US Army Corps
of Engineers
Buffalo District

FINAL

SAMPLING AND ANALYSIS PLAN

VOLUME 3 - FIELD STANDARD OPERATING PROCEDURES

TONAWANDA LANDFILL FUSRAP SITE

TONAWANDA, NEW YORK

June 1, 2001

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FIELD STANDARD OPERATING PROCEDURES

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NOTE:

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SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Groundwater Sampling Procedures: Water Level Measurement			
Procedure No: FTP-370	Revision: 0	Date: 6/30/93	Page 1 of 8
Group Manager: [redacted]	Date: 6/29/93	QA/QC Officer: [redacted]	Date: 6/29/93

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 Installation Restoration Program Standard Operating Procedures, Hazardous Waste Remediation Actions Program, Martin Marietta Energy Systems, Inc., October 1991, Procedure FP7-2.

3.1.2 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.3 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.4 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.5 Science Applications International Corporation Environmental Project Management Manual (SAIC EPMM).

3.1.6 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 1215, Use of Field Logbooks.

3.1.7 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 SAIC CORPORATE OFFICER IN CHARGE

The SAIC Corporate Officer in Charge is responsible for oversight of Groundwater Sampling Procedures: Water Level Measurement.

4.2 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.3.1 approving this procedure and

4.3.2 verifying that this procedure is being implemented.

4.4 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.5 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.5.1 ensuring that all personnel are properly trained;

4.5.2 ensuring that this and all appropriate procedures are followed; and

4.5.3 verifying that the appropriate training records are submitted to the Central Records Facility (CRF).

4.6 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.6.3 overall management of field activities.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with U.S. Department of Energy (DOE) and Occupational Safety and Health Administration (OSHA) established standards and requirements.

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for transmittal to the CRF in accordance with subsection 4.5.3.

5.7 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.

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

5.9 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.

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

5.11 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.

5.12 Information related to precipitation is included in the data.

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

5.14 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.

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

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

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

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

5.19 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.

5.20 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.

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.

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, Equipment Decontamination.

6.4.8 Close and lock well cap.

6.4.9 Record information in field logbook in accordance with FTP-1215, Use of Field Logbooks.

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

8.1 Attachment I - Field Checklist

Attachment I
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

____ Manufacturer's Calibration and Instrument Manual

____ Monitoring Equipment (PID, OVA, and Rad Meters)

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Equipment Decontamination

Procedure No: FTP-400	Revision: 0	Date: 8/30/96	Page 1 of 19

Group Manager: [redacted] Date: /27/9 [redacted] Date: /27/96

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 sample activities, but which do 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 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.3 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.4 Science Applications International Corporation. Field Technical Procedure (SAIC FTP) 405, Cleaning and Decontaminating Sample Container 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 Argon Plasma Spectrophotometer scan.

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.

3.2.4 Organic-free Water - Tap water treated with activated carbon and deionizing units or water from a Milli-Q system (or equivalent). This water should not contain pesticides, herbicides, extractable organic compounds, and less than 50 ug/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.

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 water from a tested and approved, water system.

4.0 RESPONSIBILITIES

4.1 GROUP MANAGER

The Group Manager is responsible for:

4.1.1 approving this procedure; and

4.1.2 approving site specific release criteria for radiation decontamination.

4.2 QUALITY ASSURANCE/QUALITY CONTROL OFFICER

The QA/QC Officer is responsible for:

4.2.1 approving this procedure; and

4.2.2 verifying that this procedure is being implemented.

4.3 HEALTH AND SAFETY OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying same by line management.

4.4 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.4.1 designating a qualified person to train personnel who will be using this procedure;

4.4.2 ensuring that all personnel are properly trained;

4.4.3 ensuring that this and all appropriate procedures are followed;

4.4.4 verifying that the appropriate training records are submitted to the Central Records Facility (CRF); and

4.4.5 ensuring that the program/project has adequate and appropriate resources to be performed safely.

4.5 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.5.3 overall management of field activities;

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

4.5.5 ensuring that equipment decontamination is performed safely.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program for control of employee exposure to chemical, radiological, and physical stress which is consistent with the requirements of Occupational Safety and Health Administration (OSHA) established standards and requirements. Clients specific (e.g. Department of Defense) requirements apply on a project specific basis.

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

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

5.4 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. Faceshield, 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.

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

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 for transmittal to the CRF.

5.7 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.

5.8 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.

5.9 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.

5.10 Decontamination of equipment should 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.

5.11 Decontaminated field equipment should be stored upwind of all decontamination activities.

5.12 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.

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

5.14 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.

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

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

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

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 should 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 Health and Safety 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 should 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. Which can be found in the Sampling and Analysis Plan. 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.) cannot be released for unrestricted use. These materials 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.
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 should 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 should be rinsed thoroughly with tap water.
b) All auger flights and bits shall 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 shall 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 should 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 should be wiped with a clean, damp cloth. pH meter probes, conductivity probes, DO meter probes, etc., should 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 should 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 shall 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 shall 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) shall 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 shall 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.) shall 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 shall be used to lubricate drill stem threads or any other drilling equipment being used over the borehole or in the borehole without EPA 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 shall 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 shall 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 shall 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.
- All downhole augering, drilling, and sampling equipment shall 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 shall be performed prior to arrival on site.

- All well casing, tremie tubing, etc., that arrive on-site with printing and/or writing on them shall be removed before Step #1. 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) shall not be solvent rinsed during the cleaning and decontamination process. Used plastic materials that cannot be cleaned are not acceptable and shall be discarded.

Cleaning and decontamination of all equipment shall occur at a designated area on the site, downgradient, and downwind from the clean equipment drying and storage area. The cleaning and decontamination area shall contain a wash water and/or waste pit. The pit and surrounding area shall 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. At the completion of the drilling activities, the pit shall 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 shall be collected in separate containers for proper disposal.

Tap water (potable) brought on the site for drilling and cleaning purposes shall 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 collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management.

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. Oiled 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 nonporous 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.

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 nonporous 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[1]	Removable[2,3]	Total[2,4,5] (fixed plus removable)
U-nat, U-235, U-238, and associated decay products.	1,000 dpm/100 cm^2 alpha	5,000 dpm/100 cm^2 alpha
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20 dpm/100 cm^2	500 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200 dpm/100 cm^2	1,000 dpm/100 2 cm^2
Beta-gamma emitters (Nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above[6].	1,000 dpm/100 cm^2 beta-gamma	5,000 dpm/100 cm^2 beta-gamma

[1] 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.

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

[3] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. (Note - The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. Except for transuranics and Ra-226, Ra-228, Ac-227, Th-228, Th-230, and Pa-231 alpha emitters, it is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

[4] The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 cm^2 is less than three times the guide values. For purposes of averaging, any square meter of surface shall be considered above the guide <u>G</u> if: (1) from measurements of a representative number of n sections it is determined that $1/n\ \Sigma_n\ S_i \geq G$, where S_i is the dis/min-100 cm^2 determined from measurement of section i; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm^2 area exceeds 3G.

[5] For worker and equipment frisking at the K-25 site, Total (Fixed plus removable) surface radioactivity measurements provide the applicable standard.

[6] This category of radionuclides include mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Cleaning and Decontaminating Sample Containers and Sampling Equipment			
Procedure No: FTP-405	Revision: 1	Date: 8/15/00	Page 1 of 13 R
Group Manager: [redacted]	Date: 4/17/00	[redacted]	Date: 8/15/2000

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 "Equipment Decontamination" 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 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, May 1996. R

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.3 Science Applications International Corporation Quality Assurance Program (SAIC QAP). R

3.1.4 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.

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 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.

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 GROUP MANAGER

The Group Manager is responsible for approving this procedure and revisions thereto.

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4.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.2.1 approving this procedure; and

4.2.2 verifying that this and all appropriate procedures are followed.

4.3 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.4 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.4.1 designating a qualified person to train personnel who will be using this procedure;

4.4.2 ensuring that all personnel are properly trained;

4.4.3 ensuring that this and all appropriate procedures are followed;

4.4.4 verifying that the appropriate training records are maintained as permanent records; and R

4.4.5 ensuring that the program/ project has adequate and appropriate resources to be performed safely.

4.5 FIELD MANAGER

The Field Manager or designee is responsible for:

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

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

4.5.3 overall management of field activities; and

4.5.4 ensuring that decontamination activities are performed safely.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with Occupational Safety and Health Administration (OSHA) established standards and requirements and any client-specific requirements. R

5.2 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.

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

5.4 Refer to the site- or project-specific H&S plan for relevant H&S requirements.

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

5.6 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. R

5.7 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.

5.8 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,

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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.

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

5.10 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.

5.11 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.

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

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

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

5.15 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.

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

5.17 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.

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

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

5.20 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.

5.21 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.

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

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

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 at the close of the sampling event prior to being taken off-site.

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.

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 detergentand 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.

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.

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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 collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management.

8.0 ATTACHMENTS

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

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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SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE

Title: Field Measurement Procedures: Operation of Radiation Survey Instruments			
Procedure No: FTP-451	Revision: 2	Date: 10/13/93	Page 1 of 7
Gro[redacted] Date: 10/13/93		QA/QC Officer: [redacted] Date: 10/13/93	

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1.0 PURPOSE

The purpose of this procedure is to describe the operation of selected radiation survey instruments.

2.0 SCOPE

This procedure is limited to ionization chambers, proportional counters, Geiger-Mueller (GM) counters, and scintillatin detectors. Radiation survey instruments are capable of responding to different types and levels of ionizing radiation. This procedure should be considered supplementary to the respective instrument's instruction manual. R

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 Environmental Surveillance Procedures Quality Control Program, Environmental and Safety Activities, Martin Marietta Energy Systems Inc. January 31, 1990, Procedure ESP-307-7.

3.1.2 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.3 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.4 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.5 Science Applications International Corporation Environmental Project Management Manual (SAIC EPMM).

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3.2 DEFINITIONS

3.2.1 Calibration Standard - Radioactive source appropriate to check instrument response.

3.2.2 Ionizing Radiation - Electromagnetic waves or particles with sufficient energy to ionize matter (i.e., to remove or displace electrons from atoms or molecules).

4.0 RESPONSIBILITIES

4.1 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.2.1 approving this procedure and

4.2.2 verifying that this procedure is being implemented.

4.3 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying same by line management.

4.4 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.4.1 designating a qualified person to train personnel who will use this procedure;

4.4.2 ensuring that all personnel are properly trained;

4.4.3 ensuring that this and all appropriate procedures are followed; and

4.4.4 verifying that the appropriate training records are submitted to the Central Records Facility (CRF).

R

4.5 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.5.3 overall management of field activities; and

4.5.4 selecting the proper radiation survey instrument.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with U.S. Department of Energy (DOE) and Occupational Safety and Health Administration (OSHA) established standards and requirements.

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for transmittal to the Central Records Facility.

5.7 The manufacturer's operating instructions accompanied by a summary page are attached to this procedure for each instrument on site. R

5.8 The only types of ionizing radiation are x-rays, gamma rays, alpha particles, beta particles, and neutrons.

R

5.9 Radiation survey instruments will be portable, rugged, sensitive, simple in design and operation, reliable, and intrinsically safe for use in explosive atmospheres.

5.10 In most cases, more than one kind of instrument is needed to ensure that an area is free of radioactive sources or contamination.

5.11 The instrumentation to be discussed herein is limited to ionization chambers, proportional counters, GM Counters, and scintillation detectors.

5.11.1 An Ionization Chamber consists of a gas filled envelope (usually air at atmospheric pressure) with two electrodes at different electrical potential. Ionizing radiation entering the chamber produces ions that migrate toward the electrode because of the applied potential, producing a current. The current requires an amplification to a measurable level before it can be recorded on a meter. These are high-range instruments (low sensitivity) and are used extensively for measuring high intensity beta, gamma, or x-radiation. If no audio indication is possible with the instrument, the operators must be constantly aware of the meter to determine radiation intensity. Ionization chambers do not record individual radiation particles but integrate all signals produced as an electric current to drive the meter. They should be calibrated to the type and intensity of radiation desired to be measured in milliroentgens/hour (roentgens/hour).

5.11.2 The Proportional Counter has a probe with an extremely thin window that allows alpha particles to enter, and so is used extensively for this type of radiation by adjusting instrument parameters to discriminate against beta and gamma radiation. The meter is read in counts per minute, and usually has several sensitivity scales. It should be noted that becasue of the nature of alpha particles, it is important to hold the probe as close as possible to (though not in contact with) the surface being monitored. The window of the proportional counter is delicate in construction, requiring care when being used as a field instrument.

5.11.3 GM Counters operate principally in the same manner as ionization chambers except that secondary electrons are formed allowing greater sensitivity. They are very sensitive and are commonly used to detect low level gamma and/or beta radiation. Meters are read in counts/ minute or milliroentgens/hour. The gas amplification process inherent to this type of detector allows a single beta particle or gamma photon to R

R

be detected. It should be noted that these devices are sensitive instruments and care should be taken not to exceed their maximum capacity to prevent damage to the GM tube.

5.11.4 Scintillation Detectors depend upon light produced when ionizing radiation interacts with a media (solid crystal used in survey instruments). They are extremely sensitive instruments used to detect alpha, beta, or gamma radiation simply by choosing the correct crystal. Alpha particles are detected with a silver activated zinc sulfide screen, beta radiation with an anthracene crystal (covered with a thin metal foil to screen alpha particles), and gamma or x-ray with a sodium iodide crystal. The instrument can be calibrated in the same manner as for ion chambers and GM instruments. The operator should keep in mind that in older models the detector may be damaged if directly exposed to light without first disconnecting the voltage.

6.0 PROCEDURE

6.1 Choose an instrument that is consistent with the investigative requirements. The selection of the appropriate instrument is based on the suspected contaminant radionuclide, the type of radiation emitted, and the efficiency of the instrument to detect the radiation.

6.2 See the manufacturer's operating instructions prior to use. Operate the instrument as per manufactuer'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. R

6.3 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.

6.4 Record measurements in the appropriate field logbook. R

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.

R

8.0 ATTACHMENTS

8.1 Attachment I - Field Checklist

8.2 Attachment II - A summary sheet and the manufacturer's operating instructions are attached for each project requirement. R

R

Attachment I
Field Checklist

_____ Appropriate Radiation Survey Instruments

_____ Calibration Standard-Radiation 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 Manual

_____ Decontamination Equipment

*When specified by the site-specific H&S plan.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Soil Sampling using an Auger			
Procedure No: FTP-525	Revision: 1	Date: 8/11/00	Page 1 of 6 R
Group Manager: [redacted]	Date: 8/17/00	QA/QC Officer: [redacted]	Date: 8/8/2000

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 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, May 1996. R

3.1.2 Science Applications International Corporation Quality Assurance Administration Procedures (SAIC QAAPs).

3.1.3 Science Applications International Corporation Quality Assurance Program (SAIC QAP). R

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

3.1.5 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 1215, Use of Field Logbooks.

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

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

3.1.9 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.

4.0 RESPONSIBILITIES

4.1 SAIC CORPORATE OFFICER IN CHARGE

The SAIC Corporate Officer in Charge is responsible for the oversight of Soil Sampling using an Auger

4.2 GROUP MANAGER

The Group Manager is responsible for approving this procedure and revisions thereto. R

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.3.1 approving this procedure and

4.3.2 verifying that this procedure is being implemented.

R

4.4 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.5 PROGRAM AND PROJECT MANAGER

The Program or Project Manager is responsible for:

4.5.1 ensuring that all personnel are properly trained;

4.5.2 ensuring that this and all appropriate procedures are followed; and

4.5.3 verifying that the appropriate training records are maintained as permanent records. R

4.6 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.6.3 overall management of field activities.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress, which is consistent with Occupational Safety and Health Administration (OSHA) established standards and requirements, and any client-specific requirements. R

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

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

R

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S 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. R

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

5.7 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.

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

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

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.

R

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.). R

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.

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, Use of Field Logbooks and FTP-625, Chain-of-Custody.

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. R

R

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

R

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.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Water Sampling Using a Dipper			
Procedure No: FTP-577	Revision: 1	Date: 9/15/00	Page 1 of 6
[redacted] Date: 9/17/00	[redacted] Date: 9/13/2000		

1.0 PURPOSE

The purpose of this procedure is to describe the standard methods used for sampling surface waters using a dipper.

2.0 SCOPE

This procedure applies to samples used to obtain physical, chemical, or radiological data. The resulting data may be qualitative or quantitative in nature and are approximate for use in preliminary surveys and confirmatory surveys.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, May 1996.

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.3 Science Applications International Corporation Quality Assurance Program (SAIC QAP).

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

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

3.1.6 Science Applications International Procedure (SAIC) Field Technical Procedure (FTP) 650, Labeling, Packing and Shipping of Environmental Field Samples.

3.1.7 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 1215, Use of Field Logbooks.

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 GROUP MANAGER

The Group Manager is responsible for approving this procedure and revisions thereto. R

4.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.2.1 approving this procedure; and

4.2.2 verifying that this and all appropriate procedures are followed.

4.3 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.4 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.4.1 ensuring that all personnel are properly trained;

4.4.2 ensuring that this and all appropriate procedures are followed; and

4.4.3 verifying that the appropriate training records are maintained as permanent records. R

R

4.5 FIELD MANAGER

The Field Manager or designee is responsible for:

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

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

4.5.3 overall management of field activities.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with Occupational Safety and Health Administration (OSHA) established standards and requirements and any client-specific requirements. R

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

5.6 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. R

5.7 A pond sampler, or extended dipper allows sampling of streams, ponds, waste pits, and lagoons as much as 15 feet from the bank or other secure footing for the sampling technicians, (See Attachment I).

5.8 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.

 R

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

6.0 PROCEDURE

6.1 Use plastic sheeting as ground cover for staging of equipment and/or materials, as necessary, to prevent equipment from coming in contact with contaminated surfaces.

6.2 Don clean gloves and select appropriate sample bottles, add preservative if necessary, and place them ready for use. R

6.3 If collecting the sample while in a boat or standing in a stream, ensure that the sample is collected upstream from sampler's position and upstream from where flow measurements were taken. New latex gloves are donned prior to collecting each sample.

6.4 Submerge a clean dipper slowly into the water to avoid splashing or mixing. Collect samples upstream from any area previously disturbed by sampling activity.

6.5 Slowly lift the dipper from the water surface. Unless specified in the SAP, avoid floating materials.

6.6 When volatile organic analysis (VOA) is to be performed, extreme care must be taken to avoid disturbing or aerating the sample. R

6.7 This procedure will not be used when a significant amount of material might remain on the dipper when pouring into the sample bottle. In this situation, refer to the SAP.

6.8 Remove the cap from the sample bottle, and tilt the bottle slightly.

6.9 Pour the sample slowly from the dipper down the inside of the sample bottle. Avoid splashing of the sample.

6.10 Leave adequate air space in the bottle to allow for expansion, except for VOA vials.

R

6.11 Label the bottle carefully and clearly in accordance with FTP-650, Labeling, Packaging and Shipping of Environmental Field Samples. Enter all information accurately, and check to be sure it is legible.

6.12 Packaging, labeling, and shipment are implemented in accordance with FTP-650, Labeling, Packaging and Shipping of Environmental Field Samples. R

6.13 Complete field logbook and chain-of-custody forms in accordance with procedures FTP-1215, Use of Field Logbooks and FTP-625, Chain-of-Custody.

7.0 RECORDS

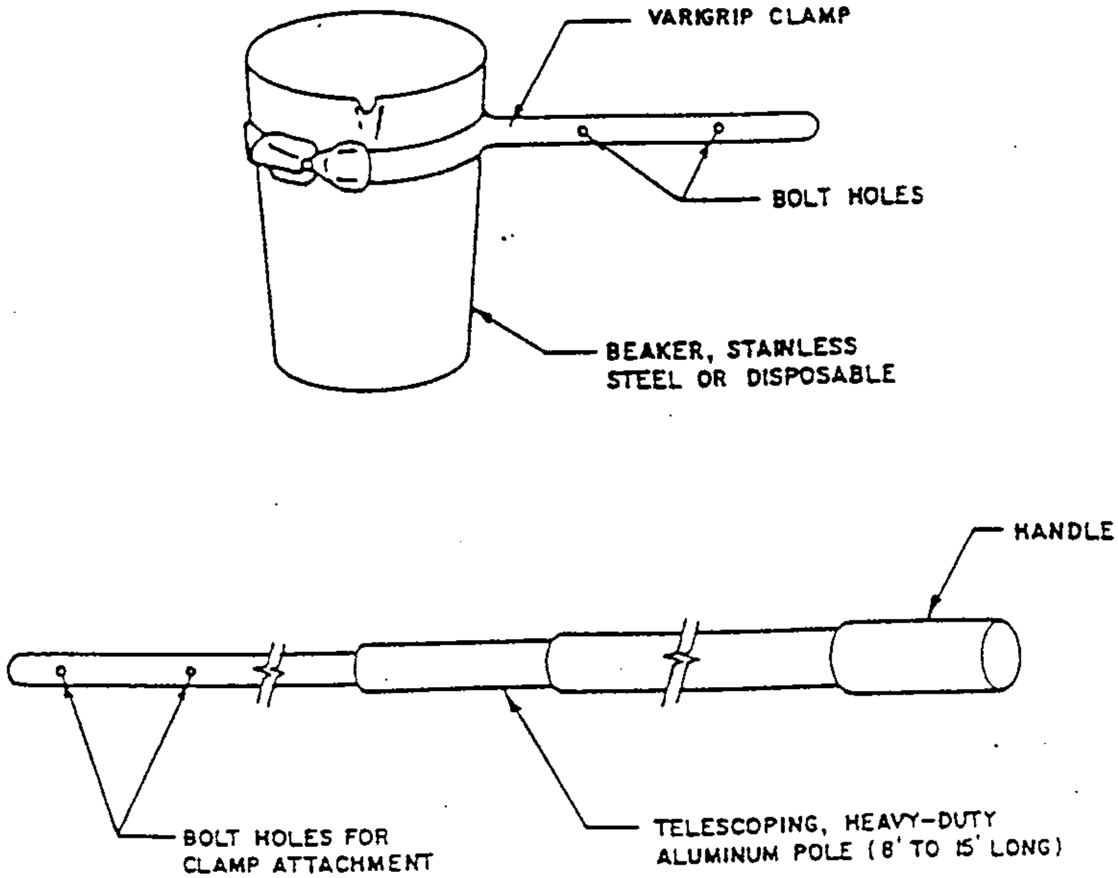
Documentation generated as a result of this procedure is collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management.

8.0 ATTACHMENTS

8.1 Attachment I - Pond Sampler

R

Attachment I
Pond Sampler



Field Checklist

____Dipper

____Pond Sampler, if necessary

____Logbook

____Sample Bottles w/Lids

____Safety Equipment

____Ice/Cooler, as required

____Health and Safety Plan

____Sampling and Analysis Plan

____Appropriate Containers for Waste and Equipment

____Quality Assurance Project Plan (QAPjP)

____Work Plan

____ Pipettes

____ Litmus Paper

____ Sample Tags

____ Extra Sample Jars

____ Black Indelible Pen

____ Labels and Tags

____ Lab Wipes

____ Decontamination Equipment

____Chain-of-Custody Forms

____Custody Seals, as required

____Chemical Preservatives, as required

____Plastic Sheeting

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

CONTROLLED NO. 21 THIS IS A RED STAMP COPY

Title: Soil Sampling Using a Spade or a Scoop			
Procedure No: FTP-550	**Revision: 1**	**Date: 8/11/00**	**Page 1 of 5** R
Group Manager: [redacted]	**Date:** 4/17/00	**QA/QC Officer:** [redacted]	**Date:** 8/8/2000

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 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, May 1996. R

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.3 Science Applications International Corporation Quality Assurance Program (SAIC QAP). R

3.1.4 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 1215, Use of Field Logbooks.

3.1.5 Science Applactions International Corporation Field Technical Procedure (SAIC FTP) 400, Equipment Decontamination.

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

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

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 SAIC CORPORATE OFFICER IN CHARGE

The SAIC Corporate Officer in Charge is responsible for oversight of Soil Sampling Using a Spade or a Scoop.

4.2 GROUP MANAGER

The Group Manager is responsible for approving this procedure and revisions thereto. R

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.3.1 approving this procedure and

4.3.2 verifying that this procedure is being implemented.

4.4 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.5 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.5.1 ensuring that all personnel are properly trained;

4.5.2 ensuring that this and all appropriate procedures are followed; and

4.5.3 verifying that the appropriate training records are maintained as a permanent record. R

4.6 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.6.3 overall management of field activities;

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

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

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with and Occupational Safety and Health Administration (OSHA) established standards and requirements, and any client-specific requirements. R

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for retention as permanent records. R

5.7 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.

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

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

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

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

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

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

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. R

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, Use of Field Logbooks and FTP-625, Chain-of-Custody.

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 collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management.

8.0 ATTACHMENTS

None. R

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

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Groundwater Sampling Procedures: Using a Bailer			
Procedure No: FTP-600	Revision: 0	Date: 6/30/93	
Group Manager: [redacted]	Date: 6/29/93	QA/QC Officer: [redacted]	Date: 6/29/93

1.0 PURPOSE

The purpose of this procedure is to describe the standard method for collecting groundwater samples using a bailer.

2.0 SCOPE

This procedure applies to collection of groundwater samples used to obtain physical, chemical, or radiological data.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 Environmental Surveillance Procedures Quality Control Program, Environmental and Safety Activities, Martin Marietta Energy Systems, Inc., January 31,1990, Procedure ESP-302-3.

3.1.2 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.3 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.4 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.5 Science Applications International Corporation Environmental Project Management Manual (SAIC EPMM).

3.1.6 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 1215, Use of Field Logbooks.

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

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

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

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 SAIC CORPORATE OFFICER IN CHARGE

The SAIC Corporate Officer in Charge is responsible for oversight of Groundwater Sampling Procedures: Using a Bailer.

4.2 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.3.1 approving this procedure and

4.3.2 verifying that this procedure is being implemented.

4.4 HEALTH & SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.5 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.5.1 ensuring that all personnel are properly trained;

4.5.2 ensuring that this and all appropriate procedures are followed; and

4.5.3 verifying that the appropriate training records are submitted to the Central Records Facility (CRF).

4.6 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.6.3 overall management of field activities.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with U.S. Department of Energy (DOE) and Occupational Safety and Health Administration (OSHA) established standards and requirements.

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for transmittal to the Central Records Facility in accordance with subsection 4.5.3.

5.7 Bailers will be constructed of stainless steel or Teflon and will be bottom loading. The SAP typically specifies appropriate size of bailer.

5.8 The cord will be compatible with analytes (i.e., stainless steel, Teflon, nylon, polyethylene). Materials are typically specified in the SAP. Braided cord will not be reused or decontaminated, but may be dedicated.

5.9 Only bottom loading stainless steel or Teflon bailers will be used. The use of bailers with bottom emptying devices is highly recommended to reduce spillage and sample agitation. See Attachment II.

5.10 Wells will have dedicated bailers to minimize cross-contamination.

5.11 Only unused, decontaminated, or dedicated cord will be used.

5.12 A reel for winding the cord is useful in raising and lowering the bailer.

5.13 Refer to a site-specific H&S Plan for detailed H&S procedures. This plan will be reviewed by the Field Manager prior to beginning work.

6.0 <u>PROCEDURE</u>

6.1 Don appropriate personal protective equipment prior to any field activities.

6.2 Place plastic sheeting around base of well and in work area to prevent equipment from coming in contact with contaminated surfaces.

6.3 Unlock and remove the well cap, note condition of well.

6.4 Prior to sampling, check the well with photon ionization detector (PID), radiation meters, and/or other appropriate instruments. Record sampling station number, sample I.D., date, time, weather conditions, and any other well-specific, pertinent information (i.e., water level, presence of product).

6.5 Remove decontaminated bailer from protective covering or dedicated bailer from well casing, attach cord if necessary, allowing enough length for bailer to reach bottom of well.

6.6 Select appropriate sample bottle, add preservatives, if necessary, and place them ready for use. Lower bailer slowly to the interval from which the sample is to be collected.

6.7 Allow bailer to fill with a minimum of surface disturbance to prevent sample water aeration.

6.8 Raise bailer to surface, feeding cord into container, reel, or place onto clean plastic sheeting. Do not allow bailer cord to contact ground.

6.9 Remove the cap from the sample bottle, and tilt the bottle slightly.

6.10 Pour the sample slowly down the inside of the sample bottle. Avoid splashing of the sample.

6.11 Leave adequate air space in the bottle to allow for expansion, except for volatile organic analysis (VOA) flasks which are filled with no air present and capped.

6.12 Label the bottle carefully, and clearly. Enter all information accurately, and check to be sure it is legible.

6.13 Samples are placed in containers defined according to needs, and then, when appropriate, packed in ice as soon as possible. Packaging, labeling, and preparation for shipment are implemented in accordance with FTP-650, Packaging and Shipping of Field Samples.

6.14 Complete field logbook and chain-of-custody forms in accordance with procedures FTP-1215, Use of Field Logbooks and FTP-625, Chain-of-Custody.

6.15 Replace bailer if dedicated; replace well cap and lock.

6.16 Sampling tools, instruments, and equipment are protected from sources of contamination prior to use and decontaminated after use as specified in FTP-400, Equipment Decontamination.

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

8.1 Attachment I - Field Checklist

8.2 Attachment II - Typical Bottom Loading Bailer

Attachment I
Field Checklist

____ Bailer

____Container, Reel or Plastic Sheeting to Collect Cord

____Cord*

____Logbook

____Sample Containers with Lids

____Safety Glasses or Monogoggles

____ Safety Shoes, if required

____Ice/Cooler, as required

____Custody Seals, as required

____Plastic Sheeting

____Pipettes

____Bucket of Known Volume

____Black Indelible Pen

____Labels and Tags

____Sampling and Analysis Plan

____Health and Safety Plan

____Waste Management Plan

____Decontamination Equipment

____Lab Wipes

____Appropriate Containers for Waste and Equipment

____Monitoring Equipment

____Preservatives

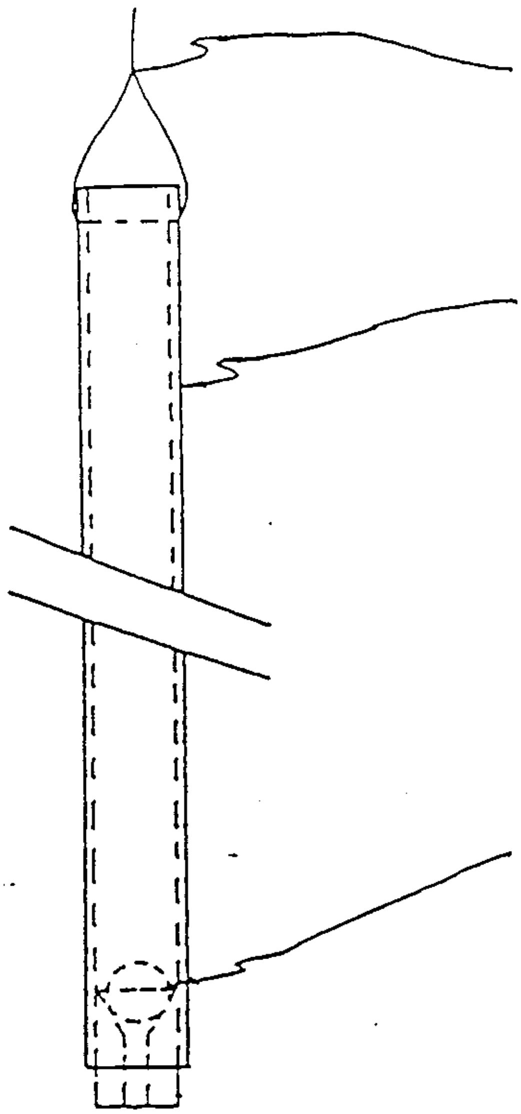
____Litmus Paper

____Sampling Forms

____Keys for Well Lock

*Refer to SAP for Approved Material

Attachment II



Note: (1) Dimensions may vary

(2) Adhesive may not be used to construct bailer

Title: Chain-of-Custody			
Procedure No: FTP-625	Revision: 0	Date: 8/30/96	Page 1 of 10
Group [redacted]	Date: [redacted]/27/96	[redacted]	Date: 8/27/96

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 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.2 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.3 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

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 numbered pages containing at a minimum a table of contents, task team activity log sheets, and sample log sheets. Field logbooks are used to permanently record information pertaining to the actual sample collection event.

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 SAIC CORPORATE OFFICER IN CHARGE

The SAIC Corporate Officer in Charge is responsible for oversight of Chain-of-Custody activities.

4.2 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.3.1 approving this procedure and

4.3.2 verifying that this procedure is being implemented.

4.4 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying same by line management.

4.5 PROGRAM OR PROJECT MANAGER

The Program/Project Manager is responsible for ensuring that this and all appropriate procedures are followed.

4.6 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.6.3 overall management of field activities;

4.6.4 assuming custody of the collected samples in the field until he or she properly transfers them to a Sample Manager, to a courier, or directly to the laboratory.

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

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with Occupational Safety and Health Administration (OSHA) established standards and requirements. Client specific (e.g., Department of Energy or Department of Defense) requirements apply on a project-specific basis.

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for transmittal to the CRF.

5.7 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.

6.2.2 Sample labels are affixed to all sample containers prior to or at the time of sampling. To the extent practicable, sample bottles are labeled prior to filling.

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.

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 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 sample is taken to record the Chain of Custody number.

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;
j) signatures of person relinquishing custody and person accepting custody each time custody is transferred from one individual to another;
k) date and time of each transfer.

6.5.3 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.

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

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.

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.

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.

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, date, and time the appropriate box on the chain-of-custody form.

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. All samples are stored under refrigeration with custody seals affixed. Keys to the secure area are kept by the Shipping Coordinator, Field Sampling Leader, or designee.

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 field 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.

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.

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

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

Attachment I
(Example)

SAIC An Employee-Owned Company
Science Applications International Corporation

CHAIN-OF-CUSTODY RECORD

Nº S00828

PROJECT NAME:	#	GC/MS	GC	INORGANICS	OTHER	SAMPLING INFO	REMARKS
PROJECT NUMBER:	No. of Bottles/Vials	624-8240, 625-8270, CLP-VOA, CLP-SVOA, Other:	601-8010, 602-8020, 608-8080, 8140, CLP Pest/PCBs, Herbicides, Other:	Metals, Cyanide, CLP Metals, Other:	TOC, TOX, Oil & Grease, Pet. Hydro., Phenols, Neutron Activation, MATRIX: Water/Soil/Sediment	DATE / TIME	
SAMPLERS (SIGNATURE)							
PRINTED NAME							
CLIENT ID (9 CHARACTERS): 1 2 3 4 5 6 7 8 9							

RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	SHIPPING INFORMATION
COMPANY NAME:		COMPANY NAME:		COMPANY NAME:		Number of Shipping Containers:
RECEIVED BY:	Date/Time	RECEIVED BY:	Date/Time	RECEIVED BY:	Date/Time	Method of Shipment
COMPANY NAME:		COMPANY NAME:		COMPANY NAME:		
RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	Special Handling Requirements
COMPANY NAME:		COMPANY NAME:		COMPANY NAME:		

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

CONTROLLED No. 47 THIS IS A RED STAMP

Title: Labeling, Packaging and Shipping of Environmental Field Samples			
Procedure No: FTP-650	Revision: 1	Date: 2/11/2000	Page 1 of 13 R
Group Manager: [redacted] Date: 2/12/00	QA/QC Officer: [redacted] Date: 2/4/2000		

1.0 PURPOSE

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

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

3.1.2 Code of Federal Regulations, Title 49, Transportation.

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

3.1.4 Science Applications International Corporation, Quality Assurance Administrative Procedures (SAIC QAAP).

3.1.5 Science Applications International Corporation, Quality Assurance Program (SAIC QAP). R

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

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

3.1.8 Science Applications International Corporation, Field Technical Procedure (SAIC FTP) 1200, Field Quality Control. R

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.2.1 approving this procedure; and

4.2.2 verifying that this procedure is being implemented.

4.3 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.4 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.4.1 designating a qualified person to train personnel who will be using this procedure;

4.4.2 ensuring that all personnel are properly trained;

4.4.3 ensuring that this and all appropriate procedures are followed;

4.4.4 verifying that the appropriate training records are submitted to the Central Records Facility (CRF); and

4.4.5 ensuring that the program/ project has adequate and appropriate resources to be performed safely.

4.5 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.5.3 overall management of field activities; and

4.5.4 ensuring that sample packaging and shipping is performed safely.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with Occupational Safety and Health Administration (OSHA) established standards and requirements. Client specific (e.g., Department of Energy or Department of Defense) requirements apply on a project-specific basis.

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S 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 transmittal to the CRF.

5.6 Receivers and carriers are to 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.

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5.7 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. The requested analysis, sample date and time, and preservative will also be presented on the sample label. R

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

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

5.10 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.

5.11 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.

5.12 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.

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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 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.

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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.

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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. DOT letters of interpretation specifically exclude preserved water samples from this class if the weight percent of preservative(s) in the samples is less than specified limits. (See Attachment I).

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); R
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) 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;
h) Place the sample container upright in the cooler;
i) Add sufficient ice to maintain the samples at the required temperature and include a temperature blank, when required;
j) Fill the cooler with appropriate sorbent/ padding;
k) Tape the liner shut;
l) Seal the laboratory paperwork inside a plastic bag and tape it to the inside of the cooler lid;
m) Place signed custody seals on the front and back of the cooler; and
n) 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 m) 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.

a) Identify the appropriate packaging by referring to IATA Dangerous Goods Regulations (for air shipments) or 49 CRF (DOT) for surface shipments, or by contacting other sources such as the air carrier's hazardous materials department;
b) Pack the sample(s) in the appropriate packaging;

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c) Mark each outer package with the proper shipping name, hazard class, packaging group, UN/ NA ID number, shipper's or consignee's name, address and telephone number, and "this end up" labels if inner containers hold liquid hazardous material;
Note: Most of these marking requirements are fulfilled by the dangerous goods airbill.

d) Affix a label indicating the DOT/ IATA hazard class on at least two sides of the package and next to the proper shipping name unless there is a limited quantity exemption.

6.3 ASSOCIATED DOCUMENTATION

6.3.1 Environmental Samples

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

6.3.2 Hazardous Materials/ Dangerous Goods

Bill of Lading- If the sample is hazardous materials/ dangerous goods, the hazardous materials/ dangerous goods bill of lading must be prepared in addition to the documents required for an environmental sample. Information on the bill of lading must include; identity of hazardous materials by proper DOT shipping description, the quantity of each hazardous material, emergency response information, the date, an emergency number (619-546-6965), the shipper, the carrier, and the consignee.
Note: The air carrier's dangerous goods airbill meets the requirements for the bill of lading.

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.

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8.0 ATTACHMENTS

8.1 Attachment I - Table 1, Limits of Water Sample Preservative Excluded from DOT Regulation

8.2 Attachment II - Custody Seal and Sample Label (Examples)

8.3 Attachment III- Cooler Shipping Description Log (Example)

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Attachment I
Table 1
Limts of Water Sample Preservative Excluded from DOT Regulation

(Water samples that fall within the categories below are not hazardous materials)

Preservative	Weight percent of preservative[1]	Approximate pH[2]	Approximate quantity added to water sample[3]
HCl	≤ 0.04%	≥ 1.96	≤ 1.1 mL of conc. (38%)/ L
$HgCl_2$	≤ 0.004%	NA	≤ 40mg/L
HNO_3	≤ 0.15%	≥ 1.62	≤ 2.1 mL of conc. (70%)/ L
H_2SO_4	≤ 0.35%	≥ 1.15	≤ 2mL of 36 N/L
NaOH	≤ 0.08%	≤ 12.3	≤ 2mL of 10 N/L

1. The DOT letters of interpretation exclude water samples from treatment as hazardous material if the weight percent of preservative is less than these concentrations. The numbers in this column are from the EPA regulations (40 CFR 136.3(e) footnote to Table II, revised April, 1994) because that is the reference quoted by DOT Hotline personnel.

2. The EPA (40 CFR 136.3(e) footnote to Table II, revised April, 1994) provides these pH levels as corresponding with the maximum concentration of acid or base added to distilled water.

3. This column presents the quantity of preservative (calculated by SAIC) required to reach the DOT weight percent limits.

Attachment II

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____________________

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Attachment III
(Example)

COOLER SHIPPING DESCRIPTION LOG

PROJECT NAME: ____________________ PROJECT NO. __________

COOLER NO: ________ AIR BILL NO. __________ DATE: __________

COOLER CONTENT INFORMATION

TOTAL NUMBER OF SAMPLES IN COOLER: __________

ALL SAMPLES CLASSIFIED AS ENVIRONMENTAL: YES ___ NO ___

IF NO, NUMBER OF SAMPLES IN THE FOLLOWING CATEGORIES:

Flammable liquid - DOT/IATA Class 3 ______

Poisonous material - DOT/IATA Class 6 ______

Radioactive material - DOT/IATA Class 7 ______

Corrosive material - DOT/IATA Class 8 ______

Hazardous waste/substance - DOT/IATA Class 9 ______

APPROVAL TO SHIP: YES ___ NO ___

SIGNATURE: ____________________
(Shipper)

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Chemical Analysis			
Procedure No: FTP-655	Revision: 0	Date: 6/30/93	Page 1 of 8
Gr[redacted]	Date: 6/29/93	QA/QC Officer: [redacted]	Date: 6/29/93

1.0 PURPOSE

The purpose of this procedure is to provide guidance for the selection of the appropriate analytical methodology.

2.0 SCOPE

This procedure applies to chemical analytical testing protocols for environmental surveillance.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 Environmental Surveillance Procedures Quality Control Program, Environmental and Safety Activities, Martin Marietta Energy Systems, Inc. January 31, 1990, Procedure ESP-700.

3.1.2 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.3 Science Applications International Corporation Environmental Project Management Manual (SAIC EPMM).

3.1.4 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.5 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.6 Data Quality Objectives for Remedial Response Activities, EPA/540/G-87/003 and 004, U.S. Environmental Protection Agency, Washington, D.C., 1987.

3.1.7 U.S. Environmental Protection Agency Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, October 1986.

3.1.8 U.S. Environmental Protection Agency Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW no. 787, July 1987.

3.1.9 Test Methods for Evaluating Solid Waste, SW-846 3rd Edition, U.S. Environmental Protection Agency, Washington, D.C.

3.1.10 Methods for Chemical Analysis of Water and Wastes, EPA-600/4-84-017, U.S. Environmental Protection Agency, Washington, D.C. 1984

3.1.11 Federal Register, Volume 44, 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the "Clean Water Act."

3.1.12 Standard Methods for the Examination of Water and Wastewater, 16th Edition, Washington, D.C. 1985

3.1.13 Annual Book of American Society for Testing and Materials Standards, American Society for Testing and Materials, Philadelphia, Pennslyvania (Most Current Version).

3.1.14 Environmental and Effluent Analysis Manual, Martin Marietta Energy Systems, Inc. 1977 (in revision).

3.1.15 Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water, available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268, September 1986

3.1.16 Methods for Organochlorine Pesticides and Chlorphenoxyacid Herbicides in Drinking Water and Raw Source Water, available from ORD Publications, CERI, EPA, Cincinnati, Ohio 45268.

3.1.17 Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA-600/4-80—032, U.S. Environmental Protection Agency.

3.2 DEFINITIONS

None.

6.6 REGULATORY REQUIREMENTS

6.6.1 Samples collected must be analyzed in accordance with applicable regulatory requirements, as appropriate.

6.6.2 Such requirements may dictate the detection limits to be achieved or, more specifically, the analytical methods to be used.

6.7 ANALYTICAL FACILITY

6.7.1 The laboratory personnel will advise on limitations and method preferences of the analytical facility. It should be noted that most laboratories have restrictions on the limit of radioactivity that they may receive.

6.7.2 Guidance will be sought from the receiving laboratory prior to sampling and transporting.

6.8 COST

6.8.1 After all other factors have been considered, and if a choice of methodology remains, select the most cost-effective method of analysis.

6.8.2 All method selections must meet the objectives of the SAP.

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.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Composite Procedures			
Procedure No: FTP-691	Revision: 0	Date: 6/30/93	Page 1 of 7
G[redacted] Date: 6/29/93		[redacted] Date: 6/29/93	

1.0 PURPOSE

The purpose of this procedure is to outline methods that may be used for field compositing of samples.

2.0 SCOPE

This procedure applies to compositing according to sample matrix (i.e., wastewater, solid material, and containerized waste). This procedure does not apply to sample collection, but rather to combining samples in preparation for testing.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 Environmental Surveillance Procedures Quality Control Program, Environmental and Safety Activities, Martin Marietta Energy Systems, Inc., January 31, 1990, Procedure ESP-308-1.

3.1.2 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.3 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.4 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.5 Science Applications International Corporation Environmental Project Management Manual (SAIC EPMM).

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

3.1.7 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 1215, Use of Field Logbooks

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

3.1.9 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 693, Container Sampling: Drums and Barrels.

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

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 SAIC CORPORATE OFFICER IN CHARGE

The SAIC Corporate Officer in Charge is responsible for oversight of Composite Procedures.

4.2 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.3.1 approving this procedure and

4.3.2 verifying that this procedure is being implemented.

4.4 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.5 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.5.1 ensuring that all personnel are properly trained;

4.5.2 ensuring that this and all appropriate procedures are followed; and

4.5.3 verifying that the appropriate training records are submitted to the Central Records Facility (CRF).

4.6 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.6.3 overall management of field activities;

4.6.4 determining which method will be used for composite sampling of discharge water; and

4.6.5 ensuring that composite samples are compatible and are collected uniformly.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program for control of employee exposure to chemical, radiological, and physical stress which is consistent with U.S. Department of Energy (DOE) and Occupational Safety and Health Administration (OSHA) established standards and requirements.

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for transmittal to the CRF in accordance with subsection 4.5.3.

5.7 Solid sample composite aliquots must be well mixed and of equal proportion before compositing.

5.8 Discharged water composite samples may be a timed-composite or a flow-proportional-composite, and may be continuously or grab sampled.

5.9 Containerized waste must be determined compatible before compositing is performed.

5.10 All aliquots must be of equal or known proportions.

5.11 Composite sampling is conducted at the beginning of field activities to locate the general areas of contamination without having to analyze a large number of samples.

5.12 Anomalous or suspected highly contaminated samples will be brought to the attention of the Field Manager.

6.0 PROCEDURE

6.1 Pyrex bowls may be substituted for stainless steel bowls. Samples are homogenized before placing in containers except for volatile organic analysis (VOA).

6.2 Compositing discharge water samples fall into two categories: timed composite sample collection and flow proportional composites.

6.2.1 Timed composite sample collection may be continuous or grab-collected. Samples that are grab-collected must be of equal periods of time and equal volume.

6.2.2 There are three methods of flow proportional compositing:

a) continuous collect;
b) collected having constant sample volume with time interval between samples proportional to flow rate; and
c) collected having equal time interval between samples and sample volume proportional to flow rate.

6.3 Containerized waste is sampled according to FTP-693, Container Sampling: Drums and Barrels.

6.3.1 Composited containerized waste must be compatible and of equal proportions.

6.3.2 The material must be mixed well, especially if it is solid. The solid material may be mixed in a stainless steel bowl with a stainless steel spoon prior to transfer into the sampling container.

6.4 Solid material that is composited must meet the following requirements:

6.4.1 the material must be well mixed;

6.4.2 uniform collection techniques must have been used;

6.4.3 samples must be of equal proportion; and

6.4.4 wipe samples must be collected from surface areas of equal size.

6.5 Sampling tools, instruments, and equipment are protected from sources of contamination prior to use and decontaminated after use as specified in FTP-400, Equipment Decontamination.

6.6 Composite samples are packaged, labeled, and prepared for shipment in accordance with FTP-650, Packaging and Shipping of Field Samples.

6.7 Complete field logbook and chain-of-custody forms in accordance with procedures FTP-1215, Use of Field Logbooks, and FTP-625, Chain-of-Custody.

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

8.1 Attachment I - Field Checklist.

Attachment I
Field Checklist

_____ Sample Collective Devices, as needed

_____ Stainless Steel Bowl, as needed

_____ Stainless Steel Spoon, as needed

_____ Logbook

_____ Sample Containers with Lids

_____ Safety Glasses or Monogoggles

_____ Gloves

_____ Safety Shoes

_____ Appropriate Containers for Waste and Equipment

_____ Black Indelible Pen

_____ Sampling and Analysis Plan

_____ Health and Safety Plan

_____ Manufacturer's Instrument Calibration and Maintenance Manual

_____ Decontamination Equipment

_____ Plastic Sheeting

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Field Measurement Procedures: Organic Vapor Detection			
Procedure No: FTP-750	Revision: 4	Date: 5/5/95	Page 1 of 6
Group Manager: [redacted]	Date: 05/04/95	QA/QC Officer: [redacted]	Date: 05/04/95

R

[redacted]

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. R

2.0 SCOPE

This procedure is meant to serve as a guide to instrument operations rather than an indication that this is the generally preferred method or instrument type. Data gained from these instruments is qualitative and quantitative.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 Environmental Surveillance Procedures Quality Control Program, Environmental and Safety Activities, Martin Marietta Energy Systems, January 31, 1990, Procedure ESP-307-6.

3.1.2 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.3 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.4 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.5 Science Applications International Corporation Environmental Project Management Manual (SAIC EPMM).

3.1.6 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, DHHS (NIOSH) Publication No. 85-115. R

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.2.1 approving this procedure; and

4.2.2 verifying that this procedure is being implemented.

4.3 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.4 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.4.1 designating a qualified person to train personnel who will use this procedure;

4.4.2 ensuring that all personnel are properly trained;

4.4.3 ensuring that this and all appropriate procedures are followed; and

4.4.4 verifying that the appropriate training records are submitted to the Central Records Facility (CRF).

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4.5 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.5.3 overall management of field activities.

5.0 GENERAL

Note: An optional field checklist is provided as Attachment I for the Project Manager's use during mobilization. R

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress, which is consistent with U.S. Department of Energy (DOE) and Occupational Safety and Health Administration (OSHA) established standards and requirements.

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for transmittal to the CRF.

5.7 The manufacturer's operating instructions accompanied by a summary page are attached to this procedure for each instrument on site.

5.8 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.

6.0 PROCEDURE

6.1 Choose an instrument that is consistent with investigative requirements. See requirements in the Health and Safety Plan and the Sampling and Analysis Plan.

6.2 Operate the instrument per the summary sheet(s) and 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 should include breathing zone ($\leq$ 14 inches 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. R

6.5 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

R

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.

6.6 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. R

7.0 <u>RECORDS</u>

Documentation generated as a result of implementing this procedure is collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management. R

8.0 <u>ATTACHMENTS</u>

8.1 Attachment I - Field Checklist (optional) R

8.2 Attachment II - A summary sheet and the manufacturer's operating instructions are attached for each instrument required for a project.

Attachment I (optional)
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
- ______ Instrument-specific Calibration Assembly R
- ______ Decontamination Equipment
- ______ Health and Safety Plan
- ______ Sampling and Analysis Plan

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Field Measurement Procedures: Combustible Gas Detection			
Procedure No: FTP-752	Revision: 3	Date: 9/15/00	Page 1 of 5
Group Manager: [redacted]	Date: 9/17/00	QA/QC Officer: [redacted]	Date: 9/13/2000

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 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, May 1996 R

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.3 Science Applications International Corporation Quality Assurance Program (SAIC QAP). R

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 GROUP MANAGER

The Group Manager is responsible for approving this procedure and revisions thereto. R

4.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.2.1 approving this procedure; and

4.2.2 verifying that this procedure is being implemented.

4.3 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and for verifying enforcement of same by line management.

4.4 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.4.1 designating a qualified person to train personnel who will be using this procedure;

4.4.2 ensuring that all personnel are properly trained;

4.4.3 ensuring that this and all appropriate procedures are followed; and

4.4.4 verifying that the appropriate training records are maintained as permanent records. R

4.5 FIELD MANAGER

The Field Manager is responsible for:

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

R

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

4.5.3 overall management of field activities.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress, which is consistent with Occupational Safety and Health Administration (OSHA) established standards and requirements and any client-specific requirements. R

5.2 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.

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements regarding personnel safety and exposure limits.

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

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 for records purposes. R

5.7 The manufacturer's operating instructions accompanied by a summary page are attached to this procedure for each instrument on site.

5.8 This instrument should be intrinsically safe.

5.9 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.

5.10 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.

5.11 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.

5.12 A combustible gas sensor will not indicate the presence of combustible airborne mists or dusts such as lubricating oils, coal dust, or grain dust.

5.13 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. R

5.14 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.

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

6.0 <u>PROCEDURE</u>

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. R

R

6.3 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.

6.4 Record measurements in the appropriate field logbook.

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

8.1 Attachment I - A summary sheet and the manufacturer's operating instructions are attached for each project requirement.

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

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Field Measurement Procedures: pH, Temperature, Salinity, and Conductivity			
Procedure No: FTP-880	Revision: 4	Date: 8/15/00	Page 1 of 4

Group Manager:	Date:	QA/QC Officer:	Date:
[redacted]	4/17/00	[redacted]	[redacted]/15/2000

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 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, May 1996. R

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.3 Science Applications International Corporation Quality Assurance Program (SAIC QAP). 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.

R

4.0 RESPONSIBILITIES

4.1 GROUP MANAGER

The Group Manager is responsible for approving this procedure and revisions thereto. R

4.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.2.1 approving this procedure and

4.2.2 verifying that this procedure is being implemented.

4.3 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.4 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.4.1 designating a qualified person to train personnel that will use this procedure;

4.4.2 ensuring that all personnel are properly trained;

4.4.3 ensuring that this and all appropriate procedures are followed; and

4.4.4 verifying that the appropriate training records are maintained as permanent records. R

4.5 FIELD MANAGER

The Field Manager is responsible for:

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

R

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

4.5.3 overall management of field activities.

5.0 <u>GENERAL</u>

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with the Occupational Safety and Health Administration (OSHA) established standards and requirements and any client-specific requirements. R

5.2 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.

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for records purposes.

5.7 The manufacturer's operating instructions accompanied by a summary page are attached to this procedure for the instrument used.

5.8 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. R

5.9 Conductivity measurements are determined electrometrically using either a glass electrode or conductivity cell.

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

R

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 collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management.

8.0 ATTACHMENTS

None

(Note: The manufacturer's operating instructions will be appended to this procedure for each field use.) R

Field Checklist

- ____ Appropriate pH, Temperature, Salinity, and Conductivity Instruments
- ____ Calibration Standard/check source
- ____ Safety Glasses or Monogoggies*
- ____ 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.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Field Measurement Procedures: Turbidity			
Procedure No: FTP-910	Revision: 0	Date: 12/31/98	Page 1 of 5
[redacted]	Date: 12/30/98	[redacted]A/QC Officer: [redacted]	Date: 12/21/98

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 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

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 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.1.1 approving this procedure; and

4.1.2 verifying that this procedure is being implemented.

4.2 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.3 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.3.1 designating a qualified person to train personnel that will use this procedure;

4.3.2 ensuring that all personnel are properly trained;

4.3.3 ensuring that this and all appropriate procedures are followed; and

4.3.4 verifying that the appropriate training records are submitted to the Central Records Facility (CRF).

4.4 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.4.3 overall management of field activities.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with Occupational Safety and Health Administration (OSHA) established standards and requirements and client-specificed requirements, when applicable.

5.2 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.

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

5.6 An example Field Checklist is provided as Attachment I to help the Field Manager assure that the necessary equipment, supplies and documentation are assembled and ready.

5.7 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 transmittal to the CRF.

5.8 The manufacturer's operating instructions, for the specific instrument used will be maintained at the site.

5.9 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.

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

8.1 Attachment I - Field Checklist

Attachment I
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.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Field Measurement Procedures: Dissolved Oxygen			
Procedure No: FTP-955	Revision: 1	Date: 9/15/00	Page 1 of 5

R

Group Manager: [redacted]	Date: 9/17/00	QA/QC Officer: [redacted]	Date: 9/11/2000

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 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, May 1996. R

3.1.2 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs)

3.1.3 Science Applications International Corporation Quality Assurance Program (SAIC QAP). R

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

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

R

3.1.6 Science Applications International Corporation Field Technical Procedure (SAIC FTP) 1215, Use of Field Logbooks.

3.2 DEFINITIONS

None.

4.0 RESPONSIBILITIES

4.1 SAIC CORPORATE OFFICER IN CHARGE

The SAIC Corporate Officer in Charge is responsible for oversight of Field Measurement Procedures: Dissolved Oxygen.

4.2 GROUP MANAGER

The Group Manager is responsible for approving this procedure and revisions thereto. R

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.3.1 approving this procedure and

4.3.2 verifying that this procedure is being implemented.

4.4 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.5 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.5.1 ensuring that all personnel are properly trained;

4.5.2 ensuring that this and all appropriate procedures are followed; and

R

4.5.3 verifying that the appropriate training records are maintained as permanent records. R

4.6 FIELD MANAGER

The Field Manager is responsible for:

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

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

4.6.3 overall management of field activities.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with Occupational Safety and Health Administration (OSHA) established standards and requirements and any client-specific requirements. R

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

5.5 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 for records purposes. 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.

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. R

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, Use of Field Logbooks and FTP-625, Chain-of-Custody.

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 collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management.

8.0 ATTACHMENTS

None R

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

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE

Title: Field Quality Control			
Procedure No: FTP-1200	Revision: 0	Date: 6/30/93	Page 1 of 6
Group Manager:/ [redacted]	Date: [redacted]/29/93	[redacted]	Date: 6/29/93

1.0 PURPOSE

The purpose of this procedure is to describe the steps necessary to ensure implementation of Field Quality Control (QC).

2.0 SCOPE

This procedure applies to samples collected as part of Science Applications International Corporation's (SAIC) field studies. It is established to ensure that samples meet the data quality objectives of the sampling event.

3.0 REFERENCES, RELATED READING, AND DEFINITIONS

3.1 REFERENCES

3.1.1 Environmental Surveillance Procedures Quality Control Program, Environmental and Safety Activities, Martin Marietta Energy Systems, January 31, 1990, Procedure ESP-400.

3.1.2 Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV Environmental Services Division, Georgia, February 1, 1991.

3.1.3 Science Applications International Corporation Quality Assurance Administrative Procedures (SAIC QAAPs).

3.1.4 Science Applications International Corporation Quality Assurance Program Plan (SAIC QAPP).

3.1.5 Science Applications International Corporation Environmental Project Management Manual (SAIC EPMM).

3.2 DEFINITIONS

3.2.1 Field QC I - Verifies that field activities are meeting established data quality objectives.

4.0 RESPONSIBILITIES

4.1 SAIC CORPORATE OFFICER IN CHARGE

The SAIC Corporate Officer in Charge is responsible for oversight of Field Quality Control.

4.2 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.3.1 approving this procedure;

4.3.2 verifying that this procedure is being implemented; and

4.3.3 assisting the Program or Project Manager in determining the data quality objectives.

4.4 HEALTH AND SAFETY (H&S) OFFICER

The H&S Officer is responsible for ensuring that appropriate SAIC and contractual H&S policies and procedures are in effect and verifying enforcement of same by line management.

4.5 PROGRAM OR PROJECT MANAGER

The Program or Project Manager is responsible for:

4.5.1 ensuring that all personnel are properly trained;

4.5.2 ensuring that this and all appropriate procedures are followed;

4.5.3 verifying that the appropriate training records are submitted to the Central Records Facility (CRF); and

4.5.4 determining the data quality objectives.

5.0 GENERAL

5.1 It is SAIC policy to maintain an effective program to control employee exposure to chemical, radiological, and physical stress which is consistent with U.S. Department of Enery (DOE) and Occupational Safety and Health Administration (OSHA) established standards and requirements.

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

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

5.4 Refer to the site- or project-specific H&S Plan for relevant H&S requirements.

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

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 for transmittal to the CRF in accordance with subsection 4.5.3.

5.7 Field QC involves first line inspections and verifications of on-going activities. Field QC is a part of the field planning, and the results of QC activities are considered in evaluating field data and analytical results. Field QC provides input for the following areas in the planning stages:

5.7.1 the number and type of environmental samples to be taken;

5.7.2 the number and type of QC samples (i.e., sample duplicates, field equipment blanks, and trip blanks);

5.7.3 the criteria for sample verification; and

5.7.4 the suitability of field techniques to meet project QC goals in obtaining data of known defensible quality.

5.8 Field QC is primarily applied to the following phases of field work:

5.8.1 sample collection, field measurements, and the ancillary tasks of labeling sample containers, cleaning equipment, and maintaining and calibrating instruments;

5.8.2 documentation and sample control; and

5.8.3 sample handling and shipment for analysis.

5.9 A QA/QC Officer assists the Program or Project Manager in determining the data quality objectives for each field activity. The QA/QC Officer provides input to the field activity planning staff in the following areas:

5.9.1 a review of the planned field techniques and the suitability (defined as practicality, economics, simplicity, versatility, and representativeness) of those techniques;

5.9.2 the number, types, and size of samples to be taken;

5.9.3 the number and type of sample duplicates, field blanks, equipment blanks, and trip blanks to be prepared;

5.9.4 the criteria for sample validation;

5.9.5 the analytical parameters of interest, the sample containers to be used, the preservatives to be used, the holding time limitation, and the analytical methods to be used;

5.9.6 the decontamination procedures for individual sampling activities;

5.9.7 the types and quantities of sampling equipment;

5.9.8 the sample handling procedures;

5.9.9 the required instrument performance criteria; and

5.9.10 appropriate training of personnel.

5.10 The required equipment and apparatus for specific field activities will be determined as described above. In addition to the required equipment and apparatus described above, the following items are required at the job site for field activities:

5.10.1 logbook - the logbook will contain daily reports of the field activities and the results of QC inspections (variances, nonconformances, and acceptable findings);

5.10.2 a copy of the appropriate field documents for the specified field activity; and

5.10.3 appropriate checklist and forms developed for field activity.

5.11 The above documents are issued to specific users, secured when not in use, and retained for the required period.

5.11.1 Entries are made in black waterproof ink in chronological order, with the local standard time in military format of each activity.

5.11.2 All entries are signed by the person making the entry.

5.11.3 Mistakes are struck through once with ink, initialed, and dated.

5.11.4 Entries are completed and detailed enough to allow reconstruction of the activities at a later date. Data are carefully recorded in appropriate units and in sufficient detail to allow other workers to continue the data collection with the same degree of accuracy.

5.11.5 All pages are signed and dated.

6.0 PROCEDURE

6.1 QA/QC OFFICER EVALUATION

6.1.1 The QA/QC Officer will evaluate the following areas:

a) project documents for completeness, compliance, and applicability to the specific activities;

b) the training of field personnel;
c) the understanding by field personnel of required field practices and project documentation requirements;
d) the appropriateness of the equipment and instruments to be used;
e) the appropriateness of the documentation of specific sampling procedures, measurement practices, and field analytical procedures; and
f) the appropriateness of checklists and inspection forms for the specified field activities.

6.2 ON SITE AUDITS AND SURVEILLANCES

6.2.1 The QA/QC Officer ensures periodic on site audits or surveillances are performed, as appropriate. Items evaluated are:

a) validity or authenticity of the samples;
b) validity of the field measurement;
c) validity of the field methodology;
d) proper documentation of field events;
e) use of standard units in reporting field events;
f) proper sample identification;
g) conformance to appropriate sample handling and preservation techniques;
h) conformance to chain-of-custody procedures;
i) appropriateness of the required number and types of field QC samples;
j) logbook protocols and the agreement with actual samples;
k) documentation of equipment calibration;
l) conformance with appropriate decontamination procedures;
m) calculations and diagrams from field logbooks; and
n) the corrective actions and reports associated with variances and nonconformances.

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.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION FIELD TECHNICAL PROCEDURE			
Title: Use of Field Logbooks			
Procedure No: FTP-1215	Revision: 0	Date: 4/09/99	Page 1 of 7
Group Manager: [redacted] Date: 4/19/99		QA/QC Officer: [redacted] Date: 4/9/99	

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, which fall within the scope of this procedure.

2.0 SCOPE

This procedure applies to all types of logbooks used for environmental field studies and for other types of field activities subject to SAIC Environmental Risk Committee approval per the SAIC Environmental Risk Management Manual (reference 3.1.5).

3.0 REFERENCES AND DEFINITIONS

3.1 REFERENCES

3.1.1 SAIC Quality Assurance Program (QAP)

3.1.2 SAIC Quality Assurance Administrative Procedure, QAAP 2.2, Readiness Review

3.1.3 SAIC Quality Assurance Administrative Procedure, QAAP 17.1, Records Management

3.1.4 SAIC Quality Assurance Technical Procedures, Volume II, Field Standard Operating Procedures

3.1.5 SAIC Environmental Risk Management Manual

3.2 DEFINITIONS

3.2.1 Field Logbook - A bound logbook 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 logbook are described in Section 5.0 of this procedure.

3.2.2 Logbook Type - Identification of 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.

3.2.3 Quality Control (QC) Review - The act of verifying the accuracy, completeness, legibility, consistency, and clarity of a field logbook.

4.0 RESPONSIBILITIES AND AUTHORITY

The responsibilities and authority described below are focused on this procedure and do not supercede other responsibilities and authority resident with these functional positions from other sources.

4.1 Group Manager

The Group Manager is responsible for approving this procedure and revisions thereto.

4.2 Quality Assurance/Quality Control (QA/QC) Officer

The QA/QC Officer is responsible for:

4.2.1 Approving this procedure and revisions thereto.

4.2.2 Verifying that this procedure is implemented.

4.2.3 Verifying during the project Readiness Review (reference 3.1.2) that appropriate field logbooks are ready for use.

4.3 Project Manager

The Project Manager is responsible for:

4.3.1 Ensuring that the field team implements this procedure.

4.3.2 Assigning a qualified person to train field personnel in the use of field logbooks as described in this procedure, and in the specific logbook requirements for the project.

4.3.3 Determining the project-specific requirements for the field logbook(s), including the extent of use of pre-printed forms in the logbook(s) and

4.3.4 Determining the frequency with which logbooks are to be copied during a project.

4.3.5 Determining the frequency at which logbook QC is to be performed.

4.4 Field Manager

The Field Manager is responsible for:

4.4.1 Ensuring that all of the general requirements detailed in Section 5.0 of this procedure are implemented by the field team.

4.4.2 Ensuring that project-specific requirements for field logbooks are determined and documented.

4.4.3 Ensuring that logbooks are assembled to meet project requirements, including the use of pre-printed forms, when applicable.

4.4.4 Ensuring that field personnel who will use a logbook are trained in the use of field logbooks as described in this procedure, and in the specific logbook requirements for the project. Ensuring that training is documented and forwarded to the records system.

4.4.5 Ensuring that field personnel implement the field logbook requirements detailed in this procedure and those requirements determined to be applicable to the specific project.

4.4.6 Ensuring that field logbooks are protected from loss, damage or deterioration and are copied on a frequency determined by the Project Manager.

4.4.7 Ensuring that field logbooks are given a QC review by a qualified person other than the person(s) making logbook entries.

4.5 Field Team Members

Field team members are responsible for:

4.5.1 Using and making entries in field logbooks in accordance with this procedure and project-specific training.

4.5.2 Ensuring that field logbooks are protected from loss, damage or deterioration.

4.5.3 Making corrections to logbooks as necessary including those noted during QC review.

4.6 QC Reviewer

The QC Reviewer is responsible for:

4.6.1 conducting a thorough review of the field logbook(s) on the schedule established by the Project Manager.

4.6.2 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; others are often available from data management personnel. 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 bound and will have sequentially numbered pages. It is recommended that field logbooks include a table of contents, when appropriate.

5.4 Field logbooks will be controlled to ensure that it is clear how many logbooks have been issued for use on the project. The Field Manager will control the issue and use of logbooks.

5.5 Field logbooks will be identified by a project name or number, by logbook type (see definition 3.2.2), and if there is more than one logbook for a project, by sequential number.

5.6 All logbook entries will be made in indelible ink, and will be clear, objective and legible.

5.7 All changes to logbook entries will be made by striking through the original entry in a manner which does not obleterate the original entry, and providing the initials of the person making the change and date the change was made.

5.8 Dates will be recorded in the month/day/year format. Time will be recorded in the 24-hour (military) clock format (e.g., 1500 hours rather than 3:00 p.m.).

5.9 The logbook user or Field Manager will indicate unused portions of completed logbook pages and completed logbooks in a positive, clearly recognizable manner. Typical methods include:

5.9.1 drawing a line through the unused area(s) and providing the initials of the person making the entry and date the entry was made.

5.9.2 writing a notation such as " INTENTIONALLY LEFT BLANK" and providing the initials of the person making the entry and date the entry was made.

5.10 Logbooks will be copied for record purposes on a frequency established by the Project Manager at the beginning of field activities. The frequency will be appropriate to the risk of loss of the data contained in the logbooks. In addition, any customer requirements regarding logbook copying and protection will be followed.

5.11 It is recommended that logbooks never be shipped to and from the field; however, if this is necessary, copies must be made to protect the data from loss.

5.12 The use of pre-printed field logbooks is recommended whenever possible. 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.

5.13 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.

5.14 The QC Reviewer will be a person with an equipment level of experience and knowledge to the field team.

5.15 QC review will be completed on a schedule determined by the Project Manager.

6.3.3 When not in use, logbooks are controlled, stored and protected in accordance with the methods established for the project.

6.3.4 The Field Manager ensures that copies of logbook pages are made at specified intervals and submitted to the records system.

6.4 LOGBOOK QC

6.4.1 On the schedule established by the Project Manager, the Field Manager ensures that each logbook used is reviewed to verifying the accuracy, completeness, legibility, consistency, and clarity of the logbook.

6.4.2 The QC Reviewer indicates acceptance of the logbook entries by writing their initials at the bottom of each page and writing in the date reviewed.

6.4.3 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. Corrections to any logbook 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 logbook copies will be processed into the SAIC Central Records Facility in accordance with SAIC QAAP 17.1 Records Management.

8.0 ATTACHMENTS

None

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: ______________ (Signature) QC Checked by: ______________ (Signature)

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) FROM	TO	Core Recovery %	Blow Counts per 6 inches	OVA/HNU (ppm)	RAD (CPM)	Sample/Core Descr./Notes
				/ / /			
				/ / /			
				/ / /			
				/ / /			
				/ / /			
				/ / /			
				/ / /			
				/ / /			

*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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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: __________

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: ____________________ QC Checked By: ____________________

(Signature) (Signature)

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
- [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

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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: _______

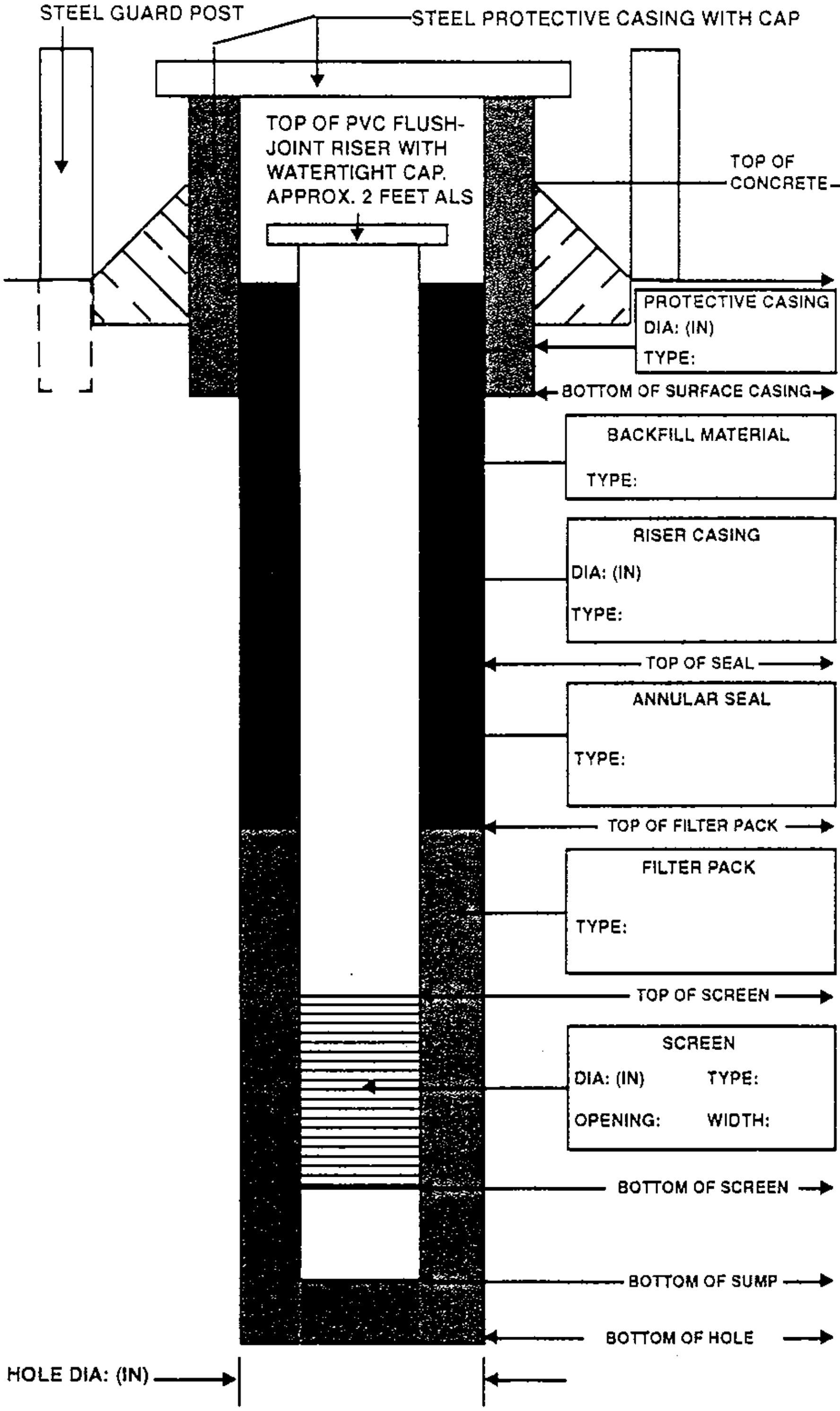
RECORDED BY: ________________________________ QC CHECKED BY: ________________________________

(Signature) (Signature)

MONITORING WELL

PROJECT NAME: PROJECT NUMBER:

WELL NUMBER:	BEGIN:	END:
COORDINATES: N: E:	REFERENCE POINT:	ELEVATION: MSL

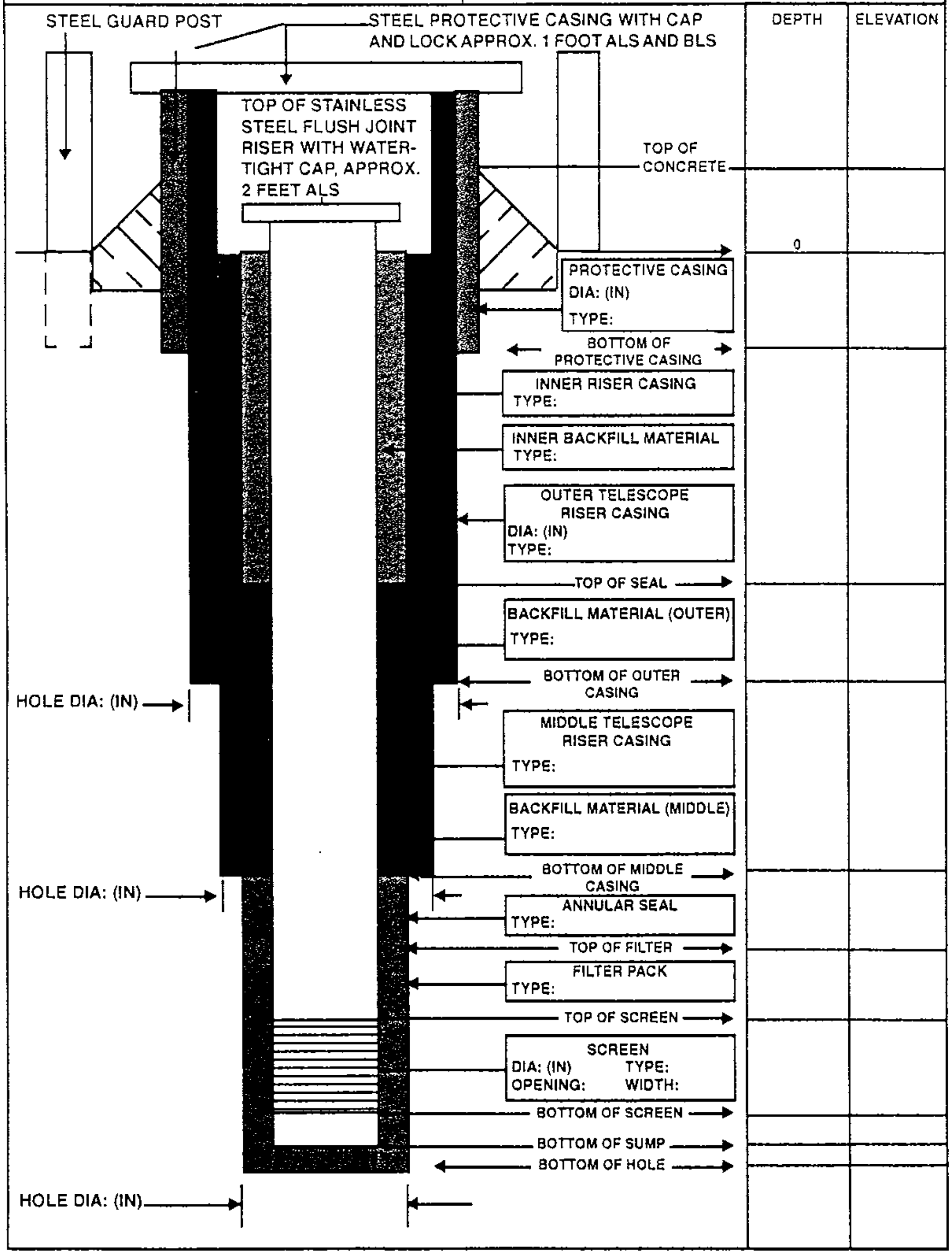


DEPTH	ELEVATION
0	

TELESCOPED WELL

PROJECT NAME: PROJECT NUMBER:

WELL NUMBER:	BEGIN:	END:
COORDINATES: N: E:	REFERENCE POINT:	ELEVATION: MSL



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:

WELL DEVELOPMENT FORM

PROJECT NAME: PROJECT NO:

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		

99-011M(P65)/04089

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 (°C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH STANDARD UNITS	TURBIDITY (NTUs)	

* Gallons per minute or bailer capacity ________

RECORDED BY: ______________________ (Signature)

QC CHECKED BY: ______________________ (Signature)

FTP-1215, Revision 0, 4/07/99

99-01M(P65)/040899

HYDROGEOLOGIC AND GEOLOGIC CHARACTERIZATION FIELD WATER-LEVEL MEASUREMENTS

PROJECT NAME: PROJECT NUMBER:

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: ______________________

FTP-1215, Revision 0, 4/07/99

BOREHOLE OR WELL PLUGGING/ABANDONMENT

PROJECT NAME: PROJECT NO:

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)

DECONTAMINATION

PROJECT NAME: PROJECT NO:

DATE	EQUIPMENT RINSATE NO.	ITEMS	DECONTAMINATED BY

99-011M(P65)/040899

EQUIPMENT CALIBRATION

PROJECT NAME: **PROJECT NUMBER:**

CATEGORY 1 **M & TE CALIBRATION LOG**

IDENTIFIER	ITEM DESCRIPTION	CALIBRATION MEASUREMENTS			BACKGROUND CHECK	RESPONSE CHECK	NAME	DATE
		PRE	ADJUSTMENT	POST				

FTP-1215, Revision 0, 4/07/99

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: ______________________

____

____

____

____

SAMPLE ID/COC TRACKING FORM

PROJECT NAME: PROJECT NO:

SAMPLE ID	FIELD COC	LAB COC	SAMPLE ID	FIELD COC	LAB COC

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.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
FIELD TECHNICAL PROCEDURE

Title: Documenting and Controlling Field Changes to Approved Work Plans

Procedure No: FTP-1220	Revision: 1	Date: 7/07/99	Page 1 of 8
Group Manager: [redacted]	Date: 8/24/99	QA/QC Officer: [redacted]	Date: 7/1/99

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

None.

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 workplan. 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 workplan or procedural requirements.

e) The discovery of unanticipated hazards or changes in site hazards, hazard monitoring, or hazard controls.

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 FIELD TEAM MEMBERS

Field Team Members are responsible for:

4.1.1 identifying items which may require field change; and

4.1.2 correctly implementing changed procedures.

4.2 FIELD TEAM LEADER

The Field Team Leader is responsible for:

4.2.1 identifying items which may require field change;

4.2.2 properly completing the FCR form prior to submittal for approval;

4.2.3 notifying the SAIC Project Manager of the FCR;

4.2.4 completing and maintaining the field change control log;

4.2.5 maintaining updated copies of FCRs with the field change control log; and

4.2.6 notifying affected field personnel of approved FCRs.

4.3 PROJECT MANAGER

The Project Manager is responsible for:

4.3.1 obtaining concurrence from the client that field changes may be made in accordance with this procedure;

4.3.2 reviewing FCRs prior to submittal to the client and coordinating with the project team and Program Manager;

4.3.3 Assuring that project Data Quality Objectives are not compromised;

4.3.4 determining the effect of the FCR on the program/project objectives and budget;

4.3.5 obtaining verbal approval for the FCR (at the discretion of the SAIC Project Manager, the Field Team Leader may obtain this approval);

4.3.6 submitting the FCR form to the client Project Manager for signature approval (at the discretion of the SAIC Project Manager, Field Team Leader may submit the FCR form for signature approval);

4.3.7 advising the client's Project Manager of the anticipated effects of the FCR;

4.3.8 ensuring that this procedure is followed; and

4.3.9 maintaining a record copy of all FCRs.

4.4 PROGRAM MANAGER

The Program Manager is responsible for:

4.4.1 assisting the Project Manager with determining the field change process acceptable to the client; and

4.4.2 providing input as to the acceptability of changes requested by the field team.

4.5 QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) OFFICER

The QA/QC Officer is responsible for:

4.5.1 approving this procedure;

4.5.2 concurring with field changes when requested; and

4.5.3 verifying that this procedure is being implemented.

4.6 GROUP MANAGER

The Group Manager is responsible for approving this procedure.

4.7 CONTRACTS MANAGER

The Contracts Manager, or designee, is responsible for:

4.7.1 assisting the Project Manager with obtaining agreement from the client as to how field changes will be proposed, approved and controlled; and

4.7.2 assisting the Project Manager to assure that changes are not out of scope.

4.8 HEALTH AND SAFETY (H&S) OFFICERS

The Health and Safety Officer responsibilities are divided as follows:

4.8.1 The Site H&S Officer (SHSO) is responsible for participating in the preparation of any FCR which may affect health or safety, and for providing on-site training for the change made by the FCR.

4.8.2 The SAIC Health and Safety Officer (Group H&S Manager) 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.

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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.

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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.) 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 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.

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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.

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6.2.12 Cost Estimate- The Field Team Leader or Project Manager includes an estimate of the cost effects based on implementing the request. 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 collected and maintained in accordance with requirements specified in QAAP 17.1, Records Management.

8.0 ATTACHMENTS

None

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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 MANAGER SIGNATURE (IF APPLICABLE)____________________ DATE__________

Field Change Control Log

Program ______________________ Sheet _____ of _____

Project Name ____________________ Contract No. ____________________

FCR NO.	DATE INITIATED	STATUS	SOP. NO./WORKPLAN SECTION AFFECTED	REQUESTOR	DATE FCR APPROVED

Science Applications International Corporation
An Employee-Owned Company

DETAILED OPERATING PROCEDURE
BOREHOLE GEOPHYSICAL SURVEY

January 1999

Reviewed by:

[redacted]

Manager Geophysical Services

Approved by:

[redacted] CPGS, CEA

Senior Geophysicist

3240 Schoolhouse Road, Middletown, Pennsylvania 17057 3 (717) 944-5501 3 (800) 944-6778

TABLE OF CONTENTS

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1.0 SCOPE AND OBJECTIVES

1.1 Scope

This Detailed Operating Procedure (DOP) provides instructions and establishes requirements for conducting borehole geophysical surveys. This procedure is applicable to all Science Applications International Corporation (SAIC) personnel involved in borehole geophysical surveys.

Borehole geophysical surveys are used to record a variety of physical measurements within a borehole. Among the measurements commonly performed are Gamma Ray, Spontaneous Potential, Resistance, Temperature, and caliper (diameter).

1.2 Objectives

The objective of this DOP is to provide uniform methods and instructions for conducting borehole geophysical surveys including:

1. Borehole/Well preparation.
2. Survey field procedures.
3. Borehole data processing.

2.0 DEFINITIONS

Anomaly - An anomaly is a geological feature distinguished by geophysical means that is different from the general surroundings (i.e., departure from the expected or normal).

Environmental Restoration (ER) Site - Any facility, location, or structure where waste is or was disposed or contained in an ER site. ER sites may contain various waste types (e.g., radioactive, mixed, suspected hazardous, hazardous, generated, or unknown) and may include buried structures such as tanks, sumps, sewage lagoons, leach fields, muck piles, waste dumps, mud pits, landfills, injection wells, disposal trenches, hazardous waste accumulation sites, tunnel ponds, or other waste containment structures used for the intentional or unintentional disposal, storage, or management of wastes. Designation as a site under the ER project does not imply classification accordance to any known regulatory framework.

Geophysical Surveyor - The geophysicist who operates the borehole geophysical surveying instruments and records the results in the field.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

For small projects, a borehole geophysical project may require a field crew of only one-person. In this instance, the field person shall be responsible for performing all of the activities described below.

3.1 SAIC Project Manager

The SAIC Project Manager, in concert with the SAIC Geophysical Manager, shall be responsible for ensuring that the borehole geophysical surveyors are trained and indoctrinated in the content of this procedure and related procedures prior to performing the activity. Furthermore, these Managers shall ensure that borehole geophysical survey activities are documented in accordance with SAIC requirements.

3.2 SAIC Field Geophysical Supervisor

For a multi-person survey crew, one of the SAIC borehole geophysical surveyors shall be designated as the field supervisor and shall be responsible for ensuring the completion of all applicable forms and for notifying the SAIC Project Manager or designee of site-specific activities, survey progress, problems, and results. The SAIC field supervisor shall be a geophysicist, responsible for ensuring that borehole geophysical survey activities are performed in accordance with this DOP.

3.3 SAIC Geophysical Surveyor

The geophysical survey field team shall consist of appropriately trained and qualified personnel, as determined by the SAIC Project Manager and the SAIC Geophysical Manager. The SAIC geophysical surveyor shall be responsible for ensuring that the borehole geophysical survey activities are performed and documented in accordance with this DOP.

4.0 MATERIAL/EQUIPMENT AND CALIBRATION

4.1 Material and Equipment

Specific equipment used to conduct borehole geophysical surveys may consist of one or more of the items shown in Table 1 below.

Table 1
Borehole Geophysical Survey Specific Equipment

MGX Motorized Winch
MGX Integrally mounted electronics console
MGX Single Conductor Cable and Cable Head
HLP-2375/S stratigraphic gamma/SP/single point resistance probe
CLP/CTP-2492 Three Armed Caliper and Temperature probe
Mud plug, power cable, serial cable
110 V or 220 V Power Source
Tripod Assembly for ground or derrick operations
Pulley Box
Project Specific Probes identified in the work plan
LOGSHELL software for data acquisition and processing
Laptop Computer with DOS or MoSlo

The following is a list of additional equipment necessary to complete a borehole geophysical survey:

1. Dummy Probe
2. Rope
3. Measuring Tape (non conductive)
4. Shovel
5. Water for rinse
6. Diskettes
7. 12 V DC to 110 V AC Converter
6. Field notebook

7. Portable Printer
8. Hand Crank
9. Non-conductive Grease
10. White Lubricant (Water Resistant)
11. "O" Rings
12. Rags (Clean)
13. Volt-Ohm Meter

4.2 Calibration Requirements

Some geophysical probes require periodic calibration. Calibration and use of the instruments shall be in accordance with the manufacturer's instructions. Calibration checks shall be performed on a periodic basis by the manufacturer, or by personnel certified by the manufacturer. Documentation of the most recent calibration will be on-site during logging activities.

5.0 METHODS

Borehole geophysical surveys are conducted to aid in the characterization of the subsurface lithology, hydrogeologic parameters, borehole/well construction and integrity, and ground water quality. Instrument output depends on the probe that is being utilized. Some of the probes utilized by SAIC include caliper, formation density, fluid temperature, normal resistivity, fluid conductivity, acoustic velocity, gamma ray, neutron-neutron, resistivity, induced polarization, complex resistivity, magnetic directional, dipmeter, magnetic susceptibility, magnetometer, electromagnetic induction, flow meter and acoustic televiewer. In a typical configuration, data is recorded digitally on a laptop computer and printed on a portable printer. In the case of the televiewer, data is most commonly recorded on videotape.

5.1 Borehole Geophysical Survey Preparation

Prior to performing borehole geophysical surveys, the following activities should be performed by the SAIC field geophysical supervisor:

1. Existing site information shall be reviewed such as vehicle access to the borehole(s) and/or well(s).
2. Diameter (inside) of the borehole and/or well and casing material (if any) should be noted.
3. Internal access (locks) to borehole and/or well should be verified.
4. Well Construction (if known) and method of construction (drilling) should be identified.
5. Geologic Log(s) should be acquired if available.
6. Health and safety hazards shall be defined.
7. Potential for stand by time should be identified, and the basis for determining.

The parameters of the subsurface to be detected and measured will be established, along with the required depth of investigation, and vertical resolution (scale) shall be established. This information will be used to determine the proper probe(s) to be used to make the measurements, the rate at which the borehole and/or well is logged, and the amount of cable needed to achieve the depth of exploration.

5.2 Site Preparation

The geophysicist will establish that the borehole and/or well to be surveyed are corroborated with the information stated in Section 5.1. A clear path from the top of the borehole and/or well will be established to the borehole logger to allow the logging cable smooth and unimpeded access. A constant power source (120 V) should also be established to the MGX logger.

For uncased wells that a televiewer survey is to be conducted, the down-looking view will be monitored during probe decent to observe borehole obstructions. In the event a televiewer survey is not to be conducted in an uncased hole, a "dummy" probe will be launched down the borehole and/or well to determine if the borehole and/or well can be surveyed and the annulus is "clear" and free of obstructions. If in the opinion of the field geophysical supervisor the borehole is clear and stable, the temperature probe may be slowly lowered in place of the dummy probe.

5.3 Survey Field Procedures

A standard procedure for conducting borehole geophysical surveys is provided below. The Field Geophysical Supervisor shall insure that the following preparations are preformed before logging commences:

1. MGX Logging Software LOGSHELL is properly loaded on a PC
2. Adequate Power Supply (250-watt minimum) is available with proper voltage.
3. Grounded power supply cables are used to operate the system.
4. Set up logger in a level and dry location.
5. Keep computer and console controls out of bright sunlight, if possible.

Logging with a PC acquisition system requires that the user take extra care in setting up the unit to avoid moisture and excess dust.

The tripod assembly can be set up in a standard wellhead position or the sheave assembly can be removed from the yoke and hung on a derrick with the safety hook. This is accomplished by removing the two (2) pins from the tripod head that hold the sheave, and attach the wheel assembly to the hook and one of the pins. The long pin that serves as the axle for the sheave must be pulled so that the cable can be run over the inside of the sheave. Re-install the long pin through the wheel and sheave so that the cable will run over the "top" of the wheel, when attached and hung from the hook.

When using the resistivity or SP logging probes, the mud plug and attaching cable must be utilized. Plug the pin on the end of the cable into the console marked **SURFACE ELECTRODE.** Place the lead electrode in a mud pit if available. If not, dig a shallow hole, keep it full of water, and place the lead electrode in the hole. If the hole will not hold water and conditions are dry, it will be necessary to drive a stake into the ground and clamp the lead electrode to the stake. This will allow for greater moisture contact.

It is very important that the **cables** be laid out in a fashion to avoid tripping hazards. The logger will have a serial cable going to the computer, a mud plug (if doing resistivity or SP probes) cable going to the mud plug electrode, and a power cable going to a power supply. In addition, the cables to the PC and the optional printer should also be laid out in a similar manner.

Before starting the logging procedure, the drive clutch should placed in **disengage/manual crank** position. This can be accomplished by grasping the knurled knob on the side of the logger and pulling out (i.e., away from the console) and turning it a few degrees. This will disengage the motor drive and allows the cable to be pulled out by hand or driven by the hand crank when the hand crank is attached.

Pull out enough cable to allow the probe to be connected near the borehole and lifted over the sheave. Once this is done, re-engage the motor drive with the clutch knob by pulling the knob out, turning back a few degrees and allowing the knob to reset in the motor drive sprocket.

The cable should be inspected for insulation with an ohmmeter daily. The center pin on the cable head should be electrically isolated from the armor or cable bulkhead by at least 20 megaohms resistance. The center conductor can be checked for continuity by shorting the bulkhead or armor to the center pin, and measuring between the armor and conductor pins on the end of the console. Cable resistance should be approximately 25.4 ohms/1000 ft. (or 87 ohms/Km) of cable. The mechanical and electrical properties of the cable are important to overall system performance and must be within acceptable limits for a successful operation. **If the cable or cable head does not meet specifications, correct the problem before attempting to log.**

The following hardware set-up must be followed in the order presented herein:

1. Connect Serial Port Cable between D89 connector on the MGX to PC Com-1 serial port.
2. Connect AC Power to Logger, PC and (optional) Printer
3. Connect Printer cable between Printer and PC
4. Turn on PC
5. Connect mud plug cable (if used) to MGX II Surface Electrode jack (green).
6. Turn on MGX console

When powering down and disassembling the equipment, the reverse order (6 to 1) should be performed.

To operate the MGX software supplied by the manufacturer must be installed on the PC. Installation of the software should follow the manufacture's instructions. The software trade name is LOGSHELL. The software LOGSHELL should be used to operate the MGX logger and record the data. Detailed instructions for the operation are contained in the software manual.

This software allows the geophysicist operator the ability to CONFIGURE the computer and other hardware. It allows the operator to change color of the PC screen and attributes, change monitor type, and color palette. CONFIGURATION submenus allow the operator to view, select and install different printers (option) for real-time plotting of the logs. It allows for the viewing, installation of different probes for geophysical logging.

The OPTIONS submenu allows the operator to see the command line (normally left off) being entered during the program. It also allows the operator to choose a default probe driver (Dprobe). The third choice is Dir, which allows the operator to store data in a specific sub-directory. The fourth choice is DSCALE, which allows the operator to select the depth scale in depth units per inch of log. This will be used in the LOG and PROCESS plotting functions. The fifth selection under the OPTIONS menu is the DIGITIZE interval. The operator can select the intervals at which data is recorded during logging.

The sixth submenu under OPTIONS allows the operator to select a text editor and the path to that editor. This can allow the operator to manipulate data in files. The final OPTION selection is MSYSTEM, which allows the geophysicist to select ENGLISH and METRIC systems of measurements.

Once all of these options are selected the operator **must** use the EXIT selection to leave the menu and enter the choices he or she has made. Under normal logging situations the CONFIGURE menu options are not changed.

After the CONFIGURE menu is addressed the next menu would be LOGGING. The LOGGING menu allows the following selections:

1. Select a probe
2. Name the Data file
3. Enter the Starting Depth
4. Select a printer
5. Begin Logging

As previously stated detailed instructions can be found in the manufacturer's manual. The geophysical operator should have a copy of the manual with him or her at all times during logging operations.

Unless otherwise specified, logs will be collected from the top of casing (or ground surface if no casing is present) to borehole bottom and vice versa. Logging speed will be adjusted to meet the appropriate speed for the data being collected. Logging speeds are summarized on Table 2.

Table 2
Recommended Logging Speeds

Tool	Speed Ft/Min
Temperature	10-15
Caliper	15-20
Resistance/SP	30+
Natural Gamma	>20
Spinner Tool	10 and 20
Fluid Conductivity	30

If partial reruns are undertaken, an overlap distance of 20 feet is standard with a deep (over 100 feet) well. When logs do not appear to be accurate based upon previously gathered well logs or information, changes in speed, time constant, scale, or spacing may improve the record

Paper plots of all logs shall be generated in the field during the logging process. Logs are normally printed out at a scale of 10 feet per inch, but the depth of the well may necessitate choosing using another scale. Digitized logs stored on a field PC and can be further processed in the office. All logs printed in the field should include, in the header, well name and number, well location, data filename, log types, scale for each log, date, and client. Other information which will be included in the data file includes owner of well and address, logging contractor and address, logging operator, drilling contractor and address, elevation of top of casing and distance above ground level, casing description, log depth datum, drilling method, type of drilling fluid, static water level, model of tool, logged interval, and logging speed and direction.

5.4 Data Processing and Interpretation

After logging has been completed the geophysicist may want to re-plot some or all of the data on different scales, combine data from different logging runs, or make higher resolution "final prints."

LOGSHELL includes several program options, which allow data processing after logging. In all instances, LOGSHELL maintains a history of all processing performed on all digital well log files. The processing options available include:

Autoprocess-this option automatically combines log data from multiple runs builds a combines log data from multiple runs and builds a combined data file that you can view on the PC screen or a printed hard copy. This is useful when more than one probe is selected for a borehole.

Custom Process – this option allows the geophysicist to build custom data files up by extracting individual traces from different logs run on the same borehole. Custom Process also allows the operator access to a program known as WLCHECK, which is a statistical averaging program. It also allows access to WLHEAD, a header plotting program, Cal2PT, a calibration program, and PRNPLOT and SCRNPLOT for printing or displaying the customized files.

A full explanation of these programs can be found in the manufacturer's manual.

Data interpretation can best be described as the comparison of the geophysical log data to known geologic data. Depending on the probe used and the parameter's measured, data collected in the logging operation can be inferred to changes in the subsurface in materials in the vicinity of the borehole. No automated programs for data interpretation with sufficient accuracy have been developed at this time. The geophysicist's experience of making comparisons of the data collected to reality is how many interpretations are made.

Facilitating interpretation, SAIC may use VIEWLOG or WellCAD. Both commercially available software packages allow log calculations and presentation in order to facilitate client needs. Use and applications for each of these software packages can be found in the software manuals.

6.0 REQUIRED INSPECTION/ACCEPTANCE CRITERIA

Comparison to geologic logs and well construction logs with the measured geophysical survey logs is necessary when the geologic and construction logs are available.

7.0 RECORDS

The following records generated as a result of implementation of this procedure shall be maintained in a safe manner and submitted to the project central files for storage:

1. Field Daily Activity Logs
2. Daily Geophysical Operations Log
3. Borehole Logging Data Acquisition Log
4. Paper copy of each well Log.

8.0 REFERENCES

8.1 Requirements and Specifications

U.S. Environmental Protection Agency, 1987. *A Compendium of Superfund Field Operations Methods*. EPA/540/P-87/001.

U.S. Environmental Protection Agency, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. EPA, Interim Final.

U.S. Environmental Protection Agency, 1989. *RCRA Facility Investigation Guidance*, EPA, Interim Final.

American Society of Testing and Materials, 1995 *Standard Guide for planning and Conducting Borehole Geophysical Logging*, ASTM Designation D5753-95.

8.2 Related Procedures

ITLV-INV-0401, "Field Activities Documentation"

8.3 Others

Manufacturer's Manual for LOGSHELL with the MGX Logging System

9.0 ATTACHMENTS

Attachment A, Daily Geophysical Operations Log
Attachment B, Borehole Logging Data Acquisition Log

DAILY GEOPHYSICAL OPERATIONS LOGS

DATE:________ TEAM LEADER:______________ PROJECT NO.
FIELD CREW:__________________ PROJECT NAME:
SITE LOCATION:

SURVEY TYPE: Seismic Refraction Seismic Reflection
EM-31 EM-61 EM-34 EM-47 SP
Utility Metal Detector Gravity Magnetometer
Electrical Imaging Resistivity
Borehole Geophysics Borehole Camera (Color or Black & White)
Other: ________________

DATA RECORDED:

PROBLEMS:

Copy: Project File, Project Manager, Equipment & Supply

BOREHOLE LOGGING
DATA ACQUISITION LOG

Project Name: ___________________ Project Number: _______________ Sheet ___ of ___
Site Name: ________________________ Operator: ___________________________________
Date:________________ Datum:__________________________

Well	File Name	Log Type	Speed	Log Direction	Top Log Interval	Btm. Log Interval	Comments

Log Types: Gamma Ray (GR), Resistance/Spontaneous Potential (R/SP), Temperature (T), Caliper (C)

HEALTH PHYSICS PROCEDURE

HP-004

REV. 1

QUALITY CONTROL OF RADIATION MONITORING EQUIPMENT

SUBMITTED BY:______________________________DATE__________________
Radiation Safety Officer

APPROVED BY:______________________________DATE__________________
Project Manager

APPROVED BY:______________________________DATE__________________
QA/QC Officer

TABLE OF CONTENTS

1.0 Purpose

This procedure establishes the guidelines and requirements for maintaining, calibrating and controlling radiological monitoring equipment (RME).

2.0 Scope

This procedure applies to all RME utilized at sites where this SAIC Engineering and Environmental Management Group (EEMG) radiation safety program is implemented.

3.0 References

3.1 ANSI N323-1978, "American National Standards Radiation Protection Instrumentation Test and Calibration"

3.2 U.S. Nuclear Regulatory Commission, Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment"

3.3 HP-001, "Health Physics Manual"

3.4 HP-112, "Radiological Incident and Deficiency Reporting"

3.5 QAAP-17.1, "Records Management"

4.0 Definitions

4.1 "As Found" Data – Instrument output data obtained using the same inputs to be used when calibration is performed but prior to making any instrument adjustments.

4.2 "As Left" Data – Instrument output data obtained using the same inputs as in 4.1 after calibration is completed.

4.3 Calibration – Adjustment of instrumentation so the accuracy and performance meet requirements specified by procedures.

4.4 Calibration Equipment – Equipment that is certified as calibrated to standards which are traceable to the National Institute of Standards and Technology (NIST) and that is used to perform calibration or performance tests on RME. When such NIST standards do not exist, the method for calibration shall be documented by procedure or included in the instrument's file and approved by the Engineering and Environmental Management Group (EEMG) Radiation Safety Officer (RSO).

4.5 Due Date – The next date an instrument must be calibrated or calibration checked.

4.6 Out-of-Calibration – Instrument removed from service due to a lapsed calibration due date.

4.7 Out of Service (OOS) – Status of any instrument not available for issue and use due to damage, equipment failure, or removed from service for long term storage.

4.8 Out-of-Specification Condition – Status of instrument that does not meet calibration criteria, pre-operational checks, performance tests, or quality control (QC) checks.

4.9 Performance Test – Verification of acceptable exposure rate instrument performance on each scale or decade normally used. No adjustments are made that could affect the calibration of the instrument.

4.10 Pre-operational (pre-op) Checks – Checks performed on any portable instrument daily or prior to use.

4.11 QC Checks – Checks on laboratory instrumentation to verify acceptable instrument performance using NIST traceable sources.

4.12 RME – Instrumentation used to measure radiation or sample mediums where radioactive material may be present.

4.13 Response Test – Test on exposure rate instruments prior to use, verifying acceptable performance.

4.14 Source Test – Verification of satisfactory count rate instrument operation using a radioactive source.

5.0 Procedure

5.1 Instrument Identification and Operational Status

5.1.1 Each item of RME shall be uniquely identified. The identification shall be permanently affixed to the instrument by etching, stamping, engraving or any other permanent means that will not impair the use of the instrument.

5.1.2 A completed calibration sticker (Attachment 1 or equivalent) shall be securely attached to each portable instrument.

5.1.3 An "Out of Service" tag (Attachment 2 or equivalent) shall be attached to an instrument and the instrument placed in segregated storage if any of the following occur:

5.1.3.1 The calibration interval has expired.

5.1.3.2 Maintenance or repair is required.

5.1.3.3 The instrument has failed a pre-op check or performance test.

5.1.3.4 The instrument is taken OOS.

5.1.4 The OOS tag shall remain attached to the instrument and the instrument shall not be released for use until appropriate action and documentation are complete.

5.1.5 Segregated storage areas for portable RME shall be located as directed by the site Radiation Protection Manager (RPM).

5.1.6 RME with an out of specification detector or scale may remain in service if the condition only affects a defined scale, range, or application, functions within specifications on the scales in use, and shall have a "Restricted Use" tag (Attachment 3) placed on the instrument. The tag shall list the instrument identification number and any special restrictions on its operation. The RPM shall approve all restricted use instruments.

5.1.7 Equipment considered to be out-of-specification shall be tagged in accordance with Section 5.1.3 until proper disposition is determined by the RPM. Disposition may include any of the following:

5.1.7.1 Recalibration,

5.1.7.2 Repair,

5.1.7.3 Replacement of the equipment, or

5.1.7.4 Re-evaluation or revision of the acceptance criteria for the equipment.

5.2 Investigations

5.2.1 Out-of-specification instrument investigations shall be performed by Health Physics Technicians and documented on Attachment 4.

5.2.2 Investigations shall determine if the instrument was used for any of the following:

5.2.2.1 Assigning permanent record exposure due to lost, damaged or misplaced dosimetry.

5.2.2.2 Unconditional releases of equipment, material or personnel from a Restricted Area.

5.2.2.3 Determining radioactive effluents due to unplanned or unmonitored release paths.

5.2.2.4 Shipping, receiving or labeling radioactive material.

5.2.3 If any condition of Section 5.2.2 is applicable, Attachment 4 shall be completed and a Radiological Incident Report initiated.

5.2.4 In the event an instrument is found to be out-of-specification, the instrument shall be taken out of service, tagged in accordance with Section 5.1.3, and Attachment 4 generated to provide documented resolution.

5.2.4.1 If it is determined that the instrument was damaged while in use and the pre-op checks were satisfactory prior to use, no investigation is necessary, provided the instrument was removed from service as soon as damage was suspected.

5.2.4.2 For instruments that fail a performance test, quality control check, response test, or source test, the investigation need only trace the instrument use back to the time of the last satisfactory pre-op check.

(a) Only those pre-op checks which determine proper instrument performance and are indicative of instrument calibration need to be considered for investigative purposes.

(b) The following conditions do not require investigation:

1. Loose cable connectors,

2. Meter light not operational, or

3. Plastic or rubber covers not pertaining to radiation detector, torn or missing.

5.2.4.3 Personnel using RME shall perform pre-op checks anytime instrument response is questionable.

5.2.4.4 Any instrument that provides "As Found" data within the manufacturer's specifications will be considered as having provided satisfactory survey results and will not require an instrument investigation.

5.3 Performance Test

5.3.1 Performance tests shall be performed daily not to exceed 36 hours apart, for exposure rate instruments in use, on each range capable of being tested by the performance test source as indicated on Attachment 5.

5.3.2 Acceptance criteria for performance tests shall be ± 20% of the known value. Deviation from this criteria shall be approved by the EEMG RSO and documented on Attachment 5 prior to implementation.

5.3.3 Results of each performance test shall be documented on Attachment 6. Upon satisfactory completion of a performance test, conspicuously indicate on the side of the instrument case that a performance test has been completed.

5.3.4 If an instrument fails a performance test, it shall be tagged in accordance with Section 5.1.3 and an investigation performed in accordance with Section 5.2.

5.4 Source Test

5.4.1 Source tests shall be performed daily, not to exceed 36 hours apart, for count rate instruments in use. One point shall be verified using a NIST traceable source to ensure instrument efficiency is satisfactory.

5.4.2 Criteria for an acceptable source test shall be documented in the following manner with the results of the test documented on Attachment 7.

5.4.2.1 For count rate instruments used as friskers, the source test acceptance criteria shall be indicated on the source jig, or documented on the instrument calibration sticker, or otherwise conspicuously labeled on each instrument.

5.4.2.2 Continuous air monitor (CAM) source test criteria shall be documented on the calibration sticker or conspicuously labeled on each instrument.

5.4.2.3 Acceptance criteria for source tests shall be ± 20% of the known value.

5.4.3 Source tests shall be performed in a consistent and reproducible manner.

5.4.4 Upon completion of a satisfactory source test, conspicuously indicate on the side of the instrument case that a source test has been completed.

5.4.5 Instruments failing a source test shall be tagged in accordance with Section 5.1.3 and an investigation performed in accordance with Section 5.2.

5.5 Response Test

5.5.1 Response tests shall be performed on all exposure rate instruments prior to sign-out using Attachment 8. If a performance test is performed at the time of instrument sign-out, this satisfies the requirement to perform a response test.

5.5.2 Criteria for satisfactory response tests shall be documented using Attachment 9, approved by the RPM, and posted near the instrument issue point.

5.5.3 Instruments failing a response test shall be tagged in accordance with Section 5.1.3 and an investigation performed in accordance with Section 5.2.

5.5.4 Acceptance criteria for response tests shall be ± 20% of a known value.

5.6 Pre-Op Checks

5.6.1 Pre-op checks shall be performed by all users prior to sign-out and use. The following pre-op checks shall be satisfactorily completed:

5.6.1.1 Verify instrument calibration is current.

5.6.1.2 Check the instrument for physical damage that may affect correct operation.

5.6.1.3 Battery check the instrument.

5.6.1.4 Verify all external cable connections are hand tight.

5.6.1.5 Ensure performance check has been completed by inspecting the calendar attached to the instrument case.

5.6.1.6 Check zero adjustment of instrument, as applicable.

5.6.1.7 Response test all exposure rate instruments in accordance with Section 5.5.

5.6.2 If any test fails to meet the requirements, tag the instrument in accordance with section 5.1.3 and initiate a Defective Instrument Report (Attachment 4).

5.7 Quality Control (QC) Checks

5.7.1 QC checks on laboratory instrumentation shall be performed daily not to exceed 36 hours apart. Radioactive sources used shall be NIST traceable.

NOTE:
RME used as an alpha or beta scaler shall have QC checks performed daily when in use. Relocation of the instrument will require verification of acceptable QC checks be documented in accordance with Section 5.7.

5.7.2 Gas flow proportional, Geiger-Mueller (GM), liquid scintillation, alpha scintillation and beta scintillation (non-portable) counting systems require the background and efficiency to be within ± 3 standard deviations or ± 10% of mean values established during calibration.

5.7.2.1 QC parameters may be updated due to change in instrument location, area background, or other parameters that affect instrument response. In this case, the RPM shall approve updated QC parameters.

5.7.2.2 QC check requirements and collected data shall be recorded on Attachment 10 or equivalent.

5.7.2.3 Attachment 10 or equivalent shall be maintained at the instrument location and available for review by personnel using the equipment.

5.7.3 Gamma spectroscopy systems shall have the following parameters evaluated daily when in use in accordance with 5.7.1.

5.7.3.1 A background count shall be performed using a minimum count time equivalent to the longest routine counting time performed for analysis of samples. Peaks that may indicate contamination of the detection system shall be evaluated by the RPM or laboratory manager.

5.7.3.2 A source count shall be performed using a minimum of 10 minutes or until 10,000 net counts are accumulated in the photopeaks of interest. The RPM, or laboratory manager, shall establish the routine counting time.

a. The QC source count shall be used to evaluate a low energy (<0.200 MeV) and high energy (>1.0 MeV) photopeak.

b. Each photopeak shall be evaluated for centroid position, resolution (FWHM), and efficiency (by quantification of NIST standard).

c. The methods for determination of acceptance criteria and the limits shall be documented on Attachment 11 or equivalent and approved by the RPM, or laboratory manager, as appropriate.

d. Attachment 11 shall be posted in the area of each gamma spectroscopy system for daily review by the individual performing QC checks.

5.8 Instrument Calibration

5.8.1 RME shall be calibrated under any of the following conditions:

5.8.1.1 Prior to calibration due date,

5.8.1.2 After maintenance and repair which may affect calibration,

5.8.1.3 If a pre-op check, performance test, source test, or QC check indicates calibration is necessary.

5.8.2 Calibration certificate (Attachment 12) shall include the following:

5.8.2.1 "As Found" and "As Left" data,

5.8.2.2 High voltage setting if a voltage plateau is required,

5.8.2.3 Instrument model and serial number,

5.8.2.4 Date of calibration and next calibration due date,

5.8.2.5 Signature of individual performing calibration,

5.8.2.6 Identification of all standards utilized,

5.8.2.7 Information regarding maintenance on the instrument, and

5.8.2.8 Review by the RPM or designee.

NOTE:
Laboratory instrumentation does not require "As Found" data by definition, but calibration shall begin with a minimum of one satisfactory QC check.

5.8.3 Instrumentation, which cannot be repaired or recalibrated, shall be dispositioned by the RPM.

5.8.4 Instrumentation requiring calibration by an off-site laboratory shall meet the requirements of this procedure.

5.8.5 Technical manuals should be used as references for repair and calibration of instrumentation.

5.8.6 Each instrument shall be labeled with the following information:

5.8.6.1 Date of calibration and next due date,

5.8.6.2 Energy correction factors, if applicable,

5.8.6.3 Acceptable response to a check source (unless exception),

5.8.6.4 Special or restricted use conditions, and

5.8.6.5 Initials or identifying mark of individual who performed the calibration.

5.9 Calibration Criteria

5.9.1 Electronic measuring and test equipment used for calibration of RME shall be within ± 2% of a NIST traceable quantity, e.g., voltage, amperage.

5.9.2 Radioactive source standards used to calibrate RME shall be NIST traceable. In order to minimize error involved with source calibrations, the following criteria have been established:

5.9.2.1 Radioactive source decay corrections shall be performed at a frequency to ensure the reported source activity used to determine instrument response on the day of calibration does not exceed ± 5% of the actual source activity.

5.9.2.2 Calibration points are calculated in order to reproduce source to detector geometry while performing calibrations. Calibration points for portable RME shall be documented on Attachment 13 and approved by the EEMG RSO if an EEMG calibration program is implemented.

5.9.2.3 Calibrations shall be performed by qualified personnel.

5.9.3 Calibrations shall be ± 10% unless a manufacturer specifies lesser accuracy. The calibration criteria shall be documented on Attachment 13 and approved by the EEMG RSO.

5.10 Instrumentation Control/Program Review

5.10.1 Portable RME shall be signed out using Attachment 8 and returned prior to the end of each shift, or arrangements made to performance or source test the instrument in accordance with applicable requirements. Methods of instrument control other than those stated in this procedure may be employed with the approval of the EEMG RSO.

5.10.2 Acceptance criteria for instrument calibrations, performance tests, source tests, response tests and QC checks shall be reviewed by the EEMG RSO to ensure adequacy of the instrumentation program.

5.11 Calibration Frequency

RME shall be calibrated at the frequencies specified in Attachment 14. More frequent calibrations may be necessary due to instrument repair or performance concerns in accordance with section 5.1.

6.0 Records

6.1 Attachments 4,5,6,7,8,9,10,11,12, and 13 are records generated by this procedure and will be processed in accordance with SAIC EEMG Quality Assurance Administrative Procedure 17.1, "Records Management".

6.2 Records generated as a result of this procedure shall be maintained in Health Physics files until transmitted to the appropriate records management center in accordance with 6.1.

ATTACHMENT 1

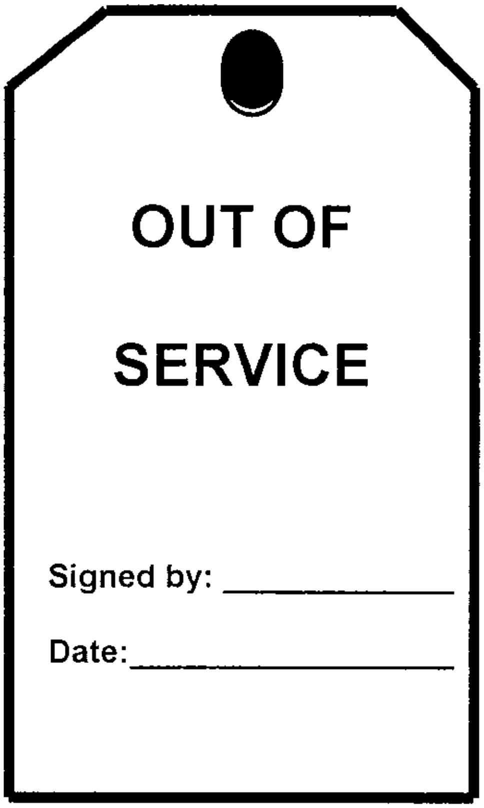
INSTRUMENT CALIBRATION STICKER

EXAMPLE

MODEL ___________
SERIAL # _________
CAL DATE ____________
DUE DATE ____________
TEST SOURCE ________
ACCEPT. CRITERIA ________
PROBE SERIAL# __________
EFF. ________________
CAL BY ______________

ATTACHMENT 2

OUT OF SERVICE TAG



ATTACHMENT 3

RESTRICTED USE TAG

EXAMPLE

RESTRICTED USE

SERIAL#: ______________________________

DATE ______________________________

INITIALS ______________________________

RESTRICTIONS______________________________

____

ATTACHMENT 4

DEFECTIVE INSTRUMENT REPORT

Model: ______________________ Serial Number: _________ Date _______________

Problem with Instrument: ____

____

____

____

____

Date Found Out-of-Spec: __________ By: ____________________________ / ____________________________

(Print) Signature

Last Calibration Date: ________________

Last Performance Test: ________________

Last Pre-Op Check: ________________

Was this instrument used to:

No	Yes	
☐	☐	A. Assign permanent record exposure.
☐	☐	B. Unconditional release of equipment, material or personnel.
☐	☐	C. Determine radioactive effluent quantities.
☐	☐	D. Ship, receive or label radioactive waste.

If any of the above questions are marked "Yes" a Radiological Incident Report shall be completed.

Corrective actions taken: ____

____

____

____

Evaluation Performed By: ___________________________ / ___________________________ / ______________

(Print) (Signature) Date

Reviewed By: ___________________________________ / _______________

Radiation Protection Manager (Date)

ATTACHMENT 5

PERFORMANCE TEST DATA SHEET

INSTRUMENT: ________________ DATE: _______

INSTRUMENT RANGE	SOURCE	SOURCE POSITION	EXPECTED RESPONSE	ACCEPTANCE CRITERIA

COMMENTS: ____

____

CALCULATED BY/DATE ______________________/__________ REVIEWED BY/DATE ______________________/__________

RADIATION PROTECTION MANAGER

ATTACHMENT 6

DAILY INSTRUMENT PERFORMANCE TEST LOG
(IN-USE INSTRUMENTS)

SOURCE(S): ______________________________

INST. TYPE	INST. SERIAL NO.	SAT/UNSAT	INITIAL	DATE

REVIEWED BY: ______________________________ DATE: ____________________
SIGNATURE

ATTACHMENT 7

COUNT RATE METER SOURCE TEST LOG

ALPHA SOURCE NO: ______________________

CAM SOURCE NO: ______________________

BETA SOURCE NO. ______________________

INSTRUMENT LOCATION	SERIAL NUMBER	BATT. CHECK SAT/UNSAT	SOURCE TEST SAT/UNSAT	DATE	TECH. INITIALS

REVIEWED BY: ______________________ DATE/TIME ______/______

ATTACHMENT 8

PORTABLE INSTRUMENT SIGN-OUT LOG

LAST NAME (PRINT)	HPID	TYPE INSTRUMENT	SERIAL NUMBER	JOB LOCATION	DATE/TIME OUT	DATE/TIME IN	RETURNED BY

ATTACHMENT 9

RESPONSE TEST CRITERIA

INSTRUMENT TYPE	SOURCE	ACCEPTANCE CRITERIA

REVIEWED BY: ______________________________ / ______________
RADIATION PROTECTION MANAGER DATE

ATTACHMENT 10

LABORATORY INSTRUMENTATION QC DATA SHEET

DATE (MO/YR): ______________ ☐Alpha Eff.: ______________ ☐Beta Eff.: ______________
Instrument No.: ______________ Source ID: ______________ Source ID: ______________
Operating Voltage: ______________ Source Accpt. Crit.: ______________ Source Accpt. Crit.: ______________
Bkgrd. Accpt. Crit.: ______________ Bkgrd. Accpt. Crit.: ______________

Day	Time	Bkgrd. QC (cpm)		Source QC (ncpm)		QC (Sat/Unsat) [1]	Initials	Comment
		Alpha	Beta	Alpha	Beta			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

1 An unsatisfactory QC check requires recording the result in the comment column and repeating the evaluation. Tag the instrument out of service and notify the HP Supervisor upon failing the QC check two times in succession.

Reviewed By: ______________ Date: ______________

ATTACHMENT 11

GAMMA SPECTROSCOPY SYSTEM QC PARAMETERS

(EXAMPLE)

Gamma Spectroscopy System # _______________

	PHOTOPEAK ACCEPTANCE CRITERIA	
PARAMETER	**RADIONUCLIDE**	**RADIONUCLIDE**
Centroid		
Resolution (FWHM)		
Activity		

Determination of Q.C. Limits

1) For a 0.5 kev/channel system, the acceptance criteria shall be the calculated centroid location ± 4 channels.
2) Photopeak resolution (FWHM) shall be determined by counting Q.C. standard 10 times following calibration, calculating the average, and taking ± 20% as an acceptable change in resolution.
3) The efficiency shall be verified by determination of standard activity. The system determined activity shall be ± 10% of the known quantity in order to meet Q.C. criteria.

Reviewed by: ________________________________ / ____________

Radiation Protection Manager Date

ATTACHMENT 12

CALIBRATION CERTIFICATE

TEST EQUIPMENT INSTRUMENT	CALIBRATION DUE DATE	INSTRUMENT INFORMATION
____________	____________	MANUFACTURER ____________
____________	____________	MODEL ____________ SERIAL# ____________
____________	____________	____________
____________	____________	SOURCES
____________	____________	____________ ____________
____________	____________	____________ ____________
		____________ ____________

CALIBRATION INFORMATION

INSTRUMENT RANGE	CALIBRATION STANDARD VALUE R/Hr	INSTRUMENT AS FOUND	RESPONSE AS LEFT	10% ACCEPTANCE VALUE	MANUFACTURER'S ACCEPTANCE VALUE	COMMENTS

REMARKS: CP = CALIBRATION POINT LC = LINEARITY CHECK

____

____

____

HIGH VOLTAGE (IF REQUIRED)____________

INSTRUMENT CALIBRATION BY:____________ REVIEWED BY: ____________
SIGNATURE RSO/Designee

CALIBRATION DATE: ____________

CALIBRATION DUE DATE: ____________

ATTACHMENT 13

CALIBRATION DATA SHEET

INSTRUMENT: ______________________________

SOURCE	INSTRUMENT RANGE	ADJ. POT.	DOSE RATE OR INPUT CPM	10% ACCEPTANCE CRITERIA	MANUFACTURER'S ACCEPTANCE CRITERIA	DISTANCE	ATTENUATION	COMMENTS

CP - CALIBRATION POINT
LC - LINEARITY CHECK

CALCULATED BY: ______________________________ DATE __________ REVIEWED BY: ______________________________ DATE: __________
SIGNATURE SIGNATURE

ATTACHMENT 14

RADIOLOGICAL MONITORING EQUIPMENT CALIBRATION FREQUENCY

INSTRUMENT TYPE	APPLICATION	CALIBRATION FREQUENCY
Count rate meters (alpha, beta, or both)	Personnel monitoring and surface contamination measurement	Annually
Exposure or dose equivalent rate meters	Determining exposure or dose equivalent rates	Annually
Alpha/beta scaler	Quantify radioactive material on smears and air sample media	Annually
Air samplers	Collect airborne radioactive material samples	6 months or greater frequency as specified by the manufacturer
Continuous air monitors	Monitor the concentration of radioactive material in the air	6 months
Effluent monitors	Monitor the quantity of radioactive material in site effluents	Annually
Micro processor based personnel contamination monitors	Quantify radioactive material on personnel	Annually
Gamma spectroscopy system	Quantify photon emitting radionuclides in sample media	Annually

HEALTH PHYSICS PROCEDURE

HP-108

REV. 0

OPERATION OF PORTABLE RADIATION SURVEY INSTRUMENTS

SUBMITTED BY:____________________________ DATE________________
Radiation Safety Officer

APPROVED BY:____________________________ DATE________________
Project Manager

APPROVED BY:____________________________ DATE________________
QA/QC Officer

TABLE OF CONTENTS

1.0 Purpose

This procedure establishes the guidelines and requirements for the operation of portable radiation survey instruments.

2.0 Scope

This procedure applies to all personnel using portable radiation monitoring equipment controlled by this SAIC Engineering and Environmental Management Group (EEMG) radiation safety program.

3.0 References

3.1 ANSI N323-1978, "American National Standards Radiation Protection Instrumentation Test and Calibration."

3.2 HP-001, "Health Physics Manual"

3.3 HP-004, "Quality Control of Radiation Monitoring Equipment"

4.0 Definitions

4.1 Due Date – The next date the instruments must be calibrated or calibration checked.

4.2 Out-of-Calibration (OOC) – Instrument removed from service due to a lapsed calibration due date.

4.3 Out of Service (OOS) – Status of any instrument not available for issue and use due to damage, equipment failure, or removed from service for long term storage.

4.4 Performance test – Verification of acceptable exposure rate instrument performance on each scale or decade normally used. No adjustments are made that could affect the calibration of the instrument.

4.5 Pre-operational Checks (POCs) – Checks performed on any portable instrument daily or prior to use.

4.6 Response Test – Test on exposure rate instruments prior to use, verifying acceptable performance.

4.7 Source Test – Verification of satisfactory count rate instrument operation using a radioactive source.

5.0 General

5.1 Personnel, other than Health Physics Technicians, shall have completed a Level II Radiation Worker Training program prior to signing out and using portable radiation monitoring equipment, other than personnel frisking equipment as covered in Radiation Worker Training (RWT).

5.2 Personnel using portable survey instruments shall ensure pre-operational checks are performed and the instrument is properly signed out.

5.3 All instrument users are responsible for notifying the Radiation Protection Manager (RPM), or designee, if an out-of-calibration instrument is suspected to be in use.

5.4 Source tests shall be performed according to HP-004.

6.0 Procedure

6.1 Pre-operational checks shall be performed by all users prior to sign-out and use. The following pre-operational checks shall be satisfactorily completed:

6.1.1 Verify instrument calibration is current.

6.1.2 Check the instrument for physical damage that may affect correct operation.

6.1.3 Battery check the instrument.

6.1.4 Verify all external cable connections are hand tight.

6.1.5 For exposure rate measuring instruments, ensure a performance test has been completed for the current day by inspecting the instrument case for a conspicuous label indicating a performance test has been completed.

6.1.6 For count rate instruments, ensure a source test has been performed for the current day by inspecting the instrument case for a conspicuous label indicating a source test has been completed.

6.1.7 Check zero adjustment of instrument, as applicable.

6.1.8 Response test all exposure rate instruments. Criteria for satisfactory response tests shall be documented and approved by the RPM, and posted in the vicinity of the instrument issue point. If a performance test is completed at the time of instrument sign-out, this satisfies the requirement to perform a response test.

6.1.9 Complete the sign-out log in accordance with HP-004.

6.2 An "Out of Service" tag shall be attached to an instrument and the instrument placed in segregated storage if any of the following occur:

6.2.1 The calibration interval has expired,

6.2.2 Maintenance or repair is required,

6.2.3 The instrument has failed a pre-operational check, or

6.2.4 The instrument is taken OOS.

6.3 If any check or test fails to meet requirements, tag the instrument in accordance with section 6.2 and notify Health Physics.

6.4 Out-of-specification instrument investigations shall be performed by Health Physics.

6.5 Refer to the instrument specific attachment for the appropriate operating instructions.

7.0 Records

There are no records generated as a result of this procedure.

HEALTH PHYSICS PROCEDURE

HP-405

REV. 0

RADIOLOGICAL SURVEYS

SUBMITTED BY: ______________________________ DATE ______________
Radiation Safety Officer

APPROVED BY: ______________________________ DATE ______________
Project Manager

APPROVED BY: ______________________________ DATE ______________
QA/QC Officer

TABLE OF CONTENTS

6.0 Procedure

6.1 General Area Beta/Gamma Radiation Surveys

6.1.1 General area surveys are normally conducted to measure only gamma radiation levels. Document all general area radiation levels on the survey form in accordance with the specifications contained in Attachment 1.

6.1.2 For general area surveys, hold the instrument detector at waist to chest level, utilizing the highest reading for documentation of survey records and postings. Normally, general area surveys are considered as being 12 inches (30 cm) away from relevant components and equipment that contribute to whole body exposure.

6.1.3 Routine and general area surveys performed for posting confirmation should include normally accessible areas.

6.1.4 Area surveys for HSWPs should include all areas where personnel might be required to perform work both at floor level and in the overheads.

6.1.5 Notify the Health Physics Superviso, if any survey results require a posting change.

6.2 Contact Beta/Gamma Radiation Surveys

6.2.1 Contact surveys should be taken at approximately one inch away from relevant components and equipment.

6.2.2 Gamma and beta general area surveys should be performed each time contact dose rates are measured which indicate both beta and gamma dose rates.

6.2.3 Hot Spots should be labeled with hot spot stickers.

6.3 Beta Radiation Surveys

6.3.1 Beta dose rate contribution is determined by the open window reading and closed window reading difference multiplied by the beta correction factor noted on the portable instrument.

6.3.2 Beta radiation surveys shall be conducted whenever the following conditions apply.

6.3.2.1 Open radioactive material processing system components or exposed system internals,

6.3.2.2 Whenever radioactive material processing system leakage is evident or suspected, 6.5 Large Area Smear Survey (Wipe)

6.5.1 A wipe is used to obtain a gross indication of contamination levels in large areas or on large pieces of equipment. It may also be used to check normally clean areas or equipment for the presence of contamination.

6.5.2 Place clean masslinn cloth on a masslinn mop and sweep the area to be surveyed. Large areas, such as hallways, should be checked by making wide sweeps from side to side similar to a continuous "S". Smaller areas and pieces of equipment may be checked by actually covering the entire surface area.

6.5.3 Count wipe with a count rate meter equipped with a detector to measure the contamination of concern.

6.5.4 Use the highest reading obtained for reporting results. Results should be reported in units of dpm/wipe.

6.5.4.1 The absence of contamination should be recorded as < x dpm/wipe with x denoting the minimum detectable capability of the instrument. The counting instrument should be noted on the survey.

6.5.4.2 If a large area wipe shows any detectable counts above background, the area/item must be smear surveyed to quantify the extent of contamination.

6.6 Performance of Radiological Surveys

6.6.1 The following surveys shall be performed:

6.6.1.1 Surveys to establish and maintain HSWPs.

6.6.1.2 Surveys in emergency situations and to investigate abnormal conditions.

6.6.1.3 Surveys to remove material or equipment form Restricted Areas for unrestricted use.

6.6.1.4 Surveys due to anticipated or actual changing of radiological conditions.

6.6.1.5 Surveys required by procedures.

6.6.1.6 Any other surveys which may be performed to comply with regulations and are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

6.6.1.7 As directed by RPM or designee.

6.7 Documentation of Radiation and Contamination Surveys

All surveys shall be documented on Attachment 1, or equivalent, with the exception of surveys for the release of equipment or tools from the RA, which shall be logged on Attachment 2, verifying survey for unrestricted use.

6.7.1 Items surveyed for release from the RA, which are intended for transport shall be documented on Attachment 1 or equivalent, prior to packaging.

6.7.2 Surveys shall be signed by the individual(s) that performed the survey.

6.7.3 Surveys shall be reviewed and signed by the RPM or designee.

6.7.4 Notations, as described on Attachment 1, should be used when recording surveys on survey maps and diagrams. Dose rate contributors shall be clearly identified on the survey form (i.e., bags, hot spots).

6.8 Airborne Particulate Sampling

6.8.1 When practical, suspend air samplers at the breathing zone level.

6.8.2 Draw breathing zone air samples instead of general area air samples when work is in progress.

6.8.3 Site perimeter air samples (at the boundary of the unrestricted area) shall be located downwind of the point of potential airborne generation.

6.8.4 Air samples shall be collected as follows:

6.8.4.1 Place particulate filter paper in the head assembly with the smooth side (if applicable) facing the air sampler.

6.8.4.2 Attach filter head assembly to air sampler, if applicable.

6.8.4.3 Record the appropriate information on the air sample data label, Attachment 3, or equivalent. The following information should be recorded:

a. site name,

b. whether the air sample being collected is for occupational or non-occupational purposes,

c. analysis required (gross alpha, gross beta, isotopic, H-3, C-14),

d. location,

e. comments on pertinent information about the work being performed during the sampling, gaps in sampling time, etc.,

f. collection start/stop date, time, initial flow rate (liters per minute, lpm), ending flow rate (lpm), and total volume (l),

g. type of air sampling instrument along with the serial number and calibration due date,

h. initial of individual performing the air sample,

i. associated HSWP number.

6.8.5 Prior to collecting air sample, ensure the minimum volume will be collected by referring to the data table associated with the instrument which will be utilized to analyze the sample.

6.8.5.1 Initiate air sample collection.

a. If an electrically powered air sampler is being used, connect the air sampler to an electrical source and place the motor switch in the "ON" position and adjust the flow rate as needed to accommodate paragraph 6.8.5.

b. If intrinsically safe air sampling equipment is used, open instrument air supply valve associated with air sample head attachment and adjust flow rate as needed to accommodate paragraph 6.8.5.

c. If a lapel sample is utilized, ensure the person on whom the sampler is placed will have the greatest potential for working in the highest airborne concentrations, as compared to the balance of personnel in the work area.

6.8.6 After completion of air sample collection, remove air sample filter media from the sampler head and carefully place in a clean container.

6.8.7 Complete the air sample data label in accordance with paragraph 6.8.4.3.

6.8.8 Gross sample analysis will require completion of Attachment 3 prior to analysis. Complete Attachment 4 or 5 during analysis of air sample, as applicable. Attachment 5 is required to correct the air sample for the presence of radon and thoron components.

6.9 Gas Sampling

6.9.1 Any deviation from the prescribed sampling methodology indicated below requires the approval of the RPM.

6.9.2 Gas samples shall be conducted as follows:

6.9.2.1 Connect a lapel sampler suction port to the outlet of the gas Marinelli container with tygon tubing.

6.9.2.2 Connect a lapel air sample head loaded with a particulate filter to the inlet of the gas Marinelli container with tygon tubing.

6.9.2.3 Ensure all connections are air-tight when setting up gas sampling equipment.

6.9.2.4 Take the sampling apparatus to the sampling area. Open the Marinelli inlet and outlet valves. Turn on the lapel sampler and purge a minimum of 3 sample volumes through the Marinelli apparatus (e.g., when using a 250 ml Marinelli, purge a total of 750 ml through the Marinelli apparatus).

6.9.2.5 Record the appropriate information on the air sample data label, as stated in 6.8.4.3.

6.9.2.6 Forward the sample to the Analytical Laboratory for analysis.

6.10 Tritium Sampling

6.10.1 Any deviation from the prescribed sampling methodology indicated below requires the approval of the RPM.

6.10.2 The minimum sample volume for tritium shall be 3 liters.

6.10.3 Tritium samples shall be conducted as follows:

6.10.3.1 Connect lapel air sample head loaded with a particulate filter to the inlet of a bubbler with tygon tubing.

6.10.3.2 Place demineralized water, equivalent to one half of the sample container volume, into the bubbler (e.g., 250-ml bubbler would require 125 ml of demineralized water).

6.10.3.3 Connect a lapel air sampler suction port to the outlet of the bubbler with tygon tubing.

6.10.3.4 Ensure all connections are air-tight when setting up tritium sampling equipment.

6.10.3.5 When pulling the sample, use the appropriate flow rate to ensure the minimum sample volume is collected during the sampling time duration. The flow rate would be a minimum of 50 ml/min., not to exceed 100 ml/min. (e.g., flow rate of 50 ml/min. started at 13:00 would run to 14:00, 60 minutes, to obtain a total sample volume of 3,000 ml or 3 liters.)

6.10.3.6 After sample collection, isolate the bubbler and record the appropriate concluding information on the air sample data label, as stated in paragraph 6.8.4.3.

6.10.3.7 Forward the sample to the Analytical Laboratory for analysis.

6.11 Tritium and Carbon Sampling

6.11.1 Any deviation from the prescribed sampling methodology indicated below requires the approval of the RPM.

6.11.2 The minimum sample volume for tritium and carbon sample shall be 3 liters.

6.11.3 Place five bubbler containers in-line, connected by tygone tubing, and ensure all connections are airtight. All five bubblers should be of the same volume.

6.11.3.1 The first two bubblers are filled with demineralized water, equivalent to one-half of the container volume (e.g., two 250 ml bubblers each containing 125 mil of demineralized water.)

6.11.3.2 The third bubbler is an empty blank.

6.11.3.3 The fourth and fifth bubblers are filled with carbo-sorb-E, equivalent to on half of the container volume (e.g., two 250 ml bubblers each containing 125 mil of carbo-sorb-E.)

6.11.4 Connect an air sample head loaded with a particulate filter to the inlet of the first bubbler with tygone tubing.

6.11.5 Connect the suction port of an approved air sampling device, assigned by the instrumentation technician, to the outlet of the last (fifth) bubbler with tygone tubing.

6.11.6 When pulling the sample, use the appropriate flow rate to ensure the minimum sample volume is collected during the sampling time duration. The flow rate should be a minimum of 50 ml/min., not to exceed 100 ml/min.

6.11.7 After sample collection, isolate the bubblers and record the appropriate information on the air sample data labels, as stated in paragraph 6.8.4.3.

6.11.8 Forward the samples to the Analytical Laboratory for analysis.

6.12 Airborne Survey Follow-up Actions

6.12.1 Obtain the air sample results.

6.12.2 If work is being performed under a HSWP, air sample results must be placed in the HSWP package.

6.12.3 Complete the Airborne Radioactive Material Area Entry Log in accordance with HP-106 and forward results to the HP Supervisor for DAC-hour tracking, as applicable.

6.12.4 Ensure that adequate respirator protection is in effect, as applicable.

6.13 Schedule of Routine Surveys

6.13.1 The RPM or designee shall specify the frequency of area surveys by completion of Attachments 6, 7, 8, and 9 or equivalent to ensure all areas of the site are surveyed routinely.

6.13.2 The RPM or designee, may identify additional areas or locations for temporary or routine surveillance.

6.13.3 Routine surveys shall be performed within ± 25% of their assigned frequency (i.e., if the routine is a monthly it should be performed within one week of it's due date.)

6.13.4 Area surveys should be performed at the following frequencies, as a suggested minimum. Greater survey frequencies may be utilized as deemed appropriate.

6.13.4.1 The following areas that are routinely accessed by personnel shall be surveyed weekly. Surveys need only to document the areas entered by personnel.

a. Radioactive material processing areas,

b. Contaminated Areas, and

c. High Radiation Areas.

6.13.4.2 The following areas, if utilized by personnel, shall be surveyed monthly:

a. Restricted Areas,

b. Office Areas, and

c. Breakrooms.

6.13.4.3 Restricted Area perimeters shall be surveyed quarterly or a minimum of once per mobilization to a job site if duration at the job site is less than 1 quarter.

6.13.4.4 Job specific surveys shall be performed as frequently as necessary to document the level of radiological hazards in the work area.

7.0 Records

Attachments 1, 2, 4, 5, 6, 7, 8, and 9 are records associated with this procedure and shall be processed in accordance with Quality Assurance Administrative Procedure 17.1, "Records Management".

SAIC EEMG RADIOLOGICAL SURVEY

HSWP NUMBER______________________
TECHNICIAN NAME______________________

DATE__________**TIME**__________
AREA______________________

LEGEND

Δ = Smear Location
\# = G/A Dose Rate (mR/hr)
xx/xx β/γ contact
xx/xx β/γ at 12"

PAGE
___**OF**___

REASON FOR SURVEY

____

RAD levels from_____ mR/hr to_____mR/hr G/A

File #______________________

INSTRUMENT________ S/N________________CAL DUE__________
INSTRUMENT________ S/N________________CAL DUE__________
INSTRUMENT________ S/N________________CAL

ITEM	α dpm/100 cm²	β dpm/100 cm²	ITEM	α dpm/100 cm²	β dpm/100 cm²
1.			13.		
2.			14.		
3.			15.		
4.			16.		
5.			17.		
6.			18.		
7.			19.		
8.			20.		
9.			21.		
10.			22.		
11.			23.		
12.			24.		

COMMENTS

____
____
____
____
____
____
____
____
____
____
____

Reviewed By: ______________________ Date: __________

UNRESTRICTED RELEASE SURVEY LOG

Item	Identification No.	Removal Contamination (dpm/100 cm^2)		Fixed Contamination (dpm/100 cm^2)	
		alpha	beta	alpha	beta

REVIEWED BY:______________________________ DATE:______________

AIR SAMPLE DATA LABEL

Occupational ☐ Non Occupational ☐
Analysis: Gross Alpha ☐ Gross Beta ☐ Isotopic ☐
H-3 ☐ C-14 ☐
Site/Sample Location:______________________________
Comments:____
____
Collection Start Date/Time/LPM:______/______/______
Collection Stop Date/Time/LPM:______/______/______
Total Volume (L):__________________________________
Air Sample Model:______________S.N.______________
Air Sample Cal Due Date:___________________________
Sample Collected by:____________HSWP#:___________

AIR SAMPLE ANALYSIS RESULTS

HSWP # ________

❑ Occupational ❑ Non-occupational

Sample Taken	Yes	No	ID No.
Particulate			
C-14			
Gas			
Tritium			

Location: ____________________

Instrument Model: __________ Serial No.: ________

Instrument Calibration Due Date: __________

Start Time / Flow Rate: ________ / ________

Stop Time / Flow Rate: ________ / ________
(N/A if Totalizer)

Sampled By: ____________ Date: ________

Sample Volume = ______ (lpm) × (minutes) = **A** [liters]

ANALYSIS RESULTS

Alpha Particulate Counter ____________ No.: ______ Beta Particulate Counter ____________ No.: ______

Alpha

Sample count rate = ________ cpm

Background count rate = ________ cpm

Net count rate = [ncpm] = **B**

Efficiency = [ ] × [0.99] = [ ] = **C**
(Counter eff.) (Collection eff.)

Activity (dpm) = $\frac{B}{C}$ = $\frac{\text{ncpm}}{\text{eff.}}$ = [dpm] = **D**

$\frac{\text{D (dpm)}}{2.22\text{E}+9}$ = [μCi/ml] = **E**

Alpha DAC Frac. = $\frac{\text{E}(\mu\text{Ci/ml})}{\text{DAC}}$ = [DAC] = **F**

Beta

Sample count rate = ________ cpm

Background count rate = ________ cpm

Net count rate = [ncpm] = **B**

Efficiency = [ ] × [0.99] = [ ] = **C**
(Counter eff.) (Collection eff.)

Activity (dpm) = $\frac{B}{C}$ = $\frac{\text{ncpm}}{\text{eff.}}$ = [dpm] = **D**

$\frac{\text{D (dpm)}}{2.22\text{E}+9}$ = [μCi/ml] = **E**

Beta DAC Frac. = $\frac{\text{E}(\mu\text{Ci/ml})}{\text{DAC}}$ = [DAC] = **F**

Sum of DAC Fractions for:

Alpha Part. + Beta Part. + H-3 + C-14 + Gas = ______ Total DAC

❑ < 0.25 DAC
(Include sample results in HSWP package)

❑ ≥ 0.25 DAC
(Contact HP Sup. & complete Airborne Area Entry Log)

Calculated By: ______________ Date: ________

Signature: ______________

Reviewed By: ______________ Date: ________

Signature: ______________

CORRECTION FOR LONG-LIVED ALPHA COMPONENTS OF PARTICULATE AIR FILTER ANALYSIS LOG SHEET

HSWP #________________ ☐ Occupational ☐ Non-Occupational

Analysis: ☐ Gross Alpha ☐ Gross Beta ☐ Isotopic

Sample Location____

Instrument Model:________Instrument Serial Number:_________Cal Due Date:___________

Collection Start Date/ Time: ____________/__________ Sample Start Flow: __________lpm

Collection Stop Date/ Time: ____________/__________ Sample Stop Flow: __________lpm

Comments-(purpose/activity/attachments/recount etc.):______________________________________

____

____

____

____

Sample Collected By:__________________________________ Date:______________

Initial count date /time;__________________/______Counted By:________________________

Instrument S/N: ______________________ Cal. Due______________

Alpha activity: __________NCPM ______________uCi/ml Alpha DAC Fraction ___________

Beta activity:__________NCPM ______________uCi/ml Beta DAC Fraction ___________

Total DAC Fraction ___________

< 0.25 Total DAC

(Include sample results in HSWP package)

≥ 0.25 Total DAC or ≥1 Total Non-occupational DAC

(Submit Air Filter for Isotopic analysis or, if radon is believed to be a factor, recount sample at 4 hours and 24 hours later.)

4 hour count date /time;__________________/_______Counted By:________________________

Alpha activity at approximately 4 hours after collection: CCPM ____________

24 hour count date /time;__________________/_______Counted By:________________________

Alpha activity at approximately 24 hours after collection: CCPM ____________

Calculate the long-lived alpha activity (C_{LL}): $C_{LL} = \frac{C_2 - C_1 e^{-\lambda \Delta t}}{1 - e^{-\lambda \Delta t}}$ = CCPM Long Lived

C_1 = 4 hour CCPM C_2 = 24 hour CCPM $\lambda = .0651\ h^{-1}$

Δt = time elapsed (hours) between 4 hr. and 24 hr. count

$$\frac{\text{CCPM long lived}}{\text{counter eff.} \times \text{collection eff.}} = DPM \div [2.22E6 \times volume(ml)] = long\ lived\ activity\ \mu Ci / ml$$

$$\frac{long\,lived\,activity(\mu Ci/ml)}{DAC(\mu Ci/ml)} = Long\,Lived\,DAC \quad Fraction = \_\_\_\_\_\_\_\_$$

Reviewed By:____________________________________Date:______________

RPM or designee

Daily Routines for __________

Routine Number	Description	Rad Con	Air	Other Requirements	Performed by	Date performed

Weekly Routines for week _____ of _________

Routine Number	Description	Rad Con	Air Sample	Other Requirements	Due Date	Performed By	Date Performed

REVIEWED BY:______________________________DATE:__________________

Quarterly Routines for ___/____/___ Months of __________

Routine Number	Description	Rad Con	Air Sample	Other Requirements	Due Date	Performed By	Date Performed

REVIEWED BY:____DATE:___________________