or aluminum to corrode at more than 6.25 mm per year or are capable of causing destruction or irreversible skin damage from a contact period of four hours or less. Acids and bases used to preserve water samples (concentrated nitric acid, hydrochloric acid, etc.) are corrosive materials. Water samples preserved with corrosive materials, per EPA methods, are generally not hazardous materials, based on DOT interpretation.

3.2.17 Class 9 - Miscellaneous Hazardous Material: This class consists of materials which cause noxious fumes or present a hazard during transportation but which do not meet the definition of any other hazard class. This class includes certain hazardous wastes requiring a manifest, or hazardous substances that exceed the reportable quantity (RQ) in one package. This class also includes materials such as dry ice and asbestos.

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4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 PROGRAM OR PROJECT MANAGER

In addition to the Common Responsibilities the Program or Project Manager is responsible for: R

4.2.1 ensuring that adequate resources are provided to facilitate compliance with this procedure and transportation regulations;

4.2.2 ensuring that personnel who receive, prepare for shipment, operate vehicles carrying, or ship hazardous materials/dangerous goods have the required training and SAIC-issued certification and perform these tasks in compliance with this procedure and applicable regulations;

4.2.3 ensuring that personnel who perform DOT-regulated tasks not addressed by this procedure receive additional documented training and perform those tasks in compliance with the applicable DOT regulations ensuring that incidents or accidents are reported to the BU H&S Manager immediately;

4.2.4 ensuring that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.

4.2.5 ensuring that incidents or accidents are reported to the BU Health and Safety (H&S) Manager immediately.

4.3 SAIC EMPLOYEES

All employees are responsible for:

4.3.1 performing hazardous materials/dangerous goods receiving, preparation for shipment, and shipment in compliance with this procedure and applicable regulations;

4.3.2 performing only those shipping-related tasks for which they have been trained; and

4.3.3 reporting all accidents immediately as specified in EC&HS Procedures 4 and 24.

5.0 GENERAL

5.1 Violation of this procedure may result in discipline, discharge, or release from service.

5.2 All personnel who perform work subject to this procedure must have successfully completed the required training and received a certificate as described in this procedure.

5.3 All personnel who perform DOT-regulated tasks that are not addressed in this procedure must receive additional documented training specific to those tasks.

5.4 All personnel who perform work subject to this procedure must receive safety training relevant to the chemicals involved. This training can consist of hazardous waste training and/or chemical-specific hazard communication training.

5.5 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.6 In addition to the requirements of this procedure, sample shipment must be performed in compliance with FTP-650 or project specific quality assurance requirements. Examples of additional requirements may include chain-of-custody forms, custody seals, analysis requests, ice in coolers to preserve samples, tape over the cooler-lid junction, etc.

5.7 The basic requirements that must be satisfied in order to comply with DOT and IATA regulations include:

a. Training - 49 CFR 172.700 Subpart H and IATA Section 1.5;
b. Shipping Papers - 49 CFR 172.200 Subpart C and IATA Section 8;
c. Marking - 49 CFR 172.300 Subpart D and IATA Section 7;
d. Labeling - 49 CFR 172.400 Subpart E and IATA Section 7;
e. Packaging - 49 CFR 173.22 – 173.476 and IATA Section 5;
f. Emergency Response Information - 49 CFR 172.600 Subpart G; and IATA Section 2.9.2.

5.8 SAIC personnel subject to this procedure must receive training on the applicable requirements at least once every two years. Training to meet DOT and IATA requirements falls into four categories. These four categories of training are; 1) safety (protective measures, emergency response information), 2) general awareness (requirements of 49 CFR 172, subpart H, recognition of hazardous materials), 3) function-specific (preparing shipping papers and packaging, labeling and marking hazardous materials), and 4) security. HAZWOPER refresher training and/or chemical specific hazard communication training satisfy the requirement for safety training. The general awareness requirement can be met through completion of externally provided DOT courses, combined with training on this procedure and EC&HS Procedure 28, “Hazardous Materials Shipping” or by completion of the E&I BU DOT/IATA course. Function specific training must address the specific tasks the employee(s) will perform. This requirement can be met (for the limited range of activities associated with environmental activities) through completion of the E&I BU DOT/IATA course. If employees will perform functions not addressed in the BU course and this procedure, the responsible manager must ensure (and document) that the employees are trained to complete those functions. Security awareness training is required for all hazmat employees. In-depth security training is required for hazmat employees who perform shipments that require a security plan.

5.9 Shipping papers (called Shippers Declaration For Dangerous Goods by IATA) are required to accompany hazardous materials or dangerous goods shipments. When SAIC uses a commercial carrier (FedEx, UPS, etc.) the vendor-supplied hazardous materials or dangerous goods shipping paperwork meets this requirement if it is completed correctly. An example of a completed shipping paper is included with this procedure.

5.10 Marking and labeling per DOT and IATA requirements must include specific types of information. Packages must be marked on the outer container with the proper shipping name, UN/NA ID number, shipping authorization, and shipper’s and consignee’s name and address. Labeling includes the hazard class, cargo aircraft only (if appropriate), and “this end up” labels if inner containers hold liquid hazardous material.

5.11 Packaging must conform to the specifications for material and quantity-specific requirements of DOT or IATA. UN specification packaging must be indelibly marked with the appropriate specification numbers (IP1, IP6, 1A1, 1A2, etc.). Other packaging can be used if a shipment meets the requirements for certain exceptions or exemptions. Excepted or exempted packagings are not required to meet UN specifications but must pass performance tests, specifically drop and stack tests, some of which can be conducted by the shipper.

5.12 Emergency response information must accompany hazardous materials shipments. This requirement can be met by providing the carrier with MSDSs or by entering the Emergency Response Guidebook guide numbers on the shipping paper. See the sample shipping paper for an example.

5.13 Security issues must be addressed in training and planning. All hazmat employees must receive at least security awareness training. Hazmat employees whose work is subject to a security plan must receive in-depth security training to cover the requirements of the applicable security plan.

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Security plans are required for employers who ship relatively high hazard materials or relatively large quantities of hazardous materials. Security plans and the associated in-depth training are beyond the scope of this procedure. Security is not a high priority for the types of shipments addressed by this procedure, because the quantities of hazardous materials shipped are small and extremely unlikely to be useful as weapons. General security precautions that should be followed by SAIC personnel include the following: 1) Secure/lock hazardous materials so that they are not accessible to unauthorized persons, 2) Inspect and inventory hazardous materials on a regular basis, and 3) Do not allow personnel who have not had DOT/IATA training to participate in hazardous materials shipments.

6.0 PROCEDURE

6.1 Job Specific Instruction - Materials of Trade Exception

6.1.1 Purpose and applicability: This instruction is intended to assist the operator of a vehicle used to transport certain hazard classes and quantities of hazardous materials in support of SAIC's business activities to recognize and control hazards associated with this task. It is applicable to employees who drive a vehicle containing these hazardous materials to and from a worksite and around the worksite. The Materials of Trade exception does not apply if hazardous materials are being delivered to another person or company "in commerce".

6.1.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific for Materials of Trade. This includes recognition of DOT labels and placards and appropriate hazard controls.

6.1.3 Requirements:

a. The operator of the vehicle must be aware that it contains hazardous materials.
b. The vehicle can contain no more than 440 pounds of hazardous material, including the weight of the hazardous material containers.
c. The vehicle can not contain self-reactive material, poisonous by inhalation material, hazardous waste, or radioactive material.
d. The maximum quantity of hazardous materials in any one package is limited. See the following table for specific information.
e. Packages must be the manufacturer's original packaging or of equal strength and integrity.
f. Packages must be marked to identify the contents.
g. Packages must be capable of preventing leakage during the planned transport.

h. Packages must be securely closed, secured against movement and protected against damage.
i. Gasoline or diesel fuel must be in containers that meet OSHA requirements. These requirements are satisfied by a clearly labeled Underwriter's Laboratories or Factory Mutual approved safety can with a flame arrestor.
j. Cylinders and pressure vessels must meet DOT requirements and must be labeled with the proper shipping name, identification number, and have a hazard class label.
k. Packages containing a reportable quantity of a hazardous substance must be marked RQ.
l. A tank containing a mixture of a Class 9 material must be marked on two sides with the identification number.

6.1.4 Ground transportation of Materials of Trade does not require:
a. Shipping papers,
b. Emergency response information,
c. Placarding, or
d. Additional formal training.

6.1.5 Examples of materials and quantities that can not be transported under this exception:
a. 55 gallons of isopropyl alcohol;
b. 55 gallons of hydrogen peroxide; and
c. 5 x 200 cubic foot bottles of compressed breathing air.

Materials of Trade Quantity Limits		
Class/ Division	Name	Maximum quantity Per Package
1	Explosives	Not permitted
2.1	Flammable gas	100 kg (220 lb.)
2.2	Nonflammable gas	100 kg (220 lb.)
2.3	Toxic gas	Not permitted
3	Flammable liquid	0.5 L of PG I, 30 L of PG II or III
4.1	Self reactive substances	Not permitted
4.1	Other flammable solids	0.5 kg of PG I, 30 kg of PG II or III
4.2	Pyrophoric substances	Not permitted
4.2	Spontaneously combustible substances	Not permitted
4.3	Water reactive substances	0.0 of PG I, 30 ml of PG II or III
5.1	Oxidizers	0.5 kg/ 004 L of PG I, 30 kg/ 30L of PG II or III
5.2	Organics peroxides	0.5 kg/ 0.5 L of PG I, 30 kg/ 30 L of PG II or III
6.1	Toxic substances – inhalation	Not permitted
6.1	Toxic substances – oral	0.5 kg/ 004 L of PG I, 30 kg/ 30L of PG II or III
6.1	Toxic substances – dermal	0.5 kg/ 004 L of PG I, 30 kg/ 30L of PG II or III

6.2	Infectious substances	Not permitted
7	Radioactive Material	Not permitted
8	Corrosive materials	0.5 kg/ 004 L of PG I, 30 kg/ 30L of PG II or III
9	Magnetized materials	0.5 kg/ 004 L of PG I, 30 kg/ 30L of PG II or III
9	Other miscellaneous materials	0.5 kg/ 004 L of PG I, 30 kg/ 30L of PG II or III
9	Hazardous waste	Not permitted
Total quantity of hazardous material that can be carried in vehicle under the Materials of Trade Exception		440 pounds

6.2 Job Specific Instruction – Shipping of Samples of Free Product (degraded gasoline or other floating product) by Air Under Limited Quantity Exception

6.2.1 Purpose and applicability: This instruction is intended to assist field personnel in the shipping of samples of light non-aqueous phase liquid (LNAPL) that is, or is likely to be, degraded gasoline or other flammable liquid. Note that the requirements for air shipment are at least as stringent as those for ground shipment.

6.2.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.2.3 Requirements:

a. Ensure that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.
b. Ensure that each of the inner packagings (sample containers) contains less than 500 mL of material. Close the sample containers tightly and secure with tape.
c. Place the inner packaging (bottles) inside a rigid plastic or metal container (intermediate container) with sufficient sorbent to absorb the liquid.
d. Close and seal the intermediate container.
e. Place the intermediate container(s) inside a cooler or other sturdy container capable of withstanding the planned shipment.
f. Fill the remaining space in the cooler with sufficient cushioning material to prevent movement of the intermediate container(s).
g. Limit the total quantity of sample in the cooler to 1 L or less. 1 L is the maximum quantity allowed in the total package for a Packing Group II flammable liquid.
h. Ensure that the packed cooler weighs less than 66 pounds (30 kg).

i. Ensure that documentation is available to prove that the cooler has passed the requirements for Limited Quantity shipment at Section 2.8.5 of the IATA regulations. A packed cooler must be capable of withstanding a 4 foot drop test onto a rigid, flat surface in a position most likely to cause the most damage without showing any damage likely to affect safety or leakage of the inner packagings. The cooler must also be capable of withstanding, without breakage or leakage of inner packages, a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the test cooler). Note that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or sulfuric acid for the project) as an excepted or limited quantity, the lab is required to perform these tests and should be able to provide documentation. If such documentation is not available for the cooler to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.

j. Seal any openings (drain) with tape inside and out.

k. Secure the lid with strapping tape.

l. Place a Class 3 Flammable Liquid label on the front of the cooler.

m. Apply orientation (this side up) labels on two opposite sides of the cooler.

n. Mark the front of the cooler to indicate the proper shipping name, UN number and shipping authorization. If the sample(s) is known to be gasoline (or is probably gasoline) mark as follows; “Gasoline Solution”, UN 1203, and Limited Quantity, or LTD QTY. If the identity of the liquid is less certain, mark as follows; “Flammable Liquid n.o.s. (environmental samples of degraded fuel)”, UN 1993, LTD. QTY. See the attached diagram of a marked cooler.

o. Write the name and address of the shipper and receiver on the cooler or on a securely attached label.

p. Ensure that the strapping tape does not obscure any labels or marking.

q. Ensure that the Shipper’s Declaration For Dangerous Goods (shipping paper) includes the following IATA-required information: Acceptable mode of transport “passenger and cargo aircraft” (mark through “cargo aircraft only”), “non-radioactive” (mark through “radioactive”), proper shipping name “Gasoline Solution” or “Flammable Liquid n.o.s. (environmental samples of degraded fuel)”, “UN 1203” or “UN 1993”, packing group “II”, shipping authorization “Limited Quantity”, hazard class “3”, description of packaging “1 plastic box”, the total quantity of sample, and packing instruction "Y305". See the completed shipping paper attached to this procedure for additional information.

r. Mark the Air Waybill to indicate "Dangerous goods as per the attached Shipper's Declaration". Federal Express Air Waybills have a box that can be checked to indicate this information. Other carriers' forms may require that you enter this information in the handling instructions. Note that some carriers may combine the Shipper's Declaration For Dangerous Goods and the Air Waybill into one document.

s. Provide the carrier with emergency response information. If the carrier is a major carrier such as Federal Express or UPS, this can be done by writing the Emergency Response Guide (current edition)(ERG) # 128 on the Shippers Declaration (these carriers normally have a copy of the ERG in their vehicles). This guide number can be entered in parenthesis after the Proper Shipping Description or in the special instruction section. If other carriers are used or if there is any doubt about the carrier having the ERG, emergency response information must be provided by supplying a copy of the MSDS or the ERG # 128.

6.3 <u>Job Specific Instruction - Shipment of Concentrated Hydrochloric Acid by Air in Limited Quantity</u>

6.3.1 Purpose and applicability: This instruction is intended to assist personnel in the shipping of hydrochloric acid sample preservative. This instruction is applicable to air shipment of hydrochloric acid (18% concentration) in quantities of 500 mL or less. Note that the requirements for air shipment are at least as stringent as those for ground shipment.

6.3.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.3.3 Requirements:

a. Ensure that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.
b. Each outer package must contain no more than 500 mL of acid total.
c. Each inner container must contain no more than 100 mL.
d. Do not re-package the acid, use the bottle provided by the supplier as the inner packaging.
e. Pack the inner package(s) with absorbent material in a tightly closed metal or rigid plastic receptacle (intermediate package).

The quantity of absorbent must be sufficient to absorb the contents of the inner package.

f. Pack the outer package (cooler) with cushioning to prevent breakage of the inner container(s).
g. Ensure that the packed cooler weighs less than 66 pounds.
h. Ensure that documentation is available to prove that the cooler has passed the requirements for Limited Quantity shipment at Section 6.6 of the IATA regulations. A packed cooler must be capable of withstanding a 4 foot drop test onto a rigid, flat surface, in a position most likely to cause the most damage. The cooler must not show any damage likely to affect safety and the inner packages must not leak. The cooler must also be capable of withstanding, without breakage or leakage of inner packages, a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the test cooler). Note that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or sulfuric acid for the project) as an excepted or limited quantity, the lab is required to perform these tests and should be able to provide documentation. If such documentation is not available for the cooler to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.
i. Seal any openings (drain) with tape inside and out.
j. Secure the lid with strapping tape.
k. Place a Class 8 corrosive label on the front of the cooler (see the attached diagram).
l. Apply orientation (this side up) labels on two opposite sides of the cooler.
m. Mark the front of the cooler “Hydrochloric Acid Solution, UN1789, LTD. QTY”
n. Write the name and address of the shipper and receiver on the cooler or on a securely attached label.
o. Ensure that the strapping tape does not obscure any labels or marking.
p. Ensure that the Shipper’s Declaration For Dangerous Goods (shipping paper) includes the following IATA-required information: Acceptable mode of transport “passenger and cargo aircraft” (mark through Cargo Aircraft Only), “Non-radioactive” (mark through radioactive), proper shipping name “Hydrochloric acid solution”, hazard class “8”, UN number “1789”, packing group “II”, description of packaging “1 plastic box (cooler)” and total quantity of acid (must be less than 0.5L), packing instruction “Y809”, authorization “LTD QTY”.

q. Mark the Air Waybill to indicate "Dangerous goods as per the attached Shipper's Declaration". Federal Express Air Waybills have a box that can be checked to indicate this information. Other carriers' forms may require that you enter this information in the handling instructions. Note that some carriers may combine the Shipper's Declaration For Dangerous Goods and the Air Waybill into one document.

r. Provide the carrier with emergency response information. If the carrier is a major carrier such as Federal Express or UPS, this can be done by writing the Emergency Response Guide (current edition)(ERG) # 157 in the handling instructions (these carriers normally have a copy of the ERG in their vehicles). This guide number can be entered in parenthesis after the Proper Shipping Description or in the special instruction section. If there is any doubt about the carrier having the ERG, emergency response information must be provided by supplying a copy of the MSDS or the ERG # 157.

6.4 Job Specific Instruction - Shipment of Calibration Gases by Air

6.4.1 Purpose and applicability: This instruction is intended to assist personnel in the shipment by air of calibration gases for photo ionization detectors, flame ionization detectors, and similar instruments. These calibration gases consist of compressed air with low concentrations (less than 5%) of gases such as isobutylene or methane. This instruction does not apply to gas mixtures that are classified as flammable or toxic. Note that the requirements for air shipment are at least as stringent as those for ground shipment.

6.4.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.4.3 Requirements: **Important note** – compressed gases can be shipped as excepted quantities but the inner packaging must have a water capacity of 30 ml or less, which is much less than the standard calibration cylinder. There is no IATA limited quantity exception for compressed gases (**Note**: DOT has a limited quantity exception at 173.306) so calibration gases in quantities greater than the excepted quantity limits must be shipped in full compliance with all IATA regulations.

a. Ensure that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.

b. Each outer package must contain no more than 75 kg total.
c. Inner packaging (cylinders) must be designed specifically for this purpose.
d. Valves must either be removed from cylinders or covered by a protective cap designed to prevent damage to the valve.
e. Place the inner package(s) (cylinder or cylinders) in a strong outer package. This outer package must be strong enough to survive transport but does not have to be a UN specification package. Note that the requirement for outer packaging is specific to cylinders with water capacities of one liter or less. This is typical for calibration gases.
f. Pack the outer package with cushioning material to prevent movement or damage of the inner container(s) (cylinder) and tightly close the outer container.
g. Place a Class 2 non-flammable gas label on the front of the outer package.
h. Mark the container (or apply a label) “Inside containers comply with prescribed regulations.”
i. Mark the front of the outer package “Compressed gas, n.o.s. (Isobutylene 0.01%, balance air), UN1956”. Note that the parenthetical description must be changed to match the contents. For instance, calibration gas for a flame ionization detector would be (Methane XX%, balance air).
j. Write the name and address of the shipper and receiver on the outer package or on a securely attached label.
k. Ensure that no labels or markings are obscured.
l. Ensure that the Shipper’s Declaration For Dangerous Goods (shipping paper) includes the following IATA-required information: Acceptable mode of transport “passenger and cargo aircraft” (mark through “cargo aircraft only”), “non-radioactive (mark through “radioactive”), proper shipping name “Compressed gas, n.o.s. (Isobutylene 0.01%, balance air)”, identification number “UN1956”, hazard class “2”, description of packaging (description of outer package and total quantity of gas), packing instruction “200”, and CHEMTREC® 24-hour hazardous materials communication service telephone number ((800) 424-9300). Note that the emergency number must be provided for fully regulated shipments. Excepted Quantity and Limited Quantity shipments are not required to include the emergency number.
m. Mark the Air Waybill to indicate “Dangerous goods as per the attached Shipper’s Declaration”. Federal Express Air Waybills have a box that can be checked to indicate this information. Other carriers’ forms may require that you enter this information in the handling instructions. Note that some carriers may combine the Shipper’s Declaration For Dangerous Goods and the Air Waybill into one document.

n. Provide the carrier with emergency response information. If the carrier is a major carrier such as Federal Express or UPS, this can be done by writing the Emergency Response Guide (current edition)(ERG) # 126 on the shipping paper (these carriers normally have a copy of the ERG in their vehicles). This guide number can be entered in parenthesis after the Proper Shipping Description or in the special instruction section. If other carriers are used or if there is any doubt about the carrier having the ERG, emergency response information must be provided by supplying a copy of the MSDS or the ERG # 126.

o. Fax a copy of the Shippers Declaration to the Corporate EC&HS office at 858-826-4360. This must be done for all fully-regulated (not excepted quantity or limited quantity) shipments so that the corporate office will be able to answer questions about the shipment, if the emergency number is called.

6.5 Job Specific Instruction - Shipping of Soil Samples Preserved with Methanol by Air as Excepted Quantity

6.5.1 Purpose and applicability: This instruction is intended to assist field personnel in the shipping of methanol-preserved soil samples collected per SW846 Method 5035. This instruction is applicable to air shipment of soil samples preserved with 30 mL or less of methanol. Note that the requirements for air shipment are at least as stringent as those for ground shipment.

6.5.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.5.3 Requirements:

a. Ensure that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.
b. Close the sample containers securely and secure with tape.
c. Place sample containers inside an intermediate package. A sturdy plastic bag meets the regulatory requirement, a rigid plastic or metal container is preferable.
d. Fill the remaining space in the intermediate packaging with sufficient sorbent to cushion the bottles and absorb their contents if spilled.
e. Close and seal the intermediate package.
f. Limit the total quantity of methanol-preserved samples (soil plus methanol) in the cooler to 500 mL or less. 500 mL is the

maximum quantity allowed in the total package for a Packing Group II flammable liquid.

g. Pack the cooler with cushioning material to prevent breakage of the samples.
h. Ensure that the packed cooler weighs less than 64 pounds (29 kg). DOT has a 64 lb limit. IATA does not have a limit, but some air carriers will refuse the shipment if it is over 64 pounds.
i. Ensure that documentation is available to prove that the cooler has passed the requirements for Excepted Quantity shipment at Section 2.7.9 of the IATA regulations. A packed cooler must be capable of withstanding a 5.9 foot drop test onto a rigid, flat surface. A sample packed cooler must withstand one drop flat on bottom, one drop flat on top, one drop flat on long side, one drop flat on short side, and one drop on a corner at the junction of three intersecting edges. The cooler must not show any damage likely to affect safety and the inner packages must not leak. The cooler must also be capable of withstanding, without breakage or leakage of inner packages, a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the test cooler). Note that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or sulfuric acid for the project) as an excepted quantity, the lab is required to perform these tests and should be able to provide documentation. If such documentation is not available for the cooler to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.
j. Seal any openings (drain) with tape inside and out.
k. Secure the lid with strapping tape.
l. Complete a Dangerous Goods in Excepted Quantities label (see attachment) with signature, title, date, address, hazard class [3], UN number [UN 1230] and place it on the front of the cooler.
m. Apply orientation (this side up) labels on two opposite sides of the cooler.
n. Ensure that the strapping tape does not obscure any labels or marking.
o. Mark the Air Waybill to indicate that the shipment contains dangerous goods but that a Shipper's Declaration is not required. Federal Express Air Waybills have a dangerous goods section with a box indicating "Yes, Shippers Declaration not required" that must be checked. Other carriers' forms may not have this box so it may be necessary to enter this information in the handling instructions. Also enter "Dangerous Goods in Excepted Quantities" on the Air Waybill. Note that the form may not have a

space to enter “Dangerous Good in Excepted Quantities”, so insert this phrase as close as possible to the statement indicating that the shipment includes dangerous goods. If the air carrier has questions, details on excepted quantity shipment can be found in Section 2.7 of the IATA regulations. Complete the remainder of the air waybill just as for any environmental sample shipment.

6.6 <u>Job Specific Instruction- Shipping of Soil Samples Preserved With Methanol by Air under the Limited Quantity Exception</u>

6.6.1 Purpose and applicability: This instruction is intended to assist field personnel in the shipping of methanol-preserved soil samples collected per SW846 Method 5035. This instruction is applicable to air shipment of soil samples preserved with 500 mL or less of methanol. Note that the requirements for air shipment are at least as stringent as those for ground shipment.

6.6.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.6.3 Requirements:

a. Ensure that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.
b. Ensure that each of the inner packagings (sample containers) contains less than 500 mL of material. Close the sample containers tightly and secure.
c. Place the sample containers inside a rigid metal or plastic container (intermediate packaging).
d. Fill the remaining space in the intermediate container with sufficient sorbent to cushion the bottles and absorb their contents if spilled.
e. Close and seal the intermediate package.
f. Limit the total quantity of methanol-preserved samples (soil plus methanol) in the cooler to 1 L or less. 1 L is the maximum quantity allowed in the total package for a Packing Group II flammable liquid.
g. Pack the cooler with cushioning material to prevent breakage of the samples.
h. Ensure that the packed cooler weighs less than 66 pounds (30 kg).
i. Ensure that documentation is available to prove that the cooler has passed the requirements for Limited Quantity shipment at Section 2.8.5 of the IATA regulations. A packed cooler must be

capable of withstanding a 4 foot drop test onto a rigid, flat surface in a position most likely to cause the most damage without showing any damage likely to affect safety or leakage of the inner packagings. The cooler must also be capable of withstanding, without breakage or leakage of inner packages; a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the test cooler). Note that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or sulfuric acid for the project) as an excepted or limited quantity, the lab is required to perform these tests and should be able to provide documentation. If such documentation is not available for the cooler to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.

j. Seal any openings (drain) with tape inside and out.
k. Secure the lid with strapping tape.
l. Place a Class 3 Flammable Liquid label on the front of the cooler.
m. Apply orientation (this side up) labels on two opposite sides of the cooler.
n. Mark the front of the cooler “Methanol solution, UN 1230, LTD. QTY.”
o. Write the name and address of the shipper and receiver on the cooler or on a securely attached label.
p. Ensure that the strapping tape does not obscure any labels or marking.
q. Ensure that the Shipper’s Declaration For Dangerous Goods (shipping paper) includes the following IATA-required information: Acceptable mode of transport “passenger and cargo aircraft” (mark through “cargo aircraft only”), “non-radioactive” (mark through “radioactive”), proper shipping name “Methanol solution, identification number “UN1230”, hazard class “3”, description of packaging (description of outer package and the total quantity of samples), and packing instruction “Y305”.
r. Mark the Air Waybill to indicate “Dangerous goods as per the attached Shipper’s Declaration”. Federal Express Air Waybills have a box that can be checked to indicate this information. Other carriers’ forms may require that you enter this information in the handling instructions. Note that some carriers may combine the Shipper’s Declaration For Dangerous Goods and the Air Waybill into one document.
s. Provide the carrier with emergency response information. If the carrier is a major carrier such as Federal Express or UPS, this can be done by writing the Emergency Response Guide (current

edition)(ERG) # 131 on the shipping paper (these carriers normally have a copy of the ERG in their vehicles). This guide number can be entered in parenthesis after the Proper Shipping Description or in the special instruction section. If other carriers are used or if there is any doubt about the carrier having the ERG, emergency response information must be provided by supplying a copy of the MSDS or the ERG # 131.

6.7 Job Specific Instruction - Shipping of Soil Samples Preserved with Sodium Bisulfate by Air as Excepted Quantity

6.7.1 Purpose and applicability: This instruction is intended to assist field personnel in the shipping of sodium bisulfate-preserved soil samples collected per SW846 Method 5035. This instruction is applicable to air shipment of soil samples preserved with 30 mL or less of sodium bisulfate. Note that the requirements for air shipment are at least as stringent as those for ground shipment.

6.7.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.7.3 Requirements:

a. Ensure that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements
b. Close the sample containers tightly and secure.
c. Place sample containers inside an intermediate package. A sturdy plastic bag meets the regulatory requirement, a rigid plastic or metal container is preferable.
d. Fill the remaining space in the intermediate package with sufficient sorbent to absorb the samples if released.
e. Close and seal the intermediate package.
f. Limit the total quantity of sodium bisulfate-preserved samples (soil plus sodium bisulfate) in the cooler to 500 mL or less. 500 mL is the maximum quantity allowed in the total package for a Packing Group II corrosive material.
g. Pack the cooler with cushioning material to prevent breakage of the samples.
h. Ensure that the packed cooler weighs less than 64 pounds (29 kg). DOT has a 64 lb limit. IATA does not have a limit, but some air carriers will refuse the shipment if it is over 64 pounds.
i. Ensure that documentation is available to prove that the cooler has passed the requirements for Excepted Quantity shipment at Section 2.7.9 of the IATA regulations. A packed cooler must be

capable of withstanding a 5.9 foot drop test onto a rigid, flat surface. A sample packed cooler must withstand one drop flat on bottom, one drop flat on top, one drop flat on long side, one drop flat on short side, and one drop on a corner at the junction of three intersecting edges. The cooler must not show any damage likely affect safety and the inner packages must not leak. The cooler must also be capable of withstanding, without breakage or leakage of inner packages, a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the test cooler). Note that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or sulfuric acid for the project) as an excepted quantity, the lab is required to perform these tests and should be able to provide documentation. If such documentation is not available for the cooler to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.

j. Seal any openings (drain) with tape inside and out.
k. Secure the lid with strapping tape.
l. Complete a Dangerous Goods in Excepted Quantities label (signature, title, date, address, hazard class [8], UN number [2837]) and place it on the front of the cooler. The label should be available from the carrier.
m. Apply orientation (this side up) labels on two opposite sides of the container.
n. Ensure that the strapping tape does not obscure any labels or marking.
o. Mark the Air Waybill to indicate that the shipment contains dangerous goods but that a Shipper's Declaration is not required. Federal Express Air Waybills have a dangerous goods section with a box indicating "Yes, Shippers Declaration not required" that must be checked. Other carriers' forms may not have this box so it may be necessary to enter this information in the handling instructions. Also enter "Dangerous Goods in Excepted Quantities" on the Air Waybill. Note that the form may not have a space to enter "Dangerous Good in Excepted Quantities", so insert this phrase as close as possible to the statement indicating that the shipment includes dangerous goods. If the air carrier has questions, details on excepted quantity shipment can be found in Section 2.7 of the IATA regulations. Complete the remainder of the air waybill just as for any environmental sample shipment.

6.8 Job Specific Instruction - Shipping of Soil Samples Preserved with Sodium Bisulfate by Air Under Limited Quantity Exception

6.8.1 Purpose and applicability: This instruction is intended to assist field personnel in the shipping of sodium bisulfate-preserved soil samples collected per SW846 Method 5035. This instruction is applicable to air shipment of soil samples preserved with 500 mL or less of sodium bisulfate. Note that the requirements for air shipment are at least as stringent as those for ground shipment.

6.8.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.8.3 Requirements:

a. Ensuring that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.
b. Ensure that each of the inner packagings (sample containers) contains less than 500 mL of material. Close the sample containers tightly and secure.
c. Place the sample containers inside one or more rigid plastic or metal containers (intermediate packaging).
d. Fill the remaining space in the intermediate packaging with sufficient sorbent to cushion the bottles and absorb their contents if spilled.
e. Close and seal the intermediate package.
f. Limit the total quantity of preserved samples (soil plus preservative) in the cooler to 1 L or less. 1 L is the maximum quantity allowed in the total package for a Packing Group II corrosive material.
g. Pack the cooler with cushioning material to prevent breakage of the samples.
h. Ensure that the packed cooler weighs less than 66 pounds (30 kg).
i. Ensure that documentation is available to prove that the cooler has passed the requirements for Limited Quantity shipment at Section 2.8.5 of the IATA regulations. A packed cooler must be capable of withstanding a 4 foot drop test onto a rigid, flat surface in a position most likely to cause the most damage without showing any damage likely to affect safety or leakage of the inner packagings. The cooler must also be capable of withstanding, without breakage or leakage of inner packages; a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the

test cooler). Note that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or sulfuric acid for the project) as an excepted or limited quantity, the lab is required to perform these tests and should be able to provide documentation. If such documentation is not available for the cooler to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.

j. Seal any openings (drain) with tape inside and out.
k. Secure the lid with strapping tape.
l. Place a Class 8 Corrosive Material label on the front of the cooler.
m. Apply orientation (this side up) labels on two opposite sides of the container.
n. Mark the front of the cooler “Bisulfate, aqueous solution, UN 2837, LTD. QTY.”
o. Write the name and address of the shipper and receiver on the cooler or on a securely attached label.
p. Ensure that the strapping tape does not obscure any labels or marking.
q. Ensure that the Shipper’s Declaration For Dangerous Goods (shipping paper) includes the following IATA-required information: Acceptable mode of transport “passenger and cargo aircraft” (mark through “cargo aircraft only”), “non-radioactive” (mark through “radioactive”), proper shipping name “Bisulfates, aqueous solution, identification number “UN2837”, hazard class “8”, description of packaging “1 plastic box” and the total quantity of samples, and packing instruction “Y809”.
r. Mark the Air Waybill to indicate “Dangerous goods as per the attached Shipper’s Declaration”. Federal Express Air Waybills have a box that can be checked to indicate this information. Other carriers’ forms may require that you enter this information in the handling instructions. Note that some carriers may combine the Shipper’s Declaration For Dangerous Goods and the Air Waybill into one document.
s. Provide the carrier with emergency response information. If the carrier is a major carrier such as Federal Express or UPS, this can be done by writing the Emergency Response Guide (current edition)(ERG) # 154 on the shipping paper (these carriers normally have a copy of the ERG in their vehicles). This guide number can be entered in parenthesis after the Proper Shipping Description or in the special instruction section. If other carriers are used or if there is any doubt about the carrier having the ERG, emergency response information must be provided by supplying a copy of the MSDS or the ERG guide.

6.9 Job Specific Instruction – Shipping of Biological Samples Preserved With Ethanol by Air Under Limited Quantity Exception

6.9.1 Purpose and applicability: This instruction is intended to assist field personnel in the shipping of ethanol-preserved biota samples. This instruction is applicable to air shipment of plant or animal samples preserved with 500 mL or less of ethanol. Note that the requirements for air shipment are at least as stringent as those for ground shipment.

6.9.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific. The safety training requirement is met by current Hazardous Waste training. The DOT general awareness and function specific training requirements can be met by attending specialized DOT training or by internal SAIC (documented) communication.

6.9.3 Requirements:

a. Ensuring that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.
b. Ensure that each of the inner packagings (sample containers) contains less than 500 mL of material. Close the sample containers tightly and secure.
c. Place the inner packaging (bottles) inside a rigid plastic or metal container (intermediate packaging) with sufficient sorbent to absorb the liquid.
d. Close and seal the intermediate package.
e. Place the intermediate container(s) inside a cooler or other sturdy container capable of withstanding the planned shipment.
f. Fill the remaining space in the cooler with sufficient cushioning material to prevent movement of the intermediate container(s).
g. Limit the total quantity of preservative in the cooler to 1 L or less. 1 L is the maximum quantity allowed in the total package for a Packing Group II flammable liquid.
h. Ensure that the packed cooler weighs less than 66 pounds (30 kg).
i. Ensure that documentation is available to prove that the cooler has passed the requirements for Limited Quantity shipment at Section 2.8.5 of the IATA regulations. A packed cooler must be capable of withstanding a 4 foot drop test onto a rigid, flat surface in a position most likely to cause the most damage without showing any damage likely to affect safety or leakage of the inner packagings. The cooler must also be capable of withstanding,

without breakage or leakage of inner packages, a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the test cooler). **Note:** that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or sulfuric acid for the project) as an excepted or limited quantity, the lab is required to perform these tests and should be able to provide documentation. If such documentation is not available for the cooler to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.

j. Seal any openings (drain) with tape inside and out.
k. Secure the lid with strapping tape.
l. Place a Class 3 Flammable Liquid label on the front of the cooler.
m. Apply orientation (this side up) labels on two opposite sides of the cooler.
n. Mark the front of the cooler “Ethanol solution, UN 1170, LTD. QTY.”
o. Write the name and address of the shipper and receiver on the cooler or on a securely attached label.
p. Ensure that the strapping tape does not obscure any labels or marking.
q. Ensure that the Shipper’s Declaration For Dangerous Goods (shipping paper) includes the following IATA-required information: Acceptable mode of transport “passenger and cargo aircraft” (mark through “cargo aircraft only”), “non-radioactive” (mark through “radioactive”), proper shipping name “Ethanol solution”, identification number “UN1170”, hazard class “3”, description of packaging “1 plastic box” and the total quantity of samples, and packing instruction “Y305”.
r. Mark the Air Waybill to indicate “Dangerous goods as per the attached Shipper’s Declaration”. Federal Express Air Waybills have a box that can be checked to indicate this information. Other carriers’ forms may require that you enter this information in the handling instructions. Note that some carriers may combine the Shipper’s Declaration For Dangerous Goods and the Air Waybill into one document.
s. Provide the carrier with emergency response information. If the carrier is a major carrier such as Federal Express or UPS, this can be done by writing the Emergency Response Guide (current edition)(ERG) # 127 on the Shippers Declaration (these carriers normally have a copy of the ERG in their vehicles). This guide number can be entered in parenthesis after the Proper Shipping Description or in the special instruction section. If other carriers

are used or if there is any doubt about the carrier having the ERG, emergency response information must be provided by supplying a copy of the MSDS or the ERG # 127.

6.10 Job Specific Instruction - Shipping of Pre-Preserved (Un-used) Sample Containers by Air as Excepted Quantity

6.10.1 Purpose and applicability: This instruction is intended to assist field personnel in the shipping of sample containers pre-preserved with corrosive materials. This instruction is applicable to air shipment of containers with less than 30 mL of preservative. Note that this instruction is appropriate for un-used sample containers (empty except for preservative). Note that the requirements for air shipment are at least as stringent as those for ground shipment. Note that pre-preserved sample containers with nitric acid may not be shipped by air under the limited quantity exception, but may still be shipped as fully regulated materials.

6.10.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.10.3 Requirements:

a. Ensuring that the proposed shipping company is contacted prior to shipment to verify that the anticipated shipping method (packaging, marking, labeling, classification) meets their understanding of the current regulatory requirements and any shipper-specific requirements.
b. Verify that the sample containers are tightly closed.
c. Place sample containers inside an intermediate package. A heavy plastic bag or rigid plastic or metal container meets this requirement.
d. Fill the remaining space in the intermediate package with cushioning/sorbent. If the bottles are already nestled in foam or interlocked cardboard sleeves, place the bottles and this cushioning inside a heavy plastic bag.
e. Close and seal the intermediate package.
f. Limit the total quantity of preservative to 500 mL or less. 500 mL is the maximum quantity allowed in the total package for a Packing Group II corrosive material.
g. Pack the cooler or box with cushioning material to prevent breakage of the bottles.
h. Ensure that the packed container weighs less than 64 pounds (29 kg). DOT has a 64 lb limit. IATA does not have a limit, but some air carriers will refuse the shipment if it is over 64 pounds.
i. Ensure that documentation is available to prove that the container has passed the requirements for Excepted Quantity shipment at

Section 2.7.9 of the IATA regulations. A packed container must be capable of withstanding a 5.9 foot drop test onto a rigid, flat surface. A sample packed cooler must withstand one drop flat on bottom, one drop flat on top, one drop flat on long side, one drop flat on short side, and one drop on a corner at the junction of three intersecting edges. It must not show any damage likely affect safety and the inner packages must not leak. It must also be capable of withstanding, without breakage or leakage of inner packages, a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the test container). Note that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or sulfuric acid for the project) as an excepted quantity, the lab is required to perform these tests and should be able to provide documentation. If such documentation is not available for the container to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.

j. Seal any openings (drain) with tape inside and out.
k. Secure the lid with strapping tape.
l. Complete a Dangerous Goods in Excepted Quantities label (signature, title, date, address, hazard class [8], UN number (hydrochloric acid is 1789, sulfuric acid is 1830, sodium hydroxide is 1823) and place it on the front of the container. The label should be available from the carrier.
m. Apply orientation (this side up) labels on two opposite sides of the container.
n. Ensure that the strapping tape does not obscure any labels or marking.
o. Mark the Air Waybill to indicate that the shipment contains dangerous goods but that a Shipper’s Declaration is not required. Federal Express Air Waybills have a dangerous goods section with a box indicating “Yes, Shippers Declaration not required” that must be checked. Other carriers’ forms may not have this box so it may be necessary to enter this information in the handling instructions. Also enter “Dangerous Goods in Excepted Quantities” on the Air Waybill. Note that the form may not have a space to enter “Dangerous Good in Excepted Quantities”, so insert this phrase as close as possible to the statement indicating that the shipment includes dangerous goods. If the air carrier has questions, details on excepted quantity shipment can be found in Section 2.7 of the IATA regulations. Complete the remainder of the air waybill just as you would for any environmental sample shipment.

6.11 Job Specific Instruction - Shipping of Nitric Acid Pre-Preserved (Un-used) Sample Containers by Ground under the DOT Small Quantity Exception.

6.11.1 Purpose and applicability: This instruction is intended to assist field personnel in the shipping of unused sample containers (empty except for preservative) pre-preserved with less than 30 mL nitric acid per container by ground using the small quantity exception.

6.11.2 Qualifications: DOT/IATA training: Safety, General Awareness, and Function Specific.

6.11.3 Requirements:

a. Verify that the sample containers are tightly closed and positively sealed with tape, wire or by other means.
b. Place sample containers inside an intermediate package. A heavy plastic bag or rigid plastic or metal container meets this requirement.
c. Fill the remaining space in the intermediate package with cushioning/sorbent. If the bottles are already nestled in foam or interlocked cardboard sleeves, place the bottles and this cushioning inside a heavy plastic bag.
d. Close and seal the intermediate package.
e. Limit the total quantity of preservative to 500 mL or less. 500 mL is the maximum quantity allowed in the total package for a Packing Group II corrosive material.
f. Pack the cooler or box with cushioning material to prevent breakage of the bottles.
g. Ensure that the packed container weighs less than 64 pounds (29 kg). DOT has a 64 lb limit.
h. Ensure that documentation is available to prove that the container has passed the requirements for the small quantity exception shipping at 49CFR173.4 of the DOT regulations. A packed container must be capable of withstanding a 5.9 foot drop test onto a rigid, flat surface. A sample packed cooler must withstand one drop flat on bottom, one drop flat on top, one drop flat on long side, one drop flat on short side, and one drop on a corner at the junction of three intersecting edges. It must not show any damage likely affect safety and the inner packages must not leak. It must also be capable of withstanding, without breakage or leakage of inner packages, a force applied to the top surface for 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 meters (including the test container). Note that if the shipment will be made in a cooler supplied by a lab, and the lab used the cooler to ship preservatives (hydrochloric or nitric acid for the project) as an excepted quantity, the lab is required to

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perform these tests and should be able to provide documentation. If such documentation is not available for the container to be used, or if the type and quantity of contents used by the lab to test the cooler is significantly different from the type and quantity of contents to be shipped, it is acceptable for the SAIC field crew to perform and document these tests in the field.

i. Seal any openings (drain) with tape inside and out.
j. Secure the lid with strapping tape.
k. Apply orientation (this side up) labels on two opposite sides of the container.
l. Cooler must be marked with statement **"This package conforms to 49 CFR 173.4."**
m. No hazardous materials shipping papers are required
n. No hazard labels or other identification markings are needed
o. Ensure that the strapping tape does not obscure any labels or marking.

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

8.1 ATTACHMENT I - Shipper's Declaration for Dangerous Goods for Gasoline Samples

8.2 ATTACHMENT II - Airbill for Gasoline Samples

8.3 ATTACHMENT III - Excepted Quantities Label from IATA Section 2.7, Figure 2.7.B. for Soil Samples Preserved With Methanol

8.4 ATTACHMENT IV – Packaging for Limited Quantity Shipment of Degraded Fuel Samples.

9.0 OTHER SOURCES OF INFORMATION

9.1 Federal Express- Phone: 1-800-463-3339 or 1-901-344-3000, Website: http://www.fedex.com/. R

9.2 Federal Express Ground Hazardous Materials Shipping Guide http://images.fedex.com/us/services/pdf/HazmatShippingGuide.pdf?link=4

9.3 DOT's Office of Hazardous Materials Safety – Phone: 1-800-467-4922, Website: http://hazmat.dot.gov

9.4 Emergency Response Guidebook – http://hazmat.dot.gov/pubs/erg/gydebook.htm

ATTACHMENT I
Shipper's Declaration for Dangerous Goods for Gasoline Samples

SHIPPER'S DECLARATION FOR DANGEROUS GOODS	(Provide at least three copies to FedEx Express)
Shipper SAIC Division XXXX 151 Lafayette Oak Ridge TN 37831	Air Waybill No. 83845783 Page 1 of 1 Pages Shippers Reference Number 01-0321-00-2904-222
Consignee John Client 1234 Abbey Road Hampton VA 28384	FedEx
Two completed and signed copies of this Declaration must be handed to the operator. TRANSPORT DETAILS This shipment is within the limitations prescribed for: PASSENGER AND CARGO AIRCRAFT / ~~CARGO AIRCRAFT ONLY~~ Airport of Departure TYS	WARNING Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder, or an IATA cargo agent.
Airport of Destination: ORF	Shipment type: (delete non-applicable) NON-RADIOACTIVE / ~~RADIOACTIVE~~

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification					Quantity and Type of Packing	Packing Inst.	Authorization
Proper Shipping Name	Class or Division	UN or ID No.	Pack-ing Group	Subsi-diary Risk			
Gasoline solution	3	UN 1203	II	----	1 plastic box X 0.4L	Y305	LTD QTY

Additional Handling Information

Emergency response information – ERG 128

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable International and National Governmental Regulations.	Name/Title of Signatory John Doe/Field Manager Place and Date Oak Ridge, TN June 30, 2003 Signature (See warning above) *John Doe*

IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT

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ATTACHMENT II
Airbill for Gasoline Samples

FedEx USA Airbill   FedEx Tracking Number 812760227090   Form ID No. 0200   Sender's Copy

1 From *Please print and press hard*

Date   Sender's FedEx Account Number XXXX-XXXX-X

Sender's Name John Doe   Phone (865) 481-4755

Company SAIC

Address 1234 Anyroad   Dept/Floor/Suite/Room

City Anytown   State XX   Zip XXXXX

2 Your Internal Billing Reference
First 24 characters will appear on invoice.   XX XXXX XX XXXX XXX

3 To
Recipient's Name John Client   Phone (404) 123-4567

Company John's employer

Address 1234 Waste Avenue
We cannot deliver to P.O. Boxes or P.O. ZIP codes.   Dept/Floor/Suite/Room

To "HOLD" at FedEx location, Print FedEx address here.

City Atlanta   State GA   Zip 30341

Questions? Call 1•800•Go•FedEx® (800-463-3339)
Visit our Web site at www.fedex.com

By using this Airbill you agree to the service conditions on the back of this Airbill and in our Current Service Guide, including terms that limit our liability.

4a Express Package Service — ***Packages up to 150 lbs.***
Delivery commitment may be later in some areas.
- ☐ FedEx Priority Overnight — Next business morning
- ☒ FedEx Standard Overnight — Next business afternoon
- ☐ FedEx First Overnight — Earliest next business morning. Delivery to select locations
- ☐ FedEx 2Day* — Second business day
- ☐ FedEx Express Saver* — Third business day

**FedEx Letter Rate not available*
Minimum charge: One-pound rate

4b Express Freight Service — ***Packages over 150 lbs.***
Delivery commitment may be later in some areas.
- ☐ FedEx 1Day Freight* — Next business day
- ☐ FedEx 2Day Freight — Second business day
- ☒ FedEx 3Day Freight — Third business day

*Call for Confirmation:

5 Packaging — ****Declared value limit $500***
- ☐ FedEx Letter*
- ☐ FedEx Pak*
- ☒ Other Pkg. Includes FedEx Box, FedEx Tube, And customer pkg.

6 Special Handling
- ☐ **Saturday Delivery** Available for FedEx Priority Overnight and FedEx 2 Day to select ZIP codes
- ☐ **Sunday Delivery** Available for FedEx Priority Overnight to select ZIP codes
- ☐ **HOLD Weekday** at FedEx Location Not available with FedEx First Overnight
- ☐ **Hold Saturday** at FedEx Location Available for FedEx Priority Overnight and FedEx 2Day to select locations

~~Does this shipment~~ contain dangerous goods?
One box must be checked.
- ☐ No
- ☒ Yes As per attached Shipper's Declaration
- ☐ Yes Shipper's Declaration not required
- ☐ Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous Goods cannot be shipped in Fed Ex Packaging   ☐ Cargo Aircraft Only

7 Payment *Bill to:*   Enter FedEx Acct. No. or Credit Card No. below
- ☐ Sender Acct. No. in Section 1 Will be billed
- ☐ Recipient
- ☐ Third Party
- ☐ Credit Card
- ☐ Cash/Check

FedEx Acct. No. Credit Card No.   Exp. Date

Total Packages	Total Weight	Total Declared Value†
1	50 lb	

Fed Ex Use Only

†Our liability is limited to $100 unless you declare a higher value. See back for details.

8 Release Signature *Sign to authorize delivery without ob[...]ure.*   360

By signing you authorize us to deliver this shipment without obtaining a signature and agree to indemnify and hold us harmless from any resulting claims.

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ATTACHMENT III
Excepted Quantities Label from IATA Section 2.7, Figure 2.7.B. for Soil Samples Preserved With Methanol
The actual label must conform in shape, color, format & text to IATA Figure 2.7.B

DANGEROUS GOODS IN EXCEPTED QUANTITIES

This package contains dangerous goods in excepted small quantities and is in all respects in compliance with the applicable international and national government regulations and the IATA Dangerous Goods Regulations

John Doe

Signature of Shipper

Field manager *11/18/2000*

Title Date

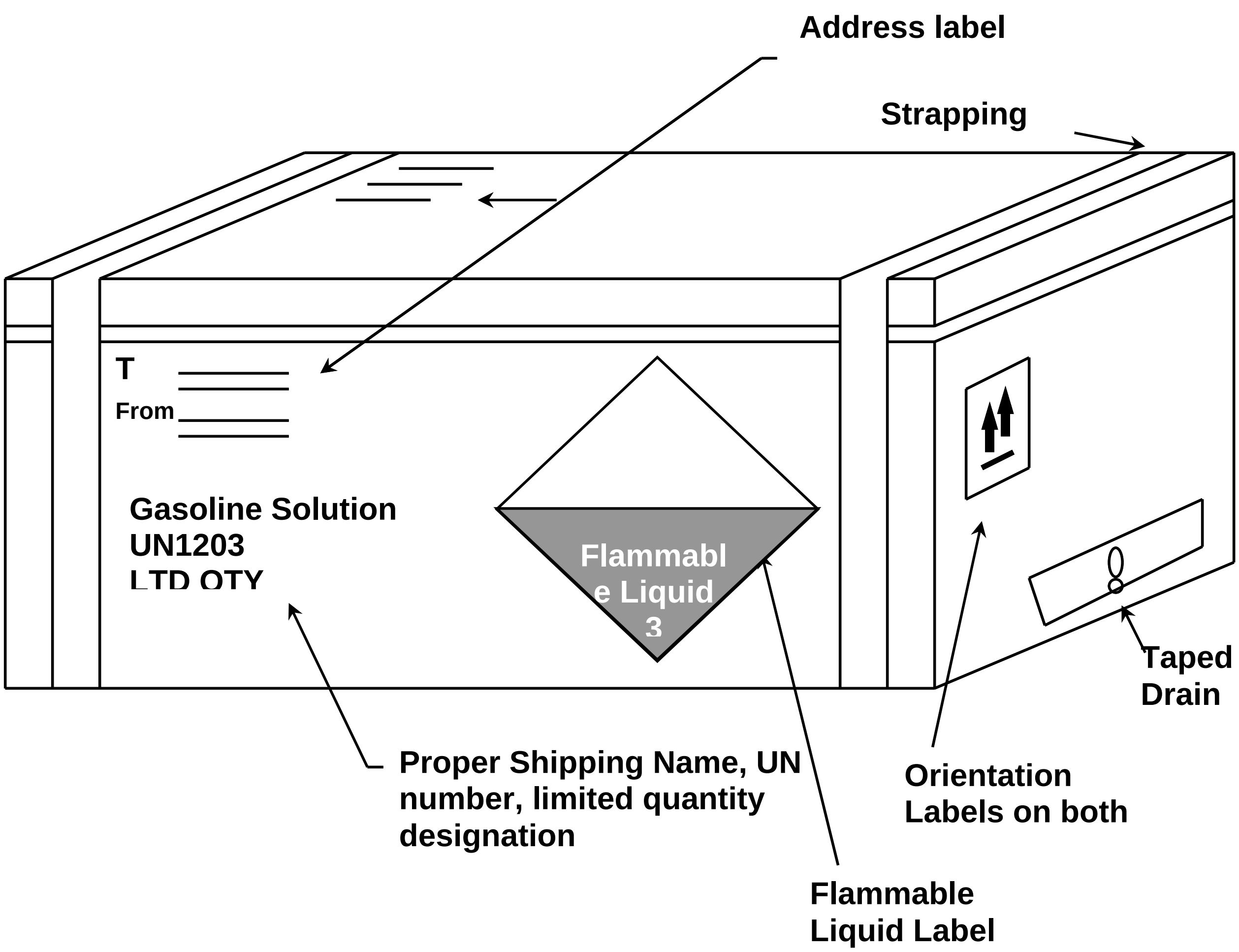
SAIC Division XXXX
1234 Anyroad

Anytown, Anystate, XXXXX

Name and address of Shipper

This package contains substance(s) in Class(es)

ATTACHMENT IV
Packaging for Limited Quantity Shipment of Degraded Fuel Samples.



SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-750

Revision Number: **6**

Date Printed: ____________

Person Checking the Revision Number: ____________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Field Measurement Procedures: Operation of Organic Vapor Detectors			
Procedure No: FTP-750	Revision: 6	Date: 11/18/2008	
Business Unit General Manager: Date: A L Arumski 12/8/08		QA/QC Officer: Date: C. D. Cowart 11/18/2008	

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1.0 PURPOSE

The purpose of this procedure is to outline the methods of detecting and/or measuring organic vapors with direct reading instruments such as photoionization detectors and flame ionization detectors.

2.0 SCOPE

This procedure is meant to serve as a guide to instrument operations. It does not indicate that this is the generally preferred method or instrument type. Specific calibration, operation and maintenance requirements are in the manufacturer's operating instructions. Data obtained from these instruments can be qualitative or quantitative.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.1.3 Science Applications International Corporation Quality Assurance Administrative Procedure (SAIC QAAP) 12.1, Control of Measuring and Test Equipment.

3.1.4 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, DHHS (NIOSH) Publication No. 85-115.

3.2 DEFINITIONS

None

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager or designee is responsible for:

4.2.1 ensuring compliance with the Sampling and Analysis Plan (SAP);

4.2.2 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable; and

4.2.3 overall management of field activities.

5.0 GENERAL

5.1 Any deviations from specified requirements will be justified and authorized by the Project Manager and/or the relevant Program Manager, and will be sufficiently documented on the appropriate field change forms to allow re-creation of the modified process.

5.2 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.3 Refer to the SAP for project/task-specific sampling and analysis requirements.

5.4 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project Manager for records purposes.

5.5 The manufacturer's operating instructions are present for each instrument on site.

5.6 A number of field instrument methods are available for detecting and/or measuring organic vapors. These include, but are not limited to, instruments equipped with flame ionization detectors (FIDs) or photoionization detectors (PIDs). These instruments can be used to detect organic vapors in depressions or confined spaces, to screen drums or other containers for the presence of trapped vapors, or to assess an area for elevated levels of volatile organics.

5.7 Guidelines presented in QAAP 12.1, "Control of Measuring and Test Equipment" will be followed for identification, storage, and documentation of the use and calibration of the organic vapor detection instrument.

5.8 Response factors and any general user maintenance performed for the instrument will be recorded.

5.9 An optional field checklist is provided immediately following this procedure for the Project Manager's use during mobilization. R

6.0 <u>PROCEDURE</u>

6.1 Choose an instrument that is consistent with investigative requirements (i.e., verify known contaminants and that the instrument used can detect the contaminant. See requirements in the H&S Plan and the SAP.

6.2 Operate the instrument per the manufacturer's instructions.

6.3 Check and, if necessary, adjust instrument calibration as per manufacturer's instructions at routine intervals. For most organic vapor detectors (PID, FID) this must be done at least once for each day's use. The calibration of an organic vapor detector is performed by exposing the instrument to a known (traceable) gas source and verifying, or correcting, instrument response to ±5% of the concentration of the test gas.

6.4 Perform the required measurements. If the measurements are intended to estimate worker exposure, follow the requirements of the H&S Plan. Collect sufficient readings to adequately assess and document potential exposures. Measurement locations will include breathing zone ($\leq$ 14 inch half circle radius in front of the shoulder), worst-case locations such as at the mouth of augers, well casings and at the bottom of trenches, and at the perimeter of the work area if offsite exposures are of concern. If measurements are zero or below the exposure limit, and there is an identifiable source, such as a borehole, it is acceptable to take most readings at the borehole with only an occasional measurement in breathing zone(s). This approach assumes that if the concentration at the source is below the exposure limit, then the concentration in a worker's breathing zone, which is further from the source, will also be less than the exposure limit. Note that the exposure limits or action levels in the H&S Plans typically refer to the concentrations in the breathing zone.

6.5 Organic vapor detectors are broad range detectors that give an indication that there are organic vapors present. Another method is required to identify the contaminants.

6.6 Record calibration data in an official project logbook such as a Measuring and Test Equipment logbook, H&S logbook, or geologist's logbook. This data must include; name of person performing calibration, name and number of instrument, type and concentration of calibration gas, lot number of calibration gas, date of calibration, instrument reading when exposed to calibration gas, amount of adjustment (if any), post-adjustment instrument reading (only if adjustment is necessary), and time of calibration if calibration is performed more than once per day.

6.7 Record field measurements in appropriate logbooks. The recorded information must include, as a minimum: name of person performing measurement, instrument project identifier, reading(s), date, time, and the specific location(s). Examples of specific locations include: headspace of sample no. xxx, 5 inches from top of auger at soil boring no. 4, at the mouth of soil boring no. 30, in breathing zone of driller, etc. Note that for repetitive measurements at the same location with essentially the same results, this information can be condensed by recording the detailed information once per uninterrupted work period (day, morning, half hour, etc.) and stating that the measurements were repeated at specific intervals with no change in results. The data and related narrative must be sufficient to demonstrate to a third party that the worker exposures were less than the exposure limits or that overexposures were detected and corrected.

6.8 If extremely high concentrations are encountered, verify that the instrument is still operating properly (i.e., check that the background reading is zero) before continued use of the instrument. Note: any equipment problem or environmental factors that may influence meter readings.

7.0 RECORDS

Documentation generated as a result of implementing this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None. R

Field Checklist

- ☐ Portable Survey Instrument
- ☐ Calibration Standard
- ☐ Pipe Cleaners
- ☐ Safety Glasses or Monogoggles
- ☐ Gloves
- ☐ Safety Shoes
- ☐ Logbook
- ☐ Black Indelible Pen
- ☐ Decontamination Equipment
- ☐ Sampling and Analysis Plan (SAP)
- ☐ Health and Safety Plan (HASP)
- ☐ Manufacturer’s Instrument Calibration and Maintenance Manual
- ☐ Instrument-specific Calibration Assembly

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-752

Revision Number: **4**

Date Printed: ____________________

Person Checking the Revision Number: ____________________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Field Measurement Procedures: Combustible Gas Detection			
Procedure No: FTP-752	Revision: 4	Date: 11/18/2008	Page 1 of 4
Business Unit General Manager: Date:	12/8/08	QA/QC Officer: C. D. Cowart	Date: 11/18/2008

R

1.0 PURPOSE

The purpose of this procedure is to describe the methods of detecting and/or measuring combustible gases.

2.0 SCOPE

This procedure serves to provide guidance in calibrating and operating a combustible gas detection meter.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.1.3 Science Applications International Corporation Quality Assurance Administrative Procedure (SAIC QAAP) 12.1, Control of Measuring and Test Equipment.

3.2 DEFINITIONS

3.2.1 Lower Explosive Limit (LEL) - The minimum concentration of a particular combustible gas in air that will burn and continue to burn when ignited.

3.2.2 Upper Explosive Limit (UEL) - The maximum concentration of a particular combustible gas in air that will burn and continue to burn when ignited.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring compliance with the Sampling and Analysis Plan (SAP);

4.2.2 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable; and

4.2.3 overall management of field activities.

5.0 GENERAL

5.1 Any deviations from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager and should be documented on the appropriate field change forms.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements regarding personnel safety and exposure limits. R

5.4 Refer to the SAP for project/task-specific sampling and analysis requirements.

5.5 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project Manager. R

5.6 The manufacturer’s operating instructions shall be available for each instrument on site.

5.7 This instrument should be intrinsically safe.

5.8 Some combustible gas sensors are designed to measure combustible gas or vapor content in air. These will not indicate the combustible gas content in an inert gas background, furnace stack, or in other atmospheres with less than 16% oxygen.

5.9 These instruments should not be used where the oxygen concentration exceeds that of fresh air (i.e., oxygen enriched atmosphere) because the extra oxygen makes any combustible mix easier to ignite and, thus, more dangerous.

5.10 Certain materials such as silicone, silicates, and organic lead compounds may tend to poison a combustible gas sensor, thereby causing erroneously low readings. Calibration checks should be made frequently if such materials are suspected to be present in the tested atmosphere.

5.11 A combustible gas sensor will not indicate the presence of combustible airborne mists or dusts such as lubricating oils, coal dust, or grain dust.

5.12 Before each day's usage (every 8 hours), sensitivity must be tested on a known concentration of each of the gases for which the instrument is calibrated. If the instrument is not adequately calibrated according to manufacturer's specification, it must be recalibrated.

5.13 The sample inlet filter should be examined each time the instrument is recharged, if appropriate. If the filter element appears to be coated with dust or dirt, it should be properly cleaned, dried, and reinserted or a new element substituted.

5.14 An optional field equipment checklist is provided as a full size form immediately following this procedure.

6.0 PROCEDURE

6.1 Choose an instrument that is consistent with investigative requirements.

6.2 See the manufacturer's operating instructions prior to use. Operate the instrument as per manufacturer's instructions including the daily calibration and note in the field logbook which instrument is being used, date of calibration, calibration standard descriptions, and post-calibration results. Also note in the field logbook the method of calibration if more than one choice exists.

6.3 Follow the guidelines in procedure QAAP 12.1, "Control of Measuring and Test Equipment" for the identification, handling, storage, and documentation of controlled use and calibration of the instrument. R

6.4 Check the last calibration date to determine if it is current. Return the instrument to the calibration lab if the calibration is out of date.

6.5 Record measurements in the appropriate field logbook.

R

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None. R

Field Checklist

- ☐ Portable Survey Instrument
- ☐ Calibration Standard
- ☐ Pipe Cleaners
- ☐ Safety Glasses or Monogoggles
- ☐ Gloves
- ☐ Safety Shoes
- ☐ Logbook
- ☐ Black Indelible Pen
- ☐ Manufacturer’s Instrument Calibration and Maintenance Manual
- ☐ Calibration Equipment (e.g., tubing, regulators, screwdrivers, etc.)
- ☐ Sampling Logbook
- ☐ Decontamination Equipment
- ☐ Health and Safety Plan
- ☐ Sampling and Analysis Plan

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-880

Revision Number: 5

Date Printed: ______________________

Person Checking the Revision Number: ______________________

<table>
<tr><td colspan="4">SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE</td></tr>
<tr><td colspan="4">Title: Field Measurement Procedures: pH, Temperature, Salinity, and Conductivity</td></tr>
<tr><td>Procedure No: FTP-880</td><td>Revision: 5</td><td>Date:11/18/2008</td><td>Page 1 of 3</td></tr>
<tr><td colspan="2">Business Unit General Manager: Date:
[signature] 12/8/08</td><td colspan="2">QA/QC Officer: Date:
C. G. Conant 11/18/2008</td></tr>
</table>

R

1.0 PURPOSE

The purpose of this procedure is to establish guidelines for the uniform calibration and use of pH, temperature, salinity, and conductivity meters.

2.0 SCOPE

This procedure applies to all pH, temperature, salinity and conductivity meters. It is not necessary that one instrument be capable of measuring all four parameters (i.e., pH, temperature, salinity, and conductivity).

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.2 DEFINITIONS

3.2.1 Buffer Solution - Commercially prepared standard solutions with known pH concentrations. Solutions are traceable to the manufacturer by lot number or similar documentation.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.2 ensuring compliance with the Sampling and Analysis Plan (SAP); and

R

4.2.3 overall management of field activities.

5.0 GENERAL

5.1 Any deviation from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager and should be documented on the appropriate field change forms.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.4 Refer to the SAP for project/task-specific sampling and analysis requirements.

5.5 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project Manager. R

5.6 The manufacturer's operating instructions should be available in the field for the instrument used.

5.7 pH measurements (Hydronium Ion Concentration) are determined electrometrically using either a glass electrode in combination with a reference potential, or a combination electrode and pH meter.

5.8 Conductivity measurements are determined electrometrically using either a glass electrode or conductivity cell.

5.9 An optional field equipment checklist is provided as a full size form immediately following this procedure.

6.0 PROCEDURE

6.1 Choose an instrument that is consistent with investigation requirements.

6.2 See the manufacturer's operating instructions of Hach Model DR/700 Portable Colorimeter prior to use. Operate the instrument as per manufacturer's instructions and note in the field logbook which instrument is being used. Also note in the field logbook the method of calibration if more than one choice exists.

6.3 Check the last calibration date to determine if it is current. Return the instrument to the instrument provider if the calibration is out of date.

R

6.4 Record measurements in the appropriate field logbook.

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None

Field Checklist

- ☐ Appropriate pH, Temperature, Salinity, and Conductivity Instruments
- ☐ Calibration Standard/check source
- ☐ Safety Glasses or Monogoggles*
- ☐ Gloves*
- ☐ Safety Shoes*
- ☐ Logbook
- ☐ Black Indelible Pen
- ☐ Sampling and Analysis Plan
- ☐ Health and Safety Plan
- ☐ Manufacturer's Instrument Calibration and Maintenance
- ☐ Decontamination Equipment

*When specified by the site-specific H&S plan.

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-910

Revision Number: **1**

Date Printed: ____________

Person Checking the Revision Number: ____________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Field Measurement Procedures: Turbidity			
Procedure No: FTP-910	**Revision: 1**	**Date: 11/18/2008**	**Page 1 of 3**
Business Unit General Manager: [signature]	**Date:** 12/8/08.	**QA/QC Officer:** C. G. Cowart	**Date:** 11/18/2008

R

1.0 PURPOSE

The purpose of this procedure is to establish guidelines for the uniform calibration and use of the turbidity meter.

2.0 SCOPE

This procedure applies to all turbidity meters.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.2 DEFINITIONS

3.2.1 Formazine- Standard solution used in calibrating turbidity meters.

3.2.2 NTUs- Nephelometric Turbidity Units are the units used to express turbuidity.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.2 ensuring compliance with the Sampling and Analysis Plan (SAP); and

4.2.3 overall management of field activities.

5.0 GENERAL

5.1 Any deviation from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager and documented on the appropriate field change forms.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.4 Refer to the SAP for project/task-specific sampling and analysis requirements.

5.5 An optional field checklist is provided as a full size form immediately following this procedure.

5.6 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project Manager. R

5.7 The manufacturer's operating instructions, for the specific instrument used will be maintained at the site.

5.8 Turbidity measurements are determined through the light-absorption-scattering method by using a glass electrode.

6.0 PROCEDURE

6.1 Choose an instrument that is consistent with investigation requirements.

6.2 See the manufacturer's operating instructions prior to use. Operate the instrument as per manufacturer's instructions. Note in the field logbook the model and serial number of the instrument being used. Also note in the field logbook the method of calibration if more than one choice exists.

6.3 Check the last calibration date to determine if it is current. Return the instrument to the equipment supplier if the calibration is out of date.

6.4 Record measurements in the appropriate field logbook.

R

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP.

R

8.0 ATTACHMENTS

None.

Field Checklist

- ☐ AppropriateTurbidity Instruments
- ☐ Calibration Standard/check source
- ☐ Safety Glasses or Monogoggles*
- ☐ Gloves*
- ☐ Safety Shoes*
- ☐ Logbook
- ☐ Black Indelible Pen
- ☐ Sampling and Analysis Plan
- ☐ Health and Safety Plan
- ☐ Manufacturer's Instrument Calibration and Maintenance
- ☐ Decontamination Equipment

*When specified by the site-specific H&S plan.

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-955

Revision Number: 2

Date Printed: ____________________

Person Checking the Revision Number: ____________________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Field Measurement Procedures: Dissolved Oxygen			
Procedure No: FTP-955	**Revision: 2**	**Date: 11/18/2008**	**Page 1 of 4**
Business Unit General Manager: [signature]	**Date:** 12/8/08	**QA/QC Officer:** C. G. Cowart	**Date:** 11/18/2008

R

1.0 PURPOSE

The purpose of this procedure is to provide general instructions both for calibrating dissolved oxygen meters and for taking field measurements of dissolved oxygen in natural and waste waters.

2.0 SCOPE

This procedure describes the use of the membrane electrodes (ME) probe method for field measurement of dissolved oxygen in a variety of ground, surface, and saline waters, as well as in domestic and industrial wastes.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual.

3.1.2 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency. R

3.1.3 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 400, Equipment Decontamination.

3.1.4 Science Applications International Corporation (SAIC) Field Technical Procedure (FTP) 625, Chain-of-Custody.

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 ensuring that all personnel perform their assigned duties in accordance with this procedure when it is applicable;

4.2.2 ensuring compliance with the Sampling and Analysis Plan (SAP); and

4.2.3 overall management of field activities.

5.0 GENERAL

5.1 Any deviations from specified requirements will be justified to and authorized by the Project Manager and/or the relevant Program Manager.

5.2 Deviations from requirements will be sufficiently documented to allow re-creation of the modified process.

5.3 Refer to the site- or project-specific Health and Safety (H&S) Plan for relevant H&S requirements. R

5.4 Refer to the SAP for project/task-specific sampling and analysis requirements.

5.5 SAIC and subcontractor personnel who use this procedure must provide documented evidence of having been trained on the procedure to the Program or Project manager. R

5.6 The most common ME instruments for determination of dissolved oxygen (DO) in water are dependent upon the rate of diffusion of molecular oxygen across a membrane and upon electrochemical reactions. Under steady-state conditions, the current or potential can be correlated with DO concentration.

5.7 Interfacial dynamics at the ME-sample interface are a factor in probe response and a significant degree of interfacial turbulence is necessary. For precision performance, turbulance must be constant.

5.8 Dissolved organic materials are not known to interfere in the output from DO probes. However, dissolved inorganic salts are a factor in the performance of DO probes. Reactive gases that pass through the ME probes may interfere. For example, chlorine will depolarize the cathode, cause a high probe output, and eventually desensitize the probe. Hydrogen sulfide will interfere with ME probes under certain conditions.

5.9 Dissolved oxygen ME probes are temperature sensitive, and temperature compensation is normally provided by the manufacturer.

R

5.10 Refer to the manufacturer's instructions, which are attached to the equipment, for calibrating and operating each specific DO meter.

5.11 An optional field equipment checklist is provided as a full size form immediately following this procedure.

6.0 PROCEDURE

6.1 CALIBRATION PROCEDURES

6.1.1 The exact calibration method used is dependent upon the specific make and model of the DO meter being used. Refer to the specific manufacturer's instruction manual for the calibration method applicable to the instrument.

6.1.2 Four common types of calibration methods used include, but are not limited to the following: Winkler method, air calibration method, 100% air saturated water method, and the salt water method.

6.2 FIELD MEASUREMENT PROCEDURE

6.2.1 Inspect membrane before each field trip for air bubbles, oily film, and/or holes. If the membrane is defective, it must be replaced and the new membrane soaked in distilled water before calibration.

6.2.2 Follow manufacturer's instructions for sample measurement.

6.2.3 When making measurements be sure that the ME stirring apparatus is working (if using a submersible stirrer). If operator is stirring the ME probe manually, then the probe must be stirred as described in manufacturer's instructions in order for the DO instrument to work effectively.

6.2.4 Keep the probe in water when not in use to prevent the membrane from drying out.

6.2.5 If the sample temperature is significantly greater (greater than 10%) than the calibration temperature, the meter is recalibrated to the manufacturer's specifications.

6.2.6 Recalibrate when the DO readings show a distinct change in DO levels or under other specific conditions described in the owners manual.

6.2.7 Complete logbook and chain-of-custody forms in accordance with procedures FTP-1215, Field Logbooks and Field Forms, and FTP-625, Chain-of-Custody. R

R

6.3 The ME probe is calibrated daily as described in the manufacturer's instructions. If a measurement seems anomalous for any reason, the probe is checked against a solution of known DO value and the field measurement taken again. The original results are either verified or changed, with an explanation recorded in the field logbooks.

7.0 RECORDS

Documentation generated as a result of this procedure is submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None

Field Checklist

- ☐ DO Meter with Stirrer
- ☐ Reagents
- ☐ Biochemical Oxygen Demand Bottles (300 ml)
- ☐ WM Flasks (500 ml minimum size)
- ☐ Burets with Holders
- ☐ Siphon Tube
- ☐ Safety Glasses or Monogoggles
- ☐ Gloves
- ☐ Safety Shoes
- ☐ Container
- ☐ Custody Seals, as required
- ☐ Chain-of-Custody Forms, as required
- ☐ Logbook
- ☐ Black Indelible Pen
- ☐ Sampling and Analysis Plan
- ☐ Manufacturer's Instrument Calibration and Maintenance Manual
- ☐ Health and Safety Plan
- ☐ Decontamination Equipment
- ☐ Lab Wipes
- ☐ Appropriate Containers for Waste

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-1215

Revision Number: **2**

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Person Checking the Revision Number: ____________________

R

1.0 PURPOSE

The purpose of this procedure is to establish minimum requirements for the development, content, use, review, protection, and disposition of field logbooks and field forms.

2.0 SCOPE

This procedure applies to all types of logbooks and field forms used for environmental field studies and for other types of field activities that capture project technical data or administrative data that support the project objectives.

3.0 REFERENCES AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual. R

3.1.2 SAIC Quality Assurance Administrative Procedure, QAAP 2.2, Readiness Review.

3.1.3 SAIC Quality Assurance Technical Procedures, Volume II, Field Standard Operating Procedures.

3.2 DEFINITIONS

3.2.1 Field Forms – a project-specific collection of forms that are not bound into a logbook, but which serve a similar purpose to a bound field logbook, in that field data is captured in real time in a specific format relevant to the objectives of the investigation or other site activity.

3.2.2 Field Logbook – A bound book with sequentially numbered pages that is used to create a permanent, real time record of activities and conditions, significant events, observations, and measurements which occur during each day of field activities. The minimum requirements for a bound logbook are described in Section 5.0 of this procedure.

R

3.2.3 Force Majeure – an extraordinary event or circumstance beyond the control of the responsible person, such as war, strike, riot, crime, flood, earthquake, volcano, which prevents fulfillment of an obligation. However, Force Majeure is not intended to excuse negligence or other malfeasance, as where non-performance is caused by the usual and natural consequences of external forces (e.g., predicted rain stops an event).

3.2.4 Logbook Type – Identification of bound logbooks by purpose or area of coverage. Examples include but are not limited to Project, Field Manager, Soil Sampling, Groundwater Sampling, Well Installation, Well Development, Soil Boring, Calibration, Decontamination and Health & Safety.

3.2.5 Quality Control (QC) Review – The act of verifying the accuracy, completeness, legibility, consistency, and clarity of a field logbook and/or field forms.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual.

4.2 PROJECT MANAGER

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In addition to the Common Responsibilities the Project Manager is responsible for:

4.2.1 Ensuring that field personnel are trained to the requirements of this procedure, and are familiarized with the specific logbook and/or field form requirements for the project.

4.2.2 Determining the project-specific requirements for the field logbook(s) and/or field forms, including the extent of use of pre-printed forms in the logbook(s).

4.2.3 Identifying the field forms that will be used for the project.

4.2.4 Ensuring that logbooks are copied for records as specified in paragraph 5.6 of this procedure.

4.2.5 Ensuring that logbook QC is performed as specified in paragraph 5.11 of this procedure.

4.3 FIELD MANAGER

The Field Manager is responsible for:

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4.3.1 Ensuring that field personnel implement the field logbook and field form requirements detailed in this procedure and those requirements determined to be applicable to the specific project.

4.3.2 Ensuring that logbooks and forms are assembled to meet project requirements, including the use of pre-printed forms, when applicable.

4.3.3 Ensuring that project-specific requirements for field logbooks and field forms are implemented in the field.

4.3.4 Ensuring that field forms are completed in accordance with project objectives.

4.3.5 Ensuring that field personnel who will use logbooks or field forms are trained in their use as described in this procedure and in the specific logbook/field form requirements for the project. Ensuring that training is documented and forwarded to the identified records system.

4.3.6 Ensuring that field logbooks and field forms are protected from loss, damage or deterioration and are copied for record as specified in paragraph 5.6 of this procedure.

4.3.7 Ensuring that field logbooks and field forms are given a QC review by a qualified person other than the person(s) making logbook entries and at a frequency specified in paragraph 5.11 of this procedure.

4.4 <u>FIELD TEAM MEMBERS</u>

Field team members are responsible for:

4.4.1 Using and making entries in field logbooks and field forms in accordance with this procedure and project-specific training.

4.4.2 Ensuring that field logbooks and forms are protected from loss, damage or deterioration.

4.4.3 Making corrections to logbooks as necessary including those noted during QC review.

4.5 <u>QC REVIEWER</u>

The QC Reviewer is responsible for:

4.5.1 Conducting a thorough review of the field logbook(s) and field forms on the schedule established by the Project Manager. This includes the general requirements in section 5.0 below as well as the technical and general information.

4.5.2 Documenting the review by initialing or signing each page reviewed along with the date reviewed.

5.0 GENERAL

5.1 This procedure is written to include Project Manager and Field Manager functional positions; however, where the same person fills both positions, the coordination steps noted in the procedure are considered to be consolidated.

5.2 This procedure is followed by a variety of form(s) which could be used in a field logbook depending on the needs of the project. These forms are provided as information only and do not represent a comprehensive set of forms. These forms may be used 'as is' or modified as necessary to meet specific project needs. Other forms or formats may also be used to meet project-specific needs.

5.3 Field logbooks will be structured and used according to the following criteria:

- Controlled by the Field Manager who will ensure that the logbooks are identified by project name or number, by logbook type (see definition 3.2.4), and if there is more than one logbook for a project, by sequential number.
- Bound with sequentially numbered pages (It is recommended that field logbooks include a table of contents, when appropriate).
- It is recommended that logbooks and field forms should be produced on waterproof (Rite in the Rain®) paper when possible.
- Entries are to be made in indelible ink, and must be clear, objective and legible. No entries are to be made in pencil or other erasable form.
- Each page used is signed (or initialed) and dated by the person making the entries.
- Dates recorded in the month/day/year format; time recorded in the 24-hour military clock format (e.g., 1500 hours rather than 3:00 p.m.)
- Changes made by striking through the original entry in a manner which does not obliterate the original entry. The initials of the person making the change and the date will be written next to the change.

- Unused portions of completed logbook pages and completed logbooks will be indicated in a positive, clearly recognizable manner. Typical methods include:
  - › drawing a line through the unused area(s) and providing the initials of the person making the entry and date the entry was made.
  - › writing a notation such as " INTENTIONALLY LEFT BLANK" and providing the initials of the person making the entry and date the entry was made.

5.4 Field forms will be structured and used according to the following criteria:

- Controlled by the Field Manager who will ensure that they are identified by project name or number.
- Entries made in indelible ink that are clear, objective and legible. No entries are to be made in pencil or other erasable form.
- Dates recorded in the month/day/year format; time recorded in the 24-hour military clock format (e.g., 1500 hours rather than 3:00 p.m.). Time is always location specific.
- Changes made by striking through the original entry in a manner which does not obliterate the original entry. The initials of the person making the change and the date will be written next to the change.

5.5 It is recommended that logbooks and field forms containing entries never be shipped to and from the field; however, if this is necessary, copies must be made to protect the data from loss during shipment.

5.6 Logbooks and field forms will be copied for record purposes on the frequency established by the Project Manager at the beginning of field activities but at no longer than 30 calendar day intervals when in use in the field.

- The frequency will be appropriate to the risk of loss of the data contained in the logbooks.
- Customer requirements regarding logbook copying and protection will be followed, when applicable.
- Exceptions to the frequency requirements for record copies may be made on a project-specific basis; however, an alternate frequency must be specified in writing, approved by the responsible manager (Project or Division) or higher line management authority, and captured in the designated records system.
- Allowance will also be made for Force Majeure events that are uncontrollable and prevent meeting the specified requirements.

5.7 The use of pre-printed field logbooks is a best practice; however, in all cases the Project Manager and/or Field Manager will determine and document the types of information to be recorded in each field logbook. The types of entries and level of detail must comply with applicable laws, regulations and any customer-specified requirements, as well as being consistent with the information requirements necessary for writing the report(s) for the project.

5.8 When field forms and a log book are both used, the log book entry should note what field forms were used, and include a daily inventory of the forms.

5.9 The names of the individuals authorized to write in the field logbook will be printed in the front of the logbook, including the QC Reviewer. It is also recommended that each individual's signature or initials be included by their printed name.

5.10 The QC Reviewer will be a person with an appropriate level of experience and knowledge to perform a review, as determined by the Project Manager.

5.11 QC review will be completed on a schedule determined by the Project Manager but at no greater than seven (7) calendar day intervals when in use in the field.

5.12 Exceptions to the frequency requirement for QC review may be made on a project-specific basis; however, an alternate frequency must be specified in writing, approved by the responsible manager (Project or Division) or higher line management authority, and captured in the designated records system. Allowance will also be made for Force Majeure events that are uncontrollable and prevent meeting the specified requirements.

6.0 PROCEDURE

6.1 BOUND LOGBOOK AND FIELD FORM DEVELOPMENT

6.1.1 The Project Manager determines the logbook and field form requirements for the project including the types of entries required, number of logbooks and forms needed, and the extent of use of pre-printed forms in the logbook(s). Where pre-printed forms are to be included in the logbooks, they may be either selected from existing examples or developed specifically for the project.

6.1.2 The Project Manager coordinates project logbook and field form needs with the Field Manager and arranges for assembly of the correct number and types of logbooks and forms for the project.

6.1.3 The logbook(s) and forms are forwarded to the Field Manager for control and use.

6.2 LOGBOOK AND FIELD FORM ENTRIES GUIDANCE

6.2.1 Logbook and field form entries should be a compilation of relevant, factual events as they occur. Keep in mind that logbooks and field forms are work products that belong to the client; therefore, they should only include entries that are appropriate to share with the client or third parties. Logbooks and field forms are subject to subpoena, made legal exhibits, read in court and become permanent legal records.

6.2.2 The following should not be included in a logbook or field form:

- unsubstantiated opinions (best professional judgment may be necessary in some cases)
- editorializing
- language that is derogatory or that would not be acceptable in front of the client or in a public forum
- events that are not relevant to the work

6.2.3 Words to avoid unless absolutely necessary and appropriate:

Not recommended	**Alternative words**
approve	work is in general conformance
inspection *	periodic observation of work in progress
supervision *	periodic observation of work in progress
or equal	or equivalent

* *Inspect and supervise are potentially dangerous words. Court decisions have interpreted these words to mean: superintend, oversee, control, manage, direct, restrict, regulate, govern, administer, and conduct.*

Also, definitive words such as: Final, Any, All, None, Full, Every, Will and Shall should be avoided.

6.2.4 Words of promise such as: Guarantee, Warrant, Certify, Ensure or Insure should be avoided unless absolutely necessary and appropriate for the scope of work.

6.3 LOGBOOK AND FIELD FORM CONTROL

6.3.1 The Field Manager takes control of the logbook(s) and field forms, and ensures that the type and content meet project requirements.

6.3.2 The Field Manager prepares the logbook(s) for use by inscribing each logbook with the identifying information required in paragraph 5.3 above. An example logbook cover page is included in the forms following this procedure.

6.3.3 The Field Manager prepares and assembles the appropriate types and quantities of field forms.

6.3.4 The Field Manager prepares and maintains a logbook inventory to ensure that the number and type of logbooks in use is known at any time.

Note: Alternatively, a centralized logbook inventory may be utilized providing continuity is maintained by having an individual designated in charge of the inventory at all times. R

6.3.5 The Field Manager ensures that logbooks and field forms are protected during use and are put under appropriate control when not in use.

6.4 LOGBOOK USE AND PROTECTION

6.4.1 The Field Manager ensures that each field team member who will use a logbook and/or field forms is provided instruction on the use and control of, as well as the entries required in, each type of logbook and form the person will use.

6.4.2 The Field Manager and field team members make entries in logbooks and forms in accordance with the general requirements in Sections 5.0 and 6.2 of this procedure and any project-specific requirements.

6.4.3 When not in use, logbooks and forms are secured, controlled, stored and protected in accordance with the methods established for the project. As a minimum, logbooks and field forms should be kept in the personal custody of the field manager (or designee) or locked up.

6.4.4 The Field Manager ensures that copies of logbook pages and field forms are made at the intervals specified in paragraph 5.6 above, and submitted to the identified records system. This includes extended intervals between field activities and upon conclusion of field activities.

6.5 QUALITY CONTROL OF LOGBOOKS AND FIELD FORMS

6.5.1 On the schedule established by the Project Manager, the Field Manager ensures that each logbook and field form used are reviewed to verify the accuracy, completeness, legibility, consistency, and clarity of these documents.

6.5.2 The QC Reviewer indicates acceptance of the logbook and field form entries by writing his/her initials at the bottom of each page as well as the date reviewed.

6.5.3 If errors, omissions, or uncertainties are found, the QC Reviewer resolves them with the person responsible for making entries on that day in the logbook or field form. Corrections to any logbook and field form entries are made by striking through the original entry and providing the initials of the person making the change and date the change was made.

7.0 RECORDS

Logbooks and/or field forms, or copies will be submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENT

None

WELL DEVELOPMENT FORM

PROJECT NAME: **PROJECT NUMBER:**

Date: _____________ Time: ____________

Task Team Members: ____

Well Number and Location: ____

Development Crew: ____

Driller (if applicable): ____

Water Levels / Time: Initial: ________ / ________ Pumping: ________ / ________
Final ________ / ________

Total Well Depth: Initial: _________ feet BTOC Final: ________ feet BTOC

Date and Time: Begin: ________ / ________ Completed: ________ / ________

Development Method(s): ____

____

Total Quantity of Water Removed: ________ gallons

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature		
Specific Conductivity		
pH		
Turbidity		

QA performed by: ____________________________________

WELL DEVELOPMENT FORM (continued)

PROJECT NAME: **PROJECT NUMBER:**

WELL NUMBER: **LOCATION:**

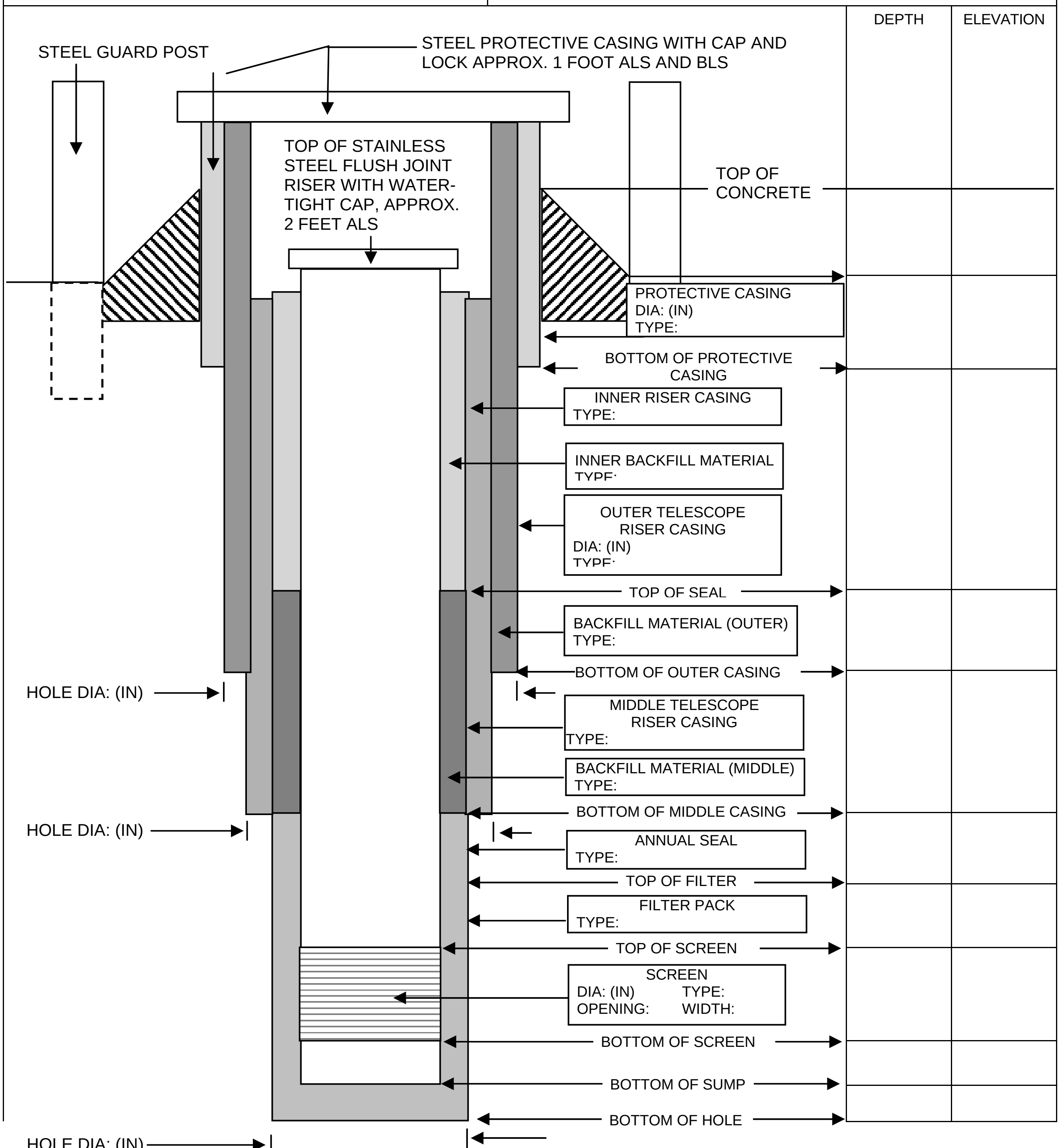
DATE AND TIME	PUMP SETTING (DEPTH BTOC)	DISCHARGE RATES* AND MEASUREMENT METHOD	FIELD MEASUREMENTS				REMARKS INCLUDING SAND PRODUCTION
			TEMP (^{O}C)	SPECIFIC CONDUCTIVITY (uMHOS/CM)	pH STANDARD UNITS	TURBIDITY (NTUs)	

* Gallons per minute or bailer capacity ___________________________

RECORDED BY: ____ QC CHECKED BY: ____
(Signature) (Signature)

TELESCOPED WELL

PROJECT NAME:	**PROJECT NO:**	
WELL NUMBER:	**BEGIN:**	**END:**
COORDINATES: **N:** **E:**	**REFERENCE POINT:**	**ELEVATION:** **MSL**



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QA performed by: ______________________________

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: **PROJECT NO:**

Date: (mm/dd/yy): ____________________ Page ________ of ________

Task Team Members:

______________________________ ______________________________

______________________________ ______________________________

______________________________ ______________________________

Narrative (include time and location):

____

____

____

____

____

____

____

____

____

____

____

Daily Weather Condition: A.M. ______________________________

P.M. ______________________________

Recorded By: ____________________ QC Checked by: ____________________

(Signature) (Signature)

SAMPLE LOG SHEET

PROJECT NAME: **PROJECT NO:**

SAMPLE ID NUMBER: ____________________ DATE COLLECTED (MM/DD/YY): __________________
TIME: _____________

SAMPLING LOCATION CODE: _____________________________________
DESCRIPTION: ____

SAMPLING POINT CODE: ____
DESCRIPTION: ____

NORTHING: ________________ EASTING: __________________ ELEVATION: ____________________

SAMPLE DEPTH CODE: ____________:______ TO _______________________________________ BLS
SAMPLE MEDIA CODE: ________________________ DESCRIPTION: _____________________________

WEATHER: ________________________________ ACTIVITIES IN AREA: _________________________
FIELD OBSERVATIONS: ____

FIELD MEASUREMENTS	READING	UNITS	SERIAL NO.	LAST CALIB.
RADIOACTIVITY:				
TEMPERATURE:				
pH:				
CONDUCTIVITY:				
REDOX:				
DO:				
ORGANIC VAPORS:				
TURBIDITY:				
OTHER __________:				

SAMPLE TYPE:
☐ GRAB ☐ SPATIAL COMPOSITE ☐ TIME COMPOSITE
☐ QC TRIP BLANK ☐ QC RINSATE ☐ QC FIELD BLANK
☐ OTHER (SPECIFY)___________________

SAMPLE COLLECTED: ☐ YES ☐ NO SAP SAMPLING PROCEDURE WAS FOLLOWED: ☐ YES ☐ NO
IF SAP WAS NOT FOLLOWED, SPECIFY WHAT DEVIATIONS WERE NECESSARY AND WHY:

Recorded By: ________________________ (Signature)

QC Checked by: ________________________ (Signature)

SAMPLE LOG SHEET

SAMPLE ID NUMBER:

CONTAINER VOLUME (mL)	CONTAINER TYPE	METHOD NAME AND NUMBER ANALYSIS	PRESERVATIVES (TYPE/VOL)	COC #	AIR BILL #	CONTAINER LOT #	LABORATORY

SAMPLE ID's RINSATE: _____________ TRIP BLANK: ____________ FIELD BLANK: ________________ FIELD DUPLICATE: ____________

RECORDED BY: ____ QC CHECKED BY: ____

(Signature) (Signature)

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SAMPLE LOCATION SKETCH	HOLE NUMBER
PROJECT	ELEVATION TOP OF HOLE
LOCATION STATION	DATUM FOR ELEVATION SHOWN

LOCATION SKETCH **SCALE:**

COMMENTS		
SIGNATURE OF INSPECTOR/DATE	PROJECT	HOLE NO.

QA performed by: ______________________________

R

SAMPLE ID/COC TRACKING FORM

PROJECT NAME: **PROJECT NO:**

SAMPLE ID	FIELD COC	LAB COC		SAMPLE ID	FIELD COC	LAB COC

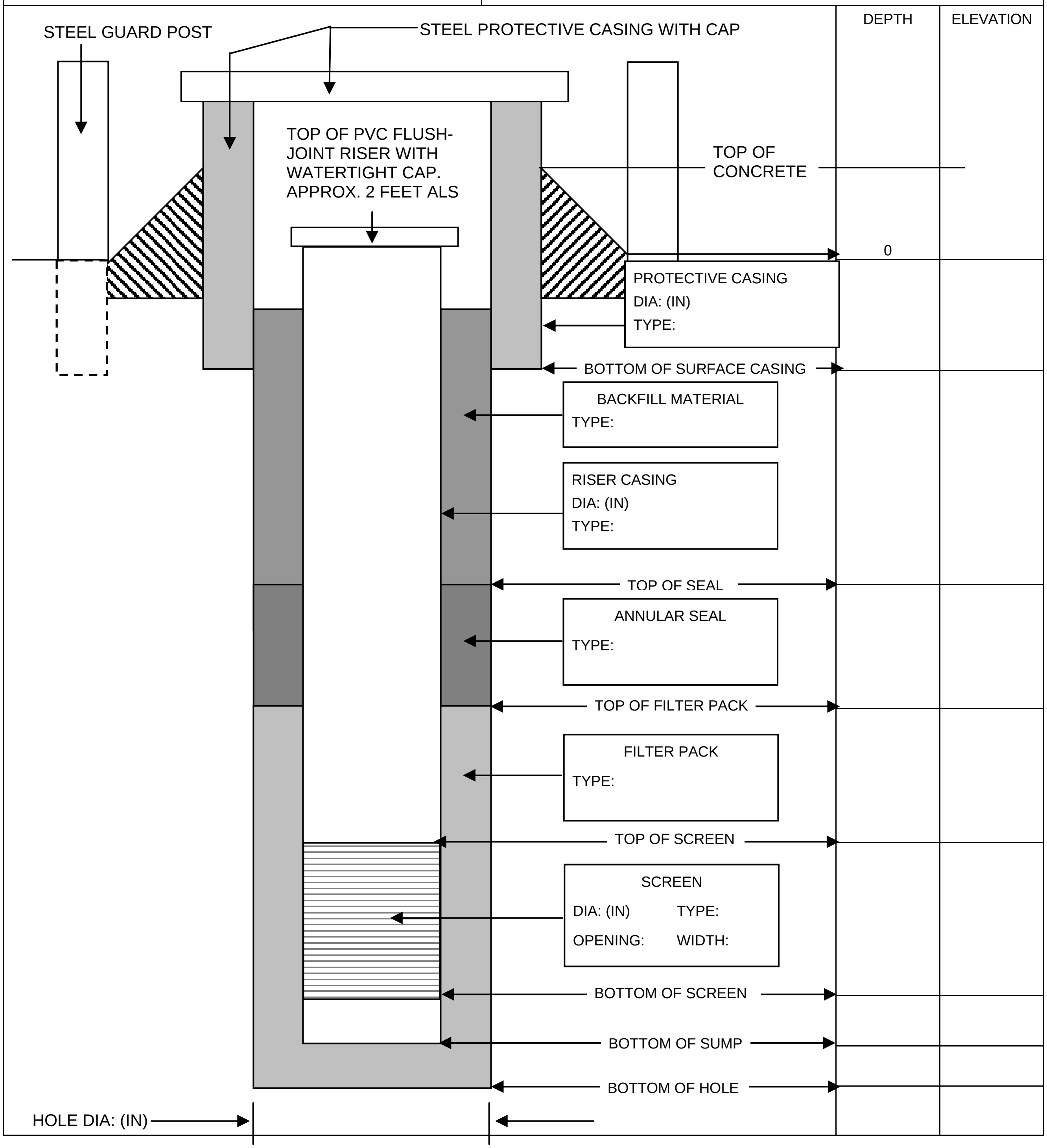
R

QA performed by: ____________________________

MONITORING WELL

PROJECT NAME: **PROJECT NO:**

WELL NUMBER:	**BEGIN:**	**END:**
COORDINATES: **N:** **E:**	**REFERENCE POINT:**	**ELEVATION:** **MSL**



QA performed by: ______________________

HYDROLOGIC AND GEOLOGIC CHARACTERIZATION FIELD WATER-LEVEL MEASUREMENTS

PROJECT NAME: **PROJECT NO:**

WELL NUMBER: ___________ **LOCATION:** _____________ **WELL ELEVATION:** ___________ **MSL**

DATE	TIME	DEPTH TO WATER (BTOC)	WATER ELEVATION (MSL)	INSTRUMENT	SERIAL NO.	REMARKS

RECORDED BY: ______________________________

QC CHECKED BY: ______________________________
DATE: ______________________________

EXAMPLE SAMPLE MEDIA CODES

SOLID MATRICES

SOIL
- [01] Surface (0–6 inches)
- [02] Subsurface (>6 inches)
- [03] Other

SEDIMENT/SLUDGES
- [11] Lake/Pond
- [12] River/Stream
- [13] Impoundment/Pond
- [14] Drum/Tank
- [19] Other

AIR SAMPLE
- [21] Filter
- [22] Sorbent
- [23] Sweepings/Fugitive Dust
- [24] Gases
- [29] Other

BIOLOGICAL/TERRESTRIAL
- [31] Biota
- [39] Other

GEOTECHNICAL
- [41] Retained on #40
- [42] Retained on #200
- [43] Passed through #200
- [49] Other

LIQUID MATRICES

SURFACE WATER
- [51] Lake/Pond
- [52] River/Stream
- [53] Impoundment/Pond
- [54] Discharge
- [55] Spring/Seep
- [59] Other

GROUNDWATER
- [61] Lake/Pond
- [62] River/Stream
- [63] Impoundment/Pond
- [64] Drum/Tank AIR SAMPLE
- [65] Lysimeter
- [66] Monitoring Well
- [67] Observation Well
- [68] Piezometer
- [69] Other
- [6A] Public Water Supply
- [6B] Purge Well
- [6C] Test Well
- [6D} Vapor Well
- [6E] Leachate Well

CONTAINERIZED

SEALED	UNSEALED
[71] Drum/Tank	[81] Drum/Tank
[72] Other	[82] Other

EQUIPMENT CALIBRATION

PROJECT NAME: **PROJECT NO:**

CATEGORY 1 **M & TE CALIBRATION LOG**

IDENTIFIER	ITEM DESCRIPTION	CALIBRATION MEASUREMENTS			BACKGROUND CHECK	RESPONSE CHECK	NAME	DATE
		PRE	ADJUSTMENT	POST				

QA performed by: ______________________

R

DRILLING/CORE LOG

PROJECT NAME: **PROJECT NO:**

Page ________ of ________

Site Location: ______________________
Boring/Well ID: ______________________

Drilling Date/Time: ________________
Started (mm/dd/yy)

Completed (mm/dd/yy) ____________

Depth Drilled ____________________ feet
Depth to Water ___________________ feet
Drilling Method ____________________
Drilling Fluid Used _________________

Hole Diameter _____________ inches
Hammer Weight ____________ inches
Hammer Drop _____________ inches

Drilling Contractor ________________

Logged by _______________________
Company ________________________

Driller _______________________
Helper _______________________
Drill Make & Model ________________
Type of Sample/Coring Device** ________________

No.	Sample/Core Depth (feet below land surface)		Core Recovery %	Blow Counts per 6 inches	OVA/HNU (ppm)	RAD (CPM)	Sample/Core Descr./Notes
	FROM	TO					
				/ / /			
				/ / /			
				/ / /			
				/ / /			
				/ / /			
				/ / /			
				/ / /			
				/ / /			

*Define color, minor constituents, soil type, trace constituents, plasticity, moisture content

MOISTURE CONTENT:
DRY—Very low moisture content
MOIST—Intermediate moisture content, grains darkened by surface water
WET—Visible free water, soil sample from water-bearing zone

** S= Split spoon
T = Shelby tube
D = Dennison
P = Pitcher
O = Other

Prepared By: ____________________ Date: ____________

QC By: ________________________ Date: ____________

DRILLING/CORE LOG

PROJECT NAME: **PROJECT NO:**

Page _________ of ________

Boring/Well ID: ________________________

Logged By: ___________________________ Company _________________________

No.	Sample/Core Depth (feet below land surface) FROM	TO	Core Recovery %	Blow Counts per 6 inches	OVA/HNU (ppm)	RAD (CPM)	Sample/Core Descr./Notes
				/ / /			
				/ / /			
				/ / /			
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*Define color, minor constituents, soil type, trace constituents, plasticity, moisture content

MOISTURE CONTENT:
DRY—Very low moisture content
MOIST—Intermediate moisture content, grains darkened by surface water
WET—Visible free water, soil sample from water-bearing zone

** S= Split spoon
T = Shelby tube
D = Dennison
P = Pitcher
O = Other

Prepared By: ____________________ Date: ____________

QC By: _________________________ Date: ____________

DECONTAMINATION

PROJECT NAME: **PROJECT NO:**

DATE	EQUIPMENT RINSATE NO.	ITEMS	DECONTAMINATED BY

QA Performed by: ______________________

R

FOR DATA COORDINATOR USE ONLY

DATA ENTRY PERFORMED BY: ____________________

DATE ENTERED: ____________________

NOTES: ____________________

DATA ENTRY PERFORMED BY: ____________________

DATE ENTERED: ____________________

NOTES: ____________________

DATA ENTRY PERFORMED BY: ____________________

DATE ENTERED: ____________________

NOTES: ____________________

QA performed by: ____________________

R

BOREHOLE OR WELL PLUGGING/ ABANDONMENT

PROJECT NAME: **PROJECT NUMBER:**

SITE ID NUMBER: ____________________ DATE PLUGGED: _____/_____/______

SITE COORDINATES: N: __________ DEPTH BLS (feet) _____________

E: __________

TYPE OF CASING: ____

CASING DIAMETER (ID) (inches) ____________ GROUND ELEVATION (feet MSL) _________

SCREENED ELEVATION (feet MSL) __________

GEOLOGIC MATERIAL AT SCREEN ____

____

AMOUNT OF CASING REMOVED (feet) ____

____

PLUGGING MATERIAL ____

APPROX. VOLUME OF PLUGGING MATERIAL (cubic feet) ______________________________

PLUGGING METHOD ____

____

REMARKS ____

____

____

RECORDED BY: ________________________ QC CHECKED BY: ______________________

(Signature) (Signature)

WELL INSTALLATION ACTIVITY/PROGRESS REPORT

PROJECT NAME: **PROJECT NO:**

WELL ID: ______________________________	Date Started: ___________	Time: ___________
	Finished: ___________	Time: ___________
Drilling Method:	Borehole Diameter:	
Supervisor/Geologist:	Driller:	
Drilling Company:	Helper:	

Footage Drilled/Augered/Cored: __________ feet to ________ feet

MATERIAL USED:	Bentonite:	bags	Bentonite:	buckets
	Cement (grout):	bags		
	Sand:	bags		

Water Used: Source: Quantity: gallons

Lubricants Used:

Well Construction Materials Used:

_____________ Inch Well Casing ________ feet ________ Inch Well Casing _________ feet

_____________ Inch Outer Casing _______ feet

Well Caps & Plugs _____________ pair Number of Guard Posts

Drain Hole (yes/no) ____________ Stamped ID (yes/no)

Activities/Comments:

Driller's Signature:	Date:
Supervisory Geologist's Signature:	Date:
Field Supervisor's Signature:	Date:
QC Checked By:	Date:

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-1220

Revision Number: **3**

Date Printed: ____________________

Person Checking the Revision Number: ____________________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Documenting and Controlling Field Changes to Approved Work Plans			
Procedure No: FTP-1220	**Revision: 3**	**Date: 11/18/2008**	**Page 1 of 6**
Business Unit General Manager: Date: [signature] 12/8/08		**QA/QC Officer: Date:** C. G. Cowart 11/18/2008	

R

1.0 PURPOSE

The purpose of this procedure is to establish a method for documenting and controlling field changes to approved work plans.

2.0 SCOPE

This procedure applies to SAIC personnel and subcontractors involved in field efforts which are governed by an approved work plan. This procedure should be used and specified within the work plan when no other programmatic procedure for the completion of field changes exists.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual. R

3.1.2 SAIC Quality Assurance Administrative Procedures (QAAP) 15.1, Control of Nonconforming Items and Services

3.2 DEFINITIONS

3.2.1 Field Change: For the purposes of this procedure, a field change is a planned deviation from a procedure or requirement established in the approved work plan. Examples of typical field changes include the following:

a) A change in the number of samples to be collected.

b) A change in sample depth, location, or interval.

c) A change in method of sample collection.

d) A clarification to conflicting or confusing work plan or procedural requirements.

e) The discovery of unanticipated hazards or changes in site hazards, hazard monitoring, or hazard controls.

R

3.2.2 Field Change Request (FCR): A form used to request and document signature approval of the field change.

3.2.3 Field Change Control Log: A log used to track the status of requested field changes.

3.2.4 Field Logbook: The site logbook, typically maintained by the Field Team Leader, which summarily documents all project field activities.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD TEAM MEMBERS

Field Team Members are responsible for:

4.2.1 identifying items which may require field change; and

4.2.2 correctly implementing changed procedures.

4.3 FIELD TEAM LEADER

The Field Team Leader is responsible for:

4.3.1 identifying items which may require field change;

4.3.2 properly completing the FCR form prior to submittal for approval;

4.3.3 notifying the SAIC Project Manager of the FCR;

4.3.4 completing and maintaining the field change control log;

4.3.5 maintaining updated copies of FCRs with the field change control log; and

4.3.6 notifying affected field personnel of approved FCRs.

4.4 CONTRACTS MANAGER

The Contracts Manager, or designee, is responsible for:

4.4.1 assisting the Project Manager with obtaining agreement from the client as to how field changes will be proposed, approved and controlled; and

4.4.2 assisting the Project Manager to assure that changes are not out of scope.

4.5 SAIC HEALTH AND SAFETY (H&S) OFFICER

The SAIC Health and Safety Officer who approved the project or program health and safety plan or similar hazard assessment is responsible for reviewing and approving FCRs which request or document changes in the H&S Plan, or which may affect the health or safety of the field team.

5.0 GENERAL

5.1 This procedure is intended to be used on field projects where a program process (e.g., client directed) for documenting, approving, and controlling changes to approved work plans is not in place.

5.2 The Program Manager, Project Manager, and/ or Contracts Manager determines if a client process is required. If not, this procedure is specified in the project Work Plan.

5.3 The Program Manager or Project Manager in coordination with the SAIC Contracts Manager, determines how the client wants to process field changes and if this procedure is acceptable.

5.4 Verbal or signature approval for a FCR must be obtained from the client before the FCR is implemented.

5.5 A deviation from the requirements (cost, scope, milestone or method) of a project work plan or procedure, without an approved FCR or prior to approval of a FCR, constitutes a nonconformance and should be documented in a nonconformance report (NCR).

5.6 The Project Manager may designate a Field Change Coordinator, when necessary.

6.0 PROCEDURE

6.1 FCR Processing

6.1.1 The Field Team Leader completes a FCR form (a full size form is provided immediately following this procedure) in accordance with paragraph 6.2 below and notifies the Project Manager.

6.1.2 The Field Team Leader initiates an entry in the Field Change Control Log (a full size form is provided immediately following this procedure) by inserting the assigned FCR number, the date initiated, the status, the procedure number or work plan section (s) affected, and the name of the person requesting the changes.

6.1.3 The original FCR or a copy is sent to the Project Manager and either the original or a copy is kept with the Field Change Control Log. The handling of original and copies is at the discretion of the Field Team Leader and Project Manager.

6.1.4 The Project Manager discusses the FCR with appropriate members of the project team (QA/QC Officer, Program Manager, Contracts Manager, H&S Officer, field team members, etc.) as appropriate to the `change, and makes any corrections needed.

6.1.5 If the FCR includes a change in the project H&S Plan or has a potential effect on the health or safety of the field team, the SAIC H&S Officer must approve the FCR.

6.1.6 The Project Manager or designee then notifies the client Project Manager and if required, other client staff such as the QA representative or Health and Safety representative, of the scope, justification and impacts of the request. The FCR form is then sent to the client Project Manager for approval.

Note: To expedite the process, the changes may be implemented after verbal client approval is obtained and documented. Verbal approval is documented by the Field Team Leader in the field logbook and in the Field Change Control Log.

6.1.7 If the client Project Manager and others (if required) approve the FCR (and no other approval is necessary), the change is signed as approved, and sent to the Field Team Leader. A record copy is retained by the Project Manager.

6.1.8 After the FCR form is signed by the client, the form (original or copy) is inserted in the Field Change Control Log in place of the FCR noted in 6.1.3 above. The "Status" and "Date FCR Approved" columns are updated in the Field Change Control Log to indicate that the field change is complete.

6.1.9 At the first opportunity, the Field Team Leader notifies all affected personnel of the field change. This notification is documented in the field logbook. If the FCR affects health or safety, the SHSO includes notification of the changes in one or more site safety briefings.

6.2 COMPLETION OF THE FCR FORM

6.2.1 FCR NO.- An FCR number is assigned to the change request. Numbers are project coded and sequential.

6.2.2 Date Initiated- The date change was first requested is entered in this field.

6.2.3 Project- The name of the affected project.

6.2.4 Contract Number- The contract number under which the project operates.

6.2.5 Requestor Identification- Print the name of the person requesting the change, organization, phone number, and title. The requestor then signs in the signature block.

6.2.6 Baseline Identification- Check each affected baseline, i.e., does the change affect the cost of the project, is there an increase or decrease in scope, is an established milestone (due date) affected, or is one or more of the methods (procedures) used to conduct the work affected.

6.2.7 Affected Document- The exact title, revision number, section number, etc. of the affected work plan or procedure is entered in this field.

6.2.8 Description of Change- This field includes sufficient information for the reviewer to determine exactly how the affected work plan or procedure will be changed.

6.2.9 Justification- Include all reasons for the change request. These may include reduction in cost, minimization of health and safety risks, etc.

6.2.10 Impact of Not Implementing Request- Often, the reciprocal of the justification may be entered in this field. In some cases this statement may justify the change.

6.2.11 Participants Affected by Implementing Request- Include all participants affected. These may include the field personnel implementing the change, the data managers, data users, subcontractors etc.

6.2.12 Cost Estimate- The Field Team Leader or Project Manager includes an estimate of the cost effects based on implementing the request.

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The person providing the cost estimate signs in this block and prints the appropriate phone number and date.

6.2.13 Previous FCR Affected- Check the appropriate box. If the yes box is checked, indicate the number(s) of the previous FCR(s) in the space provided to the right.

7.0 RECORDS

Documentation generated as a result of this procedure is to be submitted to the designated records system, in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None

Field Change Control Log

Program ______________________________

Project Name ______________________ Contract No.______________________

FCR NO.	DATE INITIATED	STATUS	SOP. NO./ WORKPLAN SECTION AFFECTED	REQUESTOR	DATE FCR APPROVED

Field Change Request (FCR)

FCR NO. ______________________ DATE INITIATED ___________________

PROJECT ____

CONTRACT NO.

REQUESTOR IDENTIFICATION

NAME _______________________ ORGANIZATION _________________ PHONE

TITLE ______________________ SIGNATURE

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ☐ Cost ☐ Scope ☐ Milestone ☐ 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 ☐ YES ☐ NO; IF YES, FCR NO.

CLIENT PROJECT MANAGER _________________________________ DATE _______________

CLIENT QA SPECIALIST ___________________________________ DATE _______________

SAIC H&S MANGER SIGNATURE (IF APPLICABLE) ________________________ DATE _______________

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Manual Name: **Quality Assurance Technical Procedures Volume II: Field Standard Operating Procedures**

Document Number: FTP-1225

Revision Number: **1**

Date Printed: ______________________

Person Checking the Revision Number: ______________________

R

1.0 PURPOSE

This procedure describes the requirements for using the Field Demobilization Checklist for Project-Generated Wastes when shutting down a field effort either as a final or temporary demobilization. The purpose of the checklist is to ensure compliance with SAIC EC&HS Procedure 25 during the demobilization of a field project. It is expected that all wastes and materials will be managed and dispositioned in full compliance with the applicable Federal, State, Local and Facility requirements associated with the types of wastes generated.

2.0 SCOPE

This procedure applies to field projects that generate waste. R

3.0 REFERENCES AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the FTP Manual. R

3.1.2 SAIC Quality Assurance Administrative Procedure (QAAP) 2.1, Indoctrination and Training

3.1.3 SAIC EC&HS Procedure 25, Management of Investigation-Derived Waste

3.2 DEFINITIONS

3.2.1 Demobilization – the activities associated with shutting down a field activity permanently or, in some cases, temporarily due to completion of a phase of an ongoing activity.

3.2.2 Solid Municipal Waste – items that can be disposed in a sanitary landfill (i.e., not regulated and not contaminated either chemically or radiologically. For example, uncontaminated packaging, personal protective equipment (PPE), broken tools, wastepaper, etc.).

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the FTP Manual. R

4.2 FIELD MANAGER

The Field Manager is responsible for:

4.2.1 Managing all wastes generated by SAIC during a field project.

4.2.2 Completing the Field Demobilization Checklist for project generated wastes.

4.2.3 Assuring that all wastes are dispositioned or controlled in accordance with the project waste management plan.

4.2.4 Submitting completed Field Demobilization Checklists to the Project Manager.

5.0 GENERAL

5.1 All field projects generating waste, other than solid municipal waste, must complete the Field Demobilization Checklist (a full size form is provided immediately following this procedure) prior to demobilizing from the site, and ensure that all wastes have been dispositioned or are controlled in a manner that: a) meets applicable regulatory requirements, b) meets client and site-specific requirements, and c) protects SAIC from an environmental incident.

5.2 The Field Demobilization Checklist should be modified as necessary to address the requirements of individual sites or the project waste management plans.

6.0 PROCEDURE

6.1 IDENTIFICATION OF FIELD CYCLES

6.1.1 The Project Manager and Field Manager determine if mobilization will cover one continuous effort or be fragmented into distinct cycles.

6.1.2 If one continuous effort, the Field Demobilization Checklist will be completed at the end of the cycle.

6.1.3 If more than one cycle, the Field Demobilization Checklist will be completed at the end of each cycle.

6.2 COMPLETION OF CHECKLISTS

6.2.1 At the end of a field cycle the Field Manager completes the Field Demobilization Checklist.

6.2.2 All line items are completed on the Field Demobilization Checklist.

6.2.3 Any items checked N/A must have a brief justification in the comments column of the Field Demobilization Checklist.

6.2.4 Any items checked “NO” on the Field Demobilization Checklist are held open until actions are complete. The Field Manager ensures that any items marked NO are corrected prior to leaving the site, and the checklist adjusted to reflect the change.

6.3 DISPOSITION OF CHECKLISTS

Upon completion of the Field Demobilization Checklist, the Field Manager submits it to the Project Manager for review and retention in accordance with Section 7.0 of this procedure.

7.0 RECORDS

The following records generated as a result of implementation of this procedure will be maintained in a safe manner and submitted to the designated records system in accordance with Section 17 of the Business Unit QAP. R

8.0 ATTACHMENTS

None

Field Demobilization Checklist for Project-Generated Wastes

Project Title:	
Contract #	**Project #**
Person Certifying Checklist (printed name)	**Signature**
Date:	

Action	**Yes**	**No**	**N/A**	**Date Completed**	**Initials**	**Comments**
1) Has all IDW or other project- generated waste been transferred to the control of the facility (i.e., SAIC has no responsibility for storage, management, or maintenance of the waste)?						
2) Has all IDW or other project- generated waste been transported offsite for disposal, and disposal documented?						
3) If waste remains onsite and SAIC has an on-going responsibility for storage, management, or maintenance; have all such wastes been characterized or samples taken to allow characterization?						
4) Has a target date for removal of wastes been established?						
5) Have actions required to remove the wastes for disposition been determined?						

Field Demobilization Checklist – Project Generated Wastes

Action	Yes	No	N/A	Date Completed	Initials	Comments
6) Has an SAIC point of contact been established?						
7) Has the waste hauling subcontractor been notified that wastes are ready for disposal?						
8) If there are known project-generated, regulated wastes (e.g., RCRA Hazardous Waste, TSCA PCB Wastes, Radioactive Wastes, or Special Wastes regulated under State Authority), have those wastes been transferred to the client (with transfer documented) or properly disposed off site? **Note**: *Regulated wastes must be removed from the site no later than 3 days after demobilization unless transferred to the facility*.						
9) If known project-generated, regulated wastes have not been transferred to the client (with transfer documented) or properly disposed off site, what steps have been taken to disposition the waste?						

Field Demobilization Checklist – Project Generated Wastes

Action	Yes	No	N/A	Date Completed	Initials	Comments
10) Are all waste containers remaining onsite properly marked and labeled, e.g., container number, date of generation, site name, source, client name, description of waste, approximate volume of waste, and physical state?						
11) If a waste storage area is required, does it have security and postings appropriate to the type(s) of waste (e.g., warning signs, emergency points of contact, spill procedures)?						
12) If required, has photographic documentation of the waste containers been made?						
13) Are all liquid wastes containerized and protected from the elements (i.e., freezing)?						
14) Do containers of liquid to be left outdoors have sufficient headspace to prevent bulging (e.g. a general rule of thumb for waste water is that the headspace should be approximately 10% of the container volume)?						
15) Has secondary containment been provided for liquid wastes remaining onsite pending disposition? If not state why such containment was not required.						

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Field Demobilization Checklist – Project Generated Wastes

Action	Yes	No	N/A	Date Completed	Initials	Comments
16) If secondary containment is required for liquid waste remaining on site, have arrangements been made to exclude or remove precipitation from the containment receptacle?						
17) Have all residual chemicals (e.g., calibration gases, alcohol, acids) been dispositioned to preclude or minimize returning to SAIC facilities?						
18) Have pre-preserved sample containers been returned to the laboratory?						
19) Have all samples (e.g., environmental or geotechnical) been accounted for and a process put in place to assure that they are not returned to SAIC property?						
20) If waste is to remain on site and SAIC has a responsibility for storage or maintenance, have arrangements been made for routine inspections?						
21) If required, has a diagram of the waste storage area been prepared or photographic documentation made?						

Field Demobilization Checklist – Project Generated Wastes

Action	Yes	No	N/A	Date Completed	Initials	Comments
22) Other:						

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Manual Name: Quality Assurance Program and Quality Assurance Administrative Procedures

Document Number: QAAP 15.1

Revision Number: **8**

Date Printed: ____________________

Person Checking the Revision Number: ____________________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION QUALITY ASSURANCE ADMINISTRATIVE PROCEDURE			
Title: Control of Nonconforming Items and Services			
Procedure No: QAAP 15.1	Revision: 8	Date: 6/16/2008	Page: 1 of 11
Business Unit General Manager: Date: Manny Walsh 6/19/08		QA/QC Officer: Date: C. D. Cowart 6/12/2008	

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1.0 PURPOSE

The purpose of this procedure is to establish a system for controlling items and services that are identified as nonconforming to relevant requirements.

2.0 SCOPE

This procedure applies to nonconforming items or services discovered on SAIC projects.

3.0 REFERENCES AND DEFINITIONS

3.1 REFERENCES

3.1.1 See common references at the front of the QAAP Manual.

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedure (SAIC QAAP) 16.1, Corrective Action.

3.1.3 Science Applications International Corporation Quality Assurance Technical Procedure (SAIC QATP) TP-DM-300-9, Database Changes.

3.2 DEFINITIONS

3.2.1 Item - An inclusive term used in place of any of the following: appurtenance, facility, sample, assembly, component, material, module, part, product, structure, subassembly, subsystem, system, unit, documented concepts, or data.

3.2.2 Disposition - The action taken to resolve a nonconforming condition and restore acceptable conditions.

3.2.3 Initiator - Individual who completes Sections A and C of the NCR form. This may be the person who found the problem, or the individual designated to review and/or compile the nonconforming items before they are submitted to the NCR Coordinator.

3.2.4 Nonconformance - A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.

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3.2.5 Nonconformance Report (NCR) - Formal documentation of the condition adverse to quality that includes a statement of the problem, the proposed corrective action, the organization/person who will implement the corrective action, and the closure date.

3.2.6 Responsible Individual - The person designated by the Initiator to be responsible for completing Section B of the NCR form by providing the disposition, probable cause and action taken to prevent recurrence. Depending on the severity of the nonconformance, this may be the person who performed the work that was nonconforming, or an individual who supervises the work.

3.2.7 Corrective Action - An appropriate measure applied to correct a nonconformance and to minimize the possibility of recurrence.

3.2.8 Service - The result generated by activities at the interface between the supplier and the customer, and by supplier internal activities to meet customer needs. Such activities in environmental programs include design, inspection, laboratory and/or field analysis, repair, and installation.

4.0 RESPONSIBILITIES

4.1 See the common responsibilities at the front of the QAAP Manual.

4.2 TASK LEADER

The Task Leader is responsible for providing assistance in completion of NCRs relating to his/her task.

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

In addition to common responsibilities found in the front of the QAAP Manual, the QA/QC Officer is responsible for:

4.3.1 designating an NCR Coordinator by memorandum;

4.3.2 evaluating the validity of each NCR and concurring with formally opening an NCR;

4.3.3 ensuring that actions are performed and completed satisfactorily according to the approved disposition; and

4.3.4 signing and checking the NCR (Section D), indicating that the disposition was completed satisfactorily.

4.4 NCR COORDINATOR

The NCR Coordinator is responsible for:

4.4.1 assigning an NCR number to formally open an NCR;

4.4.2 ensuring that Hold Tags are available for distribution;

4.4.3 updating the NCR log, verifying that Hold Tags are removed, and distributing copies of the NCR when it is opened and closed;

4.4.4 tracking and trending NCRs;

4.4.5 verifying trend category selection;

4.4.6 determining trend reporting frequency as early as possible in a project lifecycle;

4.4.7 issuing late notices as necessary; and

4.4.8 maintaining the NCR files.

4.5 SAIC PERSONNEL

All SAIC personnel are responsible for initiating an NCR when a nonconforming item or service is identified.

4.6 INITIATOR

The Initiator is responsible for:

4.6.1 informing the Responsible Individual that an NCR is being prepared; R

4.6.2 completing Section A of the NCR form through the Initiator signature and date;

4.6.3 assessing the disposition, probable cause, and actions taken to prevent recurrence proposed in Section B of the NCR form;

4.6.4 accepting by providing justification, and signing and dating the form in Section C; or rejecting by returning the form to the NCR Coordinator who will return it to the responsible individual; and

4.6.5 coordinating the NCR with the NCR Coordinator.

R

4.7 RESPONSIBLE INDIVIDUAL

The Responsible Individual is responsible for:

4.7.1 completing Section B (Disposition, Probable Cause, and Actions Taken to Prevent Recurrence) of the NCR form through the "Proposed By" signature and date; R

4.7.2 assuring that each element of Section B is addressed, including: 1) Disposition, 2) Probable Cause, and 3) Actions Taken to Prevent Recurrence; and

4.7.3 working with the Initiator to arrive at an acceptable resolution of Section B, when necessary.

5.0 GENERAL

A flow chart which illustrates the NCR process is provided as Attachment I.

5.1 NCRs are written to identify and control items having physical characteristics (e.g., materials of construction, dimensions, surface conditions, functions, or locations) and services or processes that do not conform to specified requirements (procedures, instructions, drawings, purchase orders, statements of work, etc.);

5.2 NCRs may also be written for items or services which may be unacceptable or indeterminate in their function, operation, or use even if there are no specific, stated requirements.

5.3 Any item or service found to be in noncompliance to specified requirements is documented on an NCR, unless the nonconforming item or service is reportable by another control system (e.g., audits, inspections, tests, etc.).

5.4 Nonconformances involving analytical data problems are also coordinated with the database changes process found in TP-DM-300-9 (Reference 3.1.3).

5.5 The NCR Log is maintained by the NCR Coordinator and contains the following information, as a minimum:

a) NCR number and date opened; R
b) a brief description of the nonconforming condition;
c) the person or organization responsible for determining and carrying out the disposition to correct the nonconforming condition; and
d) the status of each NCR.

5.6 The NCR Coordinator distributes a status report to Program and Project Managers and Task Leaders, as appropriate; and provides trend reports to management on a regular basis.

5.7 The responsible organization is required to provide a completed response to an NCR within 10 working days. The initiator is required to complete review of the response within 5 working days. Late responses will be documented by the NCR Coordinator. Any NCR open for more than 20 working days will be reported to program management and the QA/QC Officer.

5.8 Use only one (1) NCR form per NCR number. If additional space is needed to complete any section of the NCR, attach as many continuation pages as required.

5.9 Documentation of completion of the disposition and/or action to prevent recurrence will be attached to the NCR, when appropriate.

5.10 Information generated by the NCR process is used to perform statistical process control charting. A checklist, used to select a category (or categories) for each nonconforming item or service identified on an NCR, is provided as Attachment II. The checklist should be used by the NCR Initiator to select the most appropriate category(ies) for each nonconforming item or service. If a category is not selected by the NCR Initiator, the QA/QC Officer will make the category selection. The NCR Coordinator checks category selection at the time the NCR is entered in the database.

6.0 PROCEDURE

6.1 NONCONFORMANCE REPORT (NCR) FORM

A Nonconformance Report form is provided immediately following this procedure. The form is divided into Sections A, B, C and D and is completed as follows:

6.1.1 The Initiator completes the following parts of Section A:

a) date of NCR
b) unique numerical identification (NCR number obtained from NCR Coordinator)
c) location of nonconformance
d) page numbers
e) name, organization, and phone number of person initiating NCR

f) name of person finding the nonconformance and date the nonconformance was found
g) organization or individual responsible for the nonconformance;
h) description of the nonconformance, including:
- identification of the nonconforming item or service
- requirements, document as appropriate
- as found conditions
- surveillance or audit number, if applicable

i) nonconformance category
j) date and signature of the initiator

6.1.2 Upon completion of Section A, the NCR is forwarded to the QA/QC Officer, or designee, for signature. The QA/QC Officer indicates if a Corrective Action Report (CAR) is required in accordance with QAAP 16.1 (Reference 3.1.2) and signs the NCR, if acceptable, to open it. If unacceptable, the QA/QC Officer returns the NCR to the Initiator.

6.1.3 The NCR is submitted to the Responsible Individual and selected management, as appropriate, by the NCR Coordinator or designee.

6.1.4 The Responsible Individual completes the following parts of Section B:

a) proposed disposition - the action taken to resolve a nonconforming condition and restore acceptable conditions, i.e., what will be done or has been done to fix the specific nonconformance described in Section A.
b) probable cause - explain the cause or causes of the nonconformance(s) described in Section A. If the exact cause is not known, give the most probable cause(s).
c) actions taken to prevent recurrence - explain the actions taken to prevent the nonconformance(s) described in Section A from happening again.
d) signature and date in the "Proposed By" block.

6.1.5 After completing Section B, the Responsible Individual forwards the NCR to the NCR Coordinator or designee, who then forwards it to the Initiator for concurrence, signature, and date.

6.1.6 The Initiator assesses the proposed remedy in Section B.
Note: the Initiator may solicit assistance from a qualified person to assess the adequacy of the proposed remedy.) R

6.1.7 If in agreement with Section B, the Initiator describes the reason(s) for acceptance in Section C of the NCR form, and signs and dates the form in Section C.

6.1.8 If the Initiator does not agree, the issues are reported to the NCR Coordinator or designee, who returns the NCR to the Responsible Individual. This process continues until resolution is achieved and the Initiator completes Section C per paragraph 6.1.7.

6.1.9 The NCR is then forwarded to the QA/QC Officer through the NCR Coordinator.

6.1.10 The QA/QC Officer completes Section D:

a) indicating date and result of any required reinspection or retesting to verify acceptability of completed work; and
b) date and signature indicating verification and closure of the NCR.

6.1.11 If the QA/QC Officer determines that the completed actions do not comply with the stated disposition, or that the results of the actions were unsatisfactory, the QA/QC Officer returns the NCR to the NCR Coordinator for resolution by the Initiator and the Responsible Individual. The NCR remains open until the required work has been satisfactorily completed.

6.2 HOLD TAGS

6.2.1 When a nonconforming item is identified, the person who identifies the item stops further processing or use of the item. This is followed by obtaining a hold tag from the NCR Coordinator and attaching the tag on the item as soon as possible (Attachment III). If tagging is not feasible, the item is segregated from inadvertent use by roping off the area or otherwise securing the item in a "hold" area.

6.2.2 Hold Tags are completed, as necessary, by the Initiator of the NCR and include:

a) NCR number
b) name of the Initiator
c) phone
d) date
e) description of nonconforming item(s)
f) a sequential number reflecting the number of Hold Tags associated with the NCR

6.2.3 When a nonconforming service is identified, the Responsible Individual will ensure that any corrective actions are implemented and the disposition sustained until the service is completed.

6.2.4 When a Hold Tag is used, it remains in place until the nonconformance is resolved or the item is permanently removed. When removed, the tag is submitted to the NCR Coordinator, if possible, who attaches it to the NCR.

6.3 NCR LOG

The NCR Coordinator updates the NCR Log, verifies that any Hold Tags are removed, and distributes completed copies of the NCR to the Initiator(s), Responsible Individual(s), selected management, as appropriate, and the Central Records Facility when the NCR is closed.

7.0 RECORDS

All documents generated as a result of this procedure will be collected and maintained in accordance with the requirements specified in QAAP 17.1, Records Management. At a minimum, the NCR and any documentation supporting disposition are considered records.

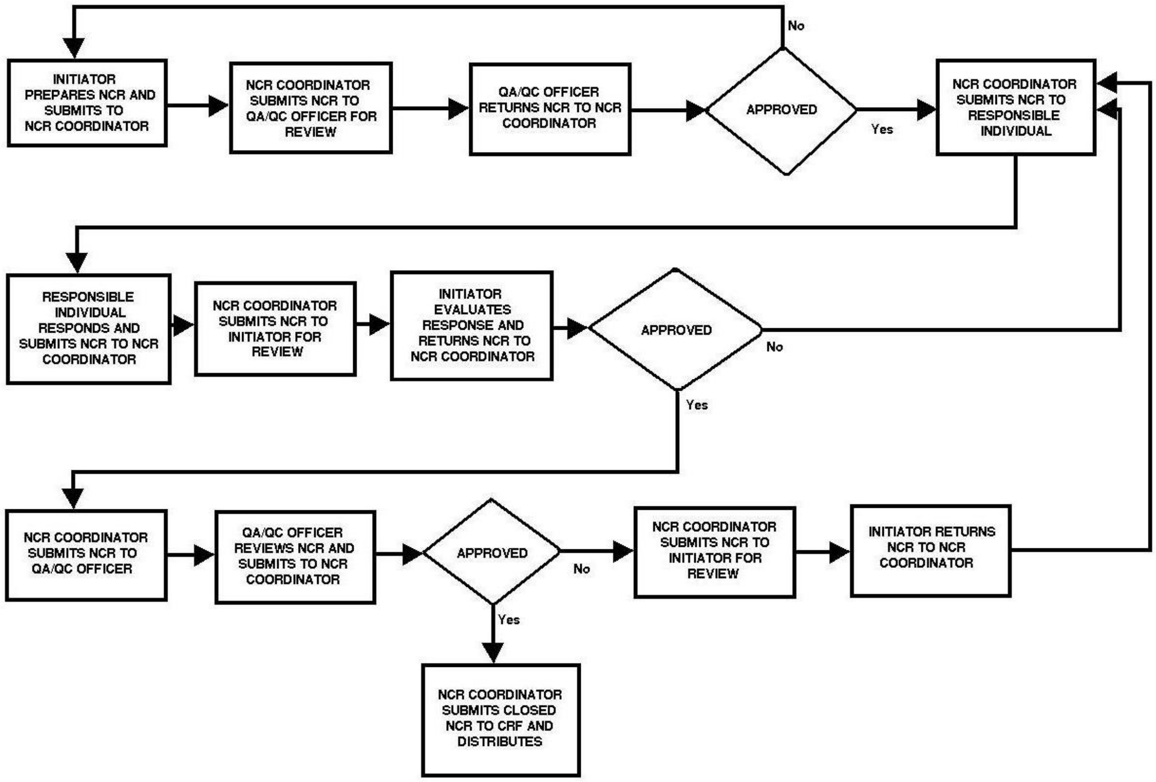
8.0 ATTACHMENTS

8.1 Attachment I - NCR Processing Flow Chart

8.2 Attachment II - Trend Categories

8.3 Attachment III- Hold Tag Example

Attachment I
Nonconformance Report Flow Diagram



Attachment II
Trend Categories

1. Logbook
2. Training
3. Sample Collection
4. Chain of Custody
5. Sample Handling / Packaging
6. Preservation
7. Hold Time
8. Calibration
9. Health and Safety
10. Regulatory Compliance
11. Laboratory Deliverable
12. Well Emplacement
13. Records Management
14. Document Control
15. Document Reviews
16. Milestone
17. Other (procedure, management)

Attachment III
Hold Tag (Example)

HOLD

TAG___ OF ___

HOLD

NCR NO. ______________________________ DATE: ________________

INITIATOR: ___________________________ PHONE: _______________
DESCRIPTION OF NONCONFORMING ITEM: ___________________

____
____
____

NONCONFORMANCE REPORT	DATE OF NCR	NCR NUMBER	
	LOCATION OF NONCONFORMANCE		PAGE __ OF __
INITIATOR (NAME/ORGANIZATION/ PHONE)	FOUND BY		DATE FOUND
RESPONSIBLE ORGANIZATION/INDIVIDUAL			PROGRAM
			PROJECT

DESCRIPTION OF NONCONFORMANCE CATEGORY:

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

DISPOSITION:

PROBABLE CAUSE:

ACTIONS TAKEN TO PREVENT RECURRENCE:

B PROPOSED BY: NAME DATE

JUSTIFICATION FOR ACCEPTANCE:

C INITIATOR: NAME DATE

VERIFICATION OF DISPOSITION AND CLOSURE APPROVAL

REINSPECTION/RETEST REQUIRED YES ☐ NO ☐ IF YES; DATE RESULT

D QUALITY ASSURANCE: NAME DATE

Instructions for completion of the Nonconformance Report
COMPLETE THIS FORM USING BLACK INK ONLY

Date of NCR:	Enter the current date.
NCR Number:	Obtain NCR number from NCR Coordinator.
Location of Nonconformance:	Enter the location of the nonconforming item.
Page ___ of____:	Enter the page number of the total number of pages.
Initiator:	Enter the name, organization, and phone number of the person initiating the NCR.
Found by:	Enter the name of the person who identified the nonconformance.
Date found:	Enter the date the nonconformance was identified.
Responsible Organization/ Individual:	Enter the name of the organization/ individual that is responsible for correcting the nonconformance.
Description of Nonconformance:	Initiator will describe in detail the nonconforming item or service; sign, date, and return the NCR to the QA/QC Officer.
Category:	Write in the number(s) of the category which best describes the nonconformance.
Disposition, Probable Cause and Actions Taken to Prevent Recurrence:	The responsible organization/ individual will describe how the nonconformance is to be corrected, give the probable cause, if known; specify actions taken to prevent recurrence, if applicable; sign, date, and return to the initiator for signature.
Justification for Acceptance:	The initiator writes the reason for accepting the explanations given in Section B of the NCR form; and signs and dates the form where indicated. If not acceptable, the initiator returns the NCR to the NCR Coordinator.
Verification of Disposition and Closure Approval:	QA/QC Officer should mark the appropriate box and sign and date in the space allotted.

CATEGORIES:

1. Logbook	2. Training	3. Sample Collection
4. Chain of Custody	5. Sample Handling / Packaging	6. Preservation
7. Hold Time	8. Calibration	9. Health and Safety
10. Regulatory Compliance	11. Laboratory Deliverable	12. Well Emplacement
13. Records Management	14. Document Control	15. Document Reviews
16. Milestone	17. Other (procedure, management)	

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

CONTROLLED DOCUMENTS

The following document is controlled by the Science Applications International Corporation (SAIC), Quality Assurance/Quality Control Officer. If you print this document, this page must be attached to the front of the document and you must fill in the information required below. The hard copy should be signed and dated the day it is printed by the user.

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Manual Name: **Quality Assurance Program and Quality Assurance Administrative Procedures**

Document Number: QAAP 16.1

Revision Number: **4**

Date Printed: ______________________

Person Checking the Revision Number: ______________________

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION QUALITY ASSURANCE ADMINISTRATIVE PROCEDURE			
Title: Corrective Action			
Procedure No: QAAP 16.1	Revision: 4	Date: 6/16/2008	Page: 1 of 7
Business Unit General Manager: Date: Manny Walsh 6/19/08		QA/QC Officer: Date: C.D. Cowart 6/12/2008	

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1.0 PURPOSE

This procedure establishes the requirements and responsibilities for identifying, documenting, investigating, resolving, and verifying completion of corrective action for significant conditions adverse to quality.

2.0 SCOPE

This procedure applies to any deficiency or apparent deficiency in Science Applications International Corporation (SAIC) activities or products that are determined to be significant conditions adverse to quality.

3.0 REFERENCES AND DEFINITIONS

3.1 REFERENCES

3.1.1 See Common References at the front of the QAAP Manual.

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedure (SAIC QAAP) 15.1, Control of Nonconforming Items and Services.

3.2 DEFINITIONS

3.2.1 Condition adverse to quality - An inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defective items, and nonconformances. A significant condition adverse to quality is one which if uncorrected could have serious effect on safety, quality, compliance, or operability.

3.2.2 Corrective Action- Measures taken to rectify deficient conditions adverse to quality and, where necessary, to prevent recurrence.

3.2.3 Corrective Action Log - A record of all Corrective Action Reports and their status maintained by the Corrective Action Report (CAR) Coordinator.

3.2.4 Corrective Action Report (CAR) - A document used by the QA/QC Officer to report and/or elevate deficiencies that are determined to be significant or of sufficient importance to warrant the attention of the Program or Project Manager.

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3.2.5 Deficiency - A condition of an item or activity, attribute, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.

3.2.6 Investigative Action - Actions taken to determine the overall extent, depth, and root cause of a deficiency.

3.2.7 Root Cause - The most fundamental reason for a condition adverse to quality.

4.0 RESPONSIBILITIES

4.1 See Common Responsibilities at the front of the QAAP Manual.

4.2 PROGRAM OR PROJECT MANAGER

In addition to common responsibilities found in the front of the QAAP Manual, the Program or Project Manager or designee is responsible for reviewing and concurring with CARs.

4.3 TASK LEADER

The Task Leader is responsible for:

4.3.1 ensuring that SAIC personnel are aware of and adhere to the requirements of this procedure; and

4.3.2 concurring with corrective action needed to prevent degradation of an item or activity, or loss to SAIC.

4.4 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

In addition to common responsibilities found in the front of the QAAP Manual, the QA/QC Officer is responsible for:

4.4.1 determining the significance of deficiencies or nonconformances and other reported conditions adverse to quality;

4.4.2 initiating a CAR once the review has determined that the deficiency, nonconformance, or other adverse condition is significant;

4.4.3 verifying that activities identified as significant conditions adverse to quality are controlled until a resolution is reached;

4.4.4 evaluating the proposed corrective actions for each CAR;

4.4.5 verifying the implementation of corrective actions for each CAR; and

4.4.6 closing out the CAR upon verification of related corrective actions.

4.5 CAR COORDINATOR

The CAR Coordinator is responsible for:

4.5.1 assigning a unique number to each CAR;

4.5.2 tracking the status of all CARs;

4.5.3 distributing copies of the CAR when a response due date has been determined and when closure has occurred; and R

4.5.4 maintaining the CAR files.

4.6 TECHNICAL PERSONNEL

Technical personnel are responsible for:

4.6.1 identifying and reporting conditions adverse to quality; and

4.6.2 assisting in determining the significance of conditions adverse to quality.

5.0 GENERAL

5.1 All SAIC personnel are required to report deficiencies in activities or items upon discovery. Most deficiencies are documented and resolved using Nonconformance Reports (NCRs) per QAAP 15.1; however, a CAR will be prepared upon detection of programmatic or significant deficiencies.

5.2 If an apparent deficiency is identified by an outside organization (e.g., the U.S. Environmental Protection Agency), the QA/QC Officer initiates the required actions to comply with that organization's requirements in accordance with this procedure.

5.3 The status of each CAR will be tracked by the CAR Coordinator from submittal to closure.

5.4 CARs will be analyzed for trends by the QA/QC Officer.

5.5 The QA/QC Officer, with concurrence of the Program or Project Manager, has the responsibility to recommend to the Contract Officer to stop work in situations that warrant it. For example:

- continuing work could result in an immediate hazard to personnel safety or the environment.

- work is being conducted under an inadequate QA program such that the quality of work or resulting items is unacceptable or indeterminate and is likely to result in failure to deliver an acceptable product.

6.0 PROCEDURE

6.1 DEFICIENCY REPORTING

6.1.1 SAIC personnel will notify the QA/QC Officer of the apparent deficiency within one work day.

6.1.2 If a deficiency is a result of an audit or surveillance, the Lead Auditor or Surveillance Leader will monitor the CAR status and ensure that adequate corrective actions are implemented.

6.1.3 The QA/QC Officer and Task Leader will determine whether immediate corrective measures are needed to prevent degradation or loss to SAIC. These measures will be recorded on the CAR.

6.1.4 Where items or services are suspected to be deficient, the QA/QC Officer and the Task Leader will take action to mark, segregate, or otherwise control use of these items or services to preclude their inadvertent use until disposition is final and approved.

6.2 INITIAL EVALUATION

6.2.1 The QA/QC Officer will determine the significance of all reported deficiencies.

6.2.2 If it is determined that a deficiency is significant, the QA/QC Officer will initiate a CAR. Examples of significant deficiencies are:

a) serious errors in design, construction, or fabrication which were detected subsequent to formal quality verification and acceptance;
b) serious errors in the execution or results of scientific investigations, performance assessments, or performance confirmation that were detected subsequent to acceptance of the resulting data;
c) a breakdown in a QA program (i.e., failure of an organization to establish and implement prescribed QA and technical requirements, plans, and procedures);
d) deficiencies that may require stopping work;
e) repetitive deficiencies;

f) deficiencies in which previous corrective action has been ineffective; and
g) failure to meet governing regulatory requirements.

6.2.3 If a condition adverse to quality exists, but does not meet the criteria in 6.2.2, the QA/QC Officer will recommend initiation of a Nonconformance Report (NCR) in accordance with QAAP 15.1 (Reference 3.1.2).

6.3 <u>CORRECTIVE ACTION REPORT</u>

6.3.1 For significant deficiencies the QA/QC Officer or designee will initiate and complete the following on the CAR, a full size form is provided immediately following this procedure: R

a) date;
b) CAR number;
c) revision number;
d) assessment or NCR number, if applicable;;
e) Initiator;
f) Category; R
g) responsible organization;
h) description of condition;
i) recommended corrective action; and
j) response due date.

6.3.2 The QA/QC Officer will evaluate the need to suspend affected work and take appropriate actions.

6.3.3 Each CAR will be reviewed, concurred with, and signed by the Program or Project Manager or other appropriate level of management.

6.3.4 A response due date of twenty (20) working days from the date of issue will be assigned to the CAR. A planned completion date must be agreed upon by the responsible organization and Task Leader and documented on the CAR.

6.3.5 The CAR Coordinator will enter the CAR into the CAR Log.

6.4 <u>INVESTIGATION</u>

6.4.1 The QA/QC Officer or designee will coordinate an investigation of the deficiency to determine the root cause and assist in the development of measures to prevent recurrence with the responsible organization and Task Leader.

6.4.2 The QA/QC Officer will, with the concurrence of the Program or Project Manager, issue a memorandum to the Contracting Officer recommending to stop work where warranted. The QA/QC Officer, with concurrence of the Program or Project Manager, has the responsibility to recommend to the Contract Officer to stop work in situations that warrant it.

6.4.3 The responsible organization will investigate to determine extent, magnitude, and overall effects of the reported deficiency, and the remedial actions that will be taken to resolve the deficiency. For a CAR, the responsible organization will determine the root cause of the deficiency and what actions will be taken to prevent recurrence of the problem. As applicable, the remedial actions, root cause, extent and effects of the problem, and actions taken to prevent recurrence will be reported to the QA/QC Officer in writing.

6.4.4 The CAR will be signed by the Task Leader and returned to the QA/QC Officer.

6.5 <u>RESOLUTION</u>

6.5.1 The QA/QC Officer will evaluate the CAR response received from the responsible organization to ensure that the corrective action is adequate; that investigation of the problem was sufficient to determine its extent, effects, and root cause; that adequate measures will be taken to prevent recurrence; and that disposition of affected items or services was satisfactory. The extent of the evaluation may range from a review of the documented response to an independent investigation, depending on the significance and complexity of the problem.

6.5.2 If the planned corrective action is determined to be inadequate, the QA/QC Officer will “Reject” the response and provide further instruction to the responsible organization. The CAR may be reissued as the next sequential revision at this time. The responsible organization will conduct further investigations, modify the response as necessary, and resubmit a response to the QA/QC Officer.

6.5.3 If the corrective action is determined to be adequate, the QA/QC Officer will “Accept” the response and the responsible organization will continue with implementation of the corrective action.

6.5.4 The responsible organization will notify the QA/QC Officer of actual completion of the agreed-upon corrective action which will be documented on the CAR.

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6.5.5 The Task Leader will concur with the completed corrective action and so signify by signing the CAR.

6.6 CLOSURE

6.6.1 The QA/QC Officer will evaluate the completed corrective action, as stated on the CAR, to assure that the specific deficiencies, as well as any underlying root causes, were corrected.

6.6.2 The QA/QC Officer or designee will ensure adequate implementation of the corrective action by conducting independent verification such as a surveillance or an audit at the responsible organization's facility at the first available opportunity. Results of the verification will be documented and included with the CAR.

6.6.3 If the corrective action is adequately completed, the CAR will be signed and closed by the QA/QC Officer, after signature by the Program or Project Manager. A copy of the closed CAR will be transmitted to the responsible organization, Task Leader, and Program or Project Manager.

6.6.4 If the corrective action is inadequate, the Task Leader will be notified by the QA/QC Officer to take further actions, and the corrective action process will be repeated in accordance with this procedure. The CAR will be reissued as the next sequential revision.

7.0 RECORDS

Documentation generated as a result of this procedure is collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management.

8.0 ATTACHMENTS

None

CORRECTIVE ACTION REPORT

CORRECTIVE ACTION REPORT	DATE OF CAR	CAR NUMBER
	REVISION NUMBER	PAGE ____ OF ____
REFERENCE ASSESSMENT / NCR NUMBER	INITIATOR (NAME/ ORGANIZATION)	
RESPONSIBLE ORGANIZATION / INDIVIDUAL	CATEGORY	
DESCRIPTION OF CONDITION		
RECOMMENDED CORRECTIVE ACTION		
RESPONSE DUE	QA/QC OFFICER SIGNATURE DATE	PROGRAM / PROJECT MANAGER SIGNATURE DATE
ROOT CAUSE		
MEASURES TO PREVENT RECURRENCE		
PLANNED COMPLETION DATE	TASK LEADER SIGNATURE DATE	
RESPONSE ☐ ACCEPT ☐ REJECT*	QA/QC OFFICER SIGNATURE DATE	PROGRAM/PROJECT MANAGER SIGNATURE DATE
COMPLETION DATE	TASK LEADER SIGNATURE DATE	
CLOSURE DATE	QA/QC OFFICER SIGNATURE DATE	PROGRAM / PROJECT MANAGER SIGNATURE DATE

* ATTACH JUSTIFICATION FOR REJECTION