

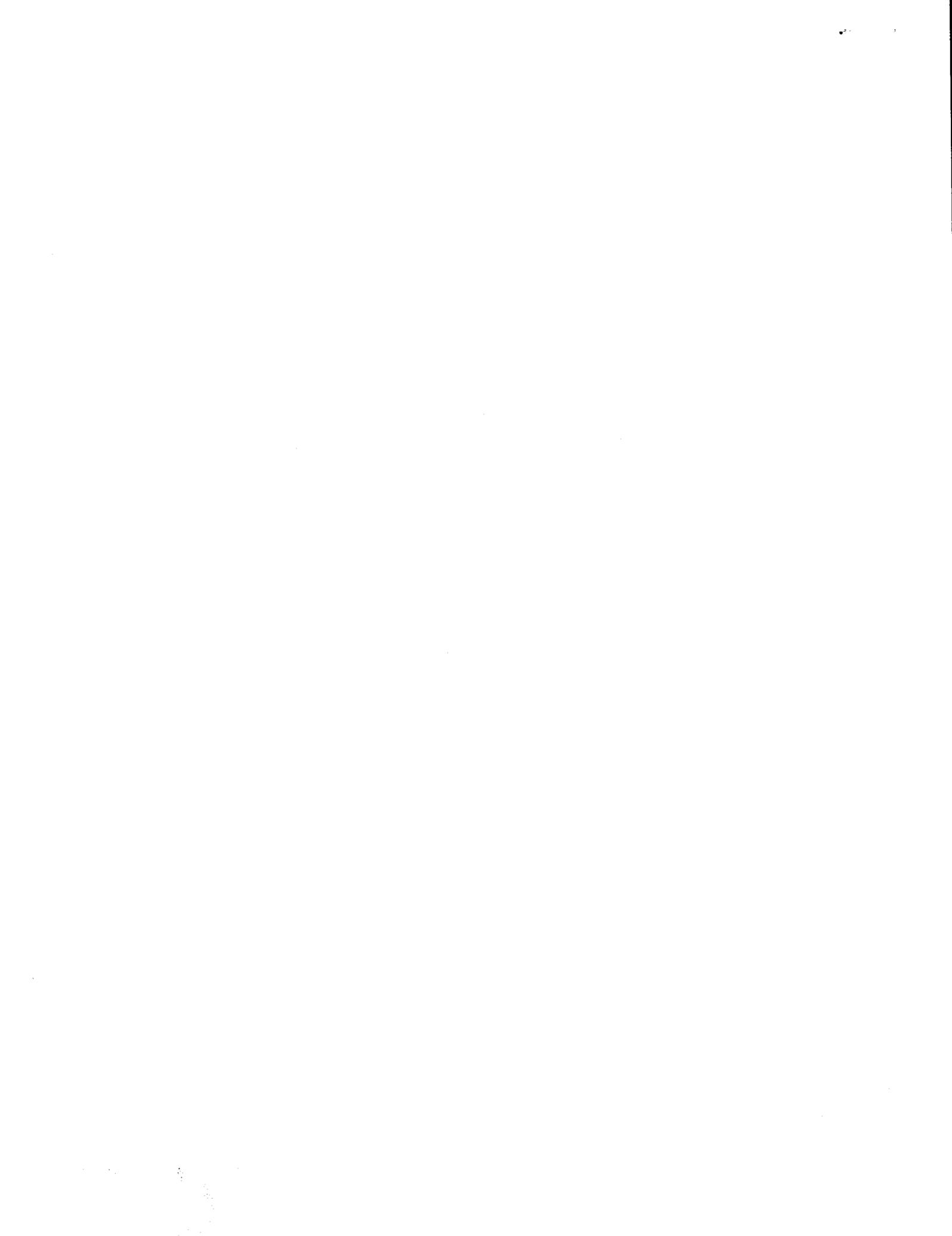
4-S64-ER-OPS-GT.39  
REV. 1



# PUSH SUBSURFACE SOIL SAMPLE



JUNE 24, 1997





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## 1.0 PURPOSE

This procedure describes the activities to collect a discrete soil sample at depth using the Geoprobe or equivalent hydraulic methodology. These samples will be for visual inspection and/or chemical/radiological analysis, as per the project specific sampling and analysis plan, or equivalent.

## 2.0 SCOPE

This procedure applies to all Rocky Flats Environmental Technology Site (Site) employees and subcontractors.

This procedure addresses the following topics:

- Field preparation
- Driving
- Sample preparation
- Sample collection
- Quality control samples
- Sample removal in the field
- Equipment decontamination
- Boring completion and abandonment
- Documentation closeout

## 3.0 OVERVIEW

The assembled sampler is connected to the leading end of the probe rod and driven, pushed, or hammered into the subsurface. Additional probe rods are connected in succession to advance the sampler to depth.

### 3.1 Large-Bore Sampler

The sampler remains sealed (closed) by a piston tip as it is being advanced. The piston tip is held in place by a reverse-threaded top-pin at the trailing end of the sampler. When the sampler tip has reached the top of the desired sampling interval, a series of extension rods, sufficient to reach depth, is coupled together and lowered down the inside diameter of the probe rods.

The extension rods are then rotated clock-wise. The male threads on the leading end of the extension rods engage the female threads on the top end of the stop-pin, and the pin is removed. After the extension rods and stop-pin have been removed, the tool string is advanced to the appropriate depth. The piston is displaced inside the sampler body by the soil as the sample is cut. To recover the sample, the sampler is retrieved from the hole and the liner containing the soil sample is removed.

### 3.2 Macro-Core Sampler

The Macro-Core sampler is advanced in depth by pushing, or by pushing while hammering, depending on the formation or soil resistance encountered during probing operations. A retractable piston assembly can be used to prevent excess sluff or sidewall material from entering the sample barrel while reentering a probe hole, but is never used during driving operations. Two types of cutting shoes are available for the macro sampler. The first type is manufactured with a machined inner groove to accept the piston assembly. The second is a smooth bore, heavy duty shoe that cuts a slightly undersized core to reduce resistance to the core while entering the inner sample tube. To use the piston assembly, the piston is inserted into the first type of cutting shoe and locked into place by rotating the inner barrel in a counter clockwise (left hand thread) direction using the wrench provided for the macro sampler. When the top of the next coring

interval is reached, the assembly is unlocked using the extension rods as described for the large-bore sampler. The bottom rod is machined to fit into the slot in the top of the piston barrel. The barrel is then rotated in a clockwise direction to unlock the piston assembly. Some hammering action will be required to release the piston assembly from the cutting shoe so core can be recovered from the next interval. The piston is free floating and will move up the inner sample tube during the coring operation. If poor recovery is expected or experienced because of lithology, a core catcher can be used that is locked into place over the threaded end of the cutting shoe and should prevent a loss of core when the sampler is retrieved back to the surface.

#### 4.0 LIMITATION AND PRECAUTIONS

During borehole drilling and sampling, the appropriate personal protective equipment (PPE), as specified in the project-specific Health and Safety Plan (HASP), shall be worn at all times.

Personnel operating the Geoprobe shall be familiar with the project-specific Sampling and Analysis Plan (SAP), or equivalent work controlling document.

Drilling and sampling activities shall be conducted in accordance with the project or site-specific HASP and SAP.

Down-hole drilling and sampling equipment shall be decontaminated after each boring is complete in accordance with 5-21000.OPS.FO.3, General Equipment Decontamination.

Sampling equipment shall be decontaminated between individual sampling points to minimize cross-contamination in accordance with 5-21000.OPS.FO.3, General Equipment Decontamination.

The drill rig and above ground equipment shall be decontaminated between work areas in accordance with 5-21000.OPS.FO.3, General Equipment Decontamination.

Any work being performed in or beside a paved road shall use a signal person with an orange vest to direct traffic when appropriate per the applicable HASP.

#### 5.0 PREREQUISITE ACTIONS

##### 5.1 Planning and Coordination

###### **Project Manager**

- (1) Verify that all personnel performing this procedure have the appropriate health and safety training as specified in the site-specific HASP.
- (2) Verify that all personnel performing this procedure have been trained in the implementation of this procedure and associated procedures.
- (3) Provide sample locations (map and/or list) to the Field Manager or designee.
- (4) Ensure that a soil disturbance permit has been obtained in accordance with 1-B37-HSP-12.08, Excavations and Trenching, or a utility clearance has been obtained in accordance with 5-21000-OPS-GT.10, Borehole Clearing.
- (5) Ensure that all field data activities are in place in accordance with 4-B29-ER-OPS-FO.14, Field Data Management.

## 5.2 Materials and Equipment

### **Field Manager**

- (1) Ensure the following equipment is available (as required) to support the sampling:
  - Piston stop-pin O-rings (large-bore)
  - Cutting shoe(s) (large-bore and/or macro)
  - Drive head
  - Sample tubes (large-bore and/or macro)
  - Piston tip(s) (large-bore)
  - Piston rod(s) (large-bore)
  - Piston assembly (macro)
  - Clear plastic liners (large-bore and/or macro)
  - Stainless steel liners
  - Cutting shoe wrench(s) (large bore and macro)
  - End caps (large-bore and/or macro)
  - Teflon tape
  - Probe rod(s)
  - Drive cap
  - Pull cap
  - Extension rods with quick-link couplers
  - Extension rod handle
  - Extruder for large-bore stainless steel liners
  - Extension rod jig
  - Pre-probes (large-bore and macro)
  - Vice grips
  - Core catchers (macro only)
  - Open-ended wrench
  - 1-inch adjustable wrench
  - Drilling rig or hydraulic pushing rig
  - Drill bit
  - Pin flag or stakes
  - Plastic beaker
  
- (2) Ensure that the following material is available (as required) to support boring completion and abandonment:
  - Granular bentonite
  - Deionized or distilled water
  - Concrete

## 6.0 INSTRUCTIONS

### 6.1 Field Preparation

#### **Field Manager**

- (1) Ensure that borings have been located, numbered, and identified by using flags, stakes, or paint markers on paved surfaces.
  
- (2) Clear the area of any obstructions per the project HASP.

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- (3) Establish an exclusion zone according to the project HASP.
  - (4) Verify the location of utilities (buried and/or above-ground) according to the project HASP.

**User**

- (5) Install the probe liner assembly.

## CAUTION

**Failure to install a pilot hole may cause unnecessary wear on the sampling tools.**

**NOTE:** *A pilot hole may be appropriate when the surface to be penetrated contains gravel, asphalt, concrete, hard sands, or rubble.*

- (6) **IF** a pilot hole is required,  
**THEN** perform the following:
  - [A] Obtain a large bore pre-probe.
  - [B] Push or drill the pre-probe to create a pilot hole to a depth just above the sampling interval.
  - [C] **IF** surface pavements are present,  
**THEN** drill through the pavements to create a hole with a larger diameter than the sampler.

## 6.2 Driving

**User**

- (1) Attach the probe rod to the assembled sampler and a drive cap to the probe rod.
- (2) Position the assembly for driving into the subsurface.
- (3) Drive the assembly into the subsurface until the drive head of the sample tube is just above the ground surface.
- (4) Remove the drive cap and the probe rod.
- (5) Secure the drive head and re-tighten the stop-pin (large-bore sampler only).
- (6) Attach additional probe rod and a drive cap (as required) and continue to drive the sampler into the ground.
- (7) Attach and drive additional probe rods (as required) in succession until the leading end of the sampler reaches the top of the desired sampling interval.
- (8) **IF** the hole encounters refusal, and the use of a pre-probe is unsuccessful in advancing past the refusal,

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**THEN** notify the Field Manager to determine the distance of bore-hole offset.

### 6.3 Sample Preparation

#### User

- (1) Clear the work area of any obstructions.
- (2) Insert an extension rod down the inside diameter of the probe rods, and be careful not to let go.
- (3) Place an extension rod coupler on the top threads of the extension rod (quick-connect couplers may already be in place).
- (4) Attach another extension rod to the coupler and lower the jointed rods down-hole.

**NOTE:** *The leading extension rod must reach the stop-pin at the top of the large-bore sampler assembly, or to the piston barrel at the top of the macro-core sampler.*

- (5) **IF** additional extension rods are required,  
**THEN** repeat Steps (2) through (4) by using the same number of extension rods as there are probe rods in the ground.
- (6) **WHEN** the leading extension rod has reached the stop-pin or piston barrel down-hole,  
**THEN** attach an extension rod handle to the top extension rod.
- (7) Turn the handle clockwise until the stop-pin detaches from the threads on the drive head, or unlock the marco piston assembly.

**NOTE:** *An extension jig may be used to hold the rod couplers in place as the top extension rods are removed.*

- (8) Remove the extension rods and uncouple the sections as each joint is pulled from the hole.
- (9) **NOTE:** *Once the stop-pin has been detached, or the piston assembly unlocked, the sampler is ready to be redriven.*

### 6.4 Sample Collection

#### User

- (1) Make a mark on the probe rod above the ground surface equivalent to the sample tube length.
- (2) Attach a drive cap to the probe rod and drive the tool string and sampler.
- (3) Remove the drive cap on the top probe rod and attach a pull cap.
- (4) Lower the probe shell and close the hammer latch over the pull cap.

- (5) Pull the tool string out of the hole, removing probe rods as necessary until the sampler is withdrawn from the hole.
- (6) Where material is sloughing into the borehole and being collected in the sampler, at the discretion of the Field Manager, a small amount (up to approximately one cup) of granulated bentonite may be poured downhole between runs as a marker for determining the boundary between sloughed material and intact core.
- (7) **IF** the sampler is located in loose soil,  
**THEN** recover the sampler as one piece by using a foot control to lift the sampler the remaining distance out of the hole.
- (8) **IF** excessive resistance is encountered while attempting to lift the sampler and probe rod out of the hole by using the foot control,  
**THEN**
  - [A] Unscrew the drive head from the sampler.
  - [B] Remove the drive head with the drive rod, the piston rod, and the piston tip.
- (9) Detach the probe rod.
- (10) Unscrew the cutting shoe using the cutting shoe wrench if necessary.
- (11) Pull the cutting shoe out with the liner attached.
- (12) **IF** the liner does not slide out readily with the cutting shoe,  
**THEN** take off the drive head and push down on the side wall of the liner, or use other extruding devices that may be on hand.
- (13) **IF** the liner is brass, stainless steel, or Teflon, and volatile organic compound (VOC) samples are to be collected,  
**THEN** cover the end of the sample tube with Teflon tape.

**NOTE:** *Care shall be taken not to stretch, and thereby thin, the Teflon tape.*

[A] Minimize headspace on the tape by smoothing out and pressing over the end of the soil core.

- (14) **IF** VOC samples will be collected,  
**THEN** cap off the ends of the liner by using a black and red end cap.

**NOTE:** *A black end cap should be used at the bottom of the sample core and a red cap at the top of the core.*

- (15) **IF** the samples are to be removed from the liner in the field,  
**THEN** go to Section 6.6.

- (16) Handle the collected sample and complete the Chain of Custody Form in accordance with 5-21000-OPS-FO.13, Containerization, Preserving, Handling and Shipping of Soil and Water Samples.
- (17) Remaining sample will be returned to the geoprobe hole, or stored in core boxes if specified in the project-specific SAP, or equivalent plan.
- (18) **IF** collected core is to be described,  
**THEN** visually log core in accordance with 5-21000-ER-OPS-GT.01, Logging Alluvial and Bedrock Material.

#### 6.5 Quality Control Samples

Sample collection will be the same as the steps in Section 6.4. Duplicate samples are intended to be as close to exact duplicates of the original samples as possible. They are to be obtained immediately adjacent to the planned samples that they are intended to duplicate. Quality Control Samples are designated in the project SAP, or equivalent plan.

##### **User**

- (1) Obtain duplicate and blank samples in accordance with the SAP, or equivalent plan.
- (2) **IF** sufficient material is available to collect a planned QC sample,  
**THEN** collect the sample and document on Appendix 1, Daily Field Activity Report.
- (3) **IF** insufficient material is unavailable to collect a planned QC sample,  
**THEN** notify the Field Manager and document on Appendix 1, Daily Field Activity Report.

#### 6.6 Sample Removal in the Field

##### **User**

- (1) **IF** samples were gathered using clear plastic or Teflon liners,  
**THEN** carefully slit open the liner with a utility knife, or if possible, slide the core out of the liner and into the core box or sample container.
- (2) **IF** samples were gathered using large bore brass or stainless steel liners,  
**THEN** separate the liner into appropriate sections and remove the sample from the liner with an extruder.
- (3) Screen the sample as specified in the SAP and the HASP.

#### 6.7 Equipment Decontamination

##### **User**

- (1) Decontaminate sampling equipment in accordance with 5-21000-OPS-FO.3, General Equipment Decontamination.
- (2) Decontaminate driving equipment in accordance with 5-21000-OPS-FO.4, Heavy Equipment Decontamination, prior to leaving the Site.

## 6.8 Boring Completion and Abandonment

### User

- (1) Contact the Project Manager to determine if the borehole will be abandoned or completed as a monitoring well.
  - [A] Document the decision in the Chronological Record of Activities and Comments Section on Appendix 1.
- (2) **IF** the borehole to be abandoned is less than 2-in. in diameter and completed in the upper hydrostratigraphic unit (UHSU),  
**THEN** plug the open hole with granular bentonite and hydrate with a small amount of deionized or distilled water.
- (3) **IF** the borehole is completed into the lower hydrostratigraphic unit (LHSU),  
**THEN** abandon the borehole in accordance with 5-21000-OPS-GT.5, Plugging and Abandonment of Boreholes.
- (4) **IF** the borehole is to be completed as a monitoring well,  
**THEN** complete the borehole operation in accordance with 5-21000-OPS-GT.6, Monitoring Well and Piezometer Installation.

## 6.9 Documentation Closeout

### User

- (1) Document all activities as outlined on Appendix 1, Daily Field Activity Report.
- (2) Write "N/A" in any blocks that are not applicable and/or line through, initial and date any large blocks that are not applicable.
- (3) Obtain an independent review and signature of the completed Daily Field Activity Report.

## 7.0 **RECORDS**

Management of all records is consistent with 1-77000-RM-001, Records Management Guidance for Records Sources.

Ensure that the original and one copy, as required, of the Daily Field Activity Report is transmitted to the ERPD Project File Center in accordance with 2-G18ER-ADM-17.01, Records Capture and Transmittal.

Submission of record copies to the ERPD Project File Center is in accordance with Administrative Records requirements, as defined in 2-S65-ER-ADM-17.02, Administrative Record Document Identification and Transmittal.

There are no non-quality records generated by this procedure.

## **8.0 REFERENCES**

1-B37-HSP-12.08, Excavations and Trenching

1-77000-RM-001, Records Management Guidance for Records Sources

2-G18-ER-ADM-17.01, Records Capture and Transmittal

2-S65-ER-ADM-17.02, Administrative Record Document Identification and Transmittal

4-B29-ER-OPS-FO.14, Field Data Management

5-21000-OPS-FO.3, General Equipment Decontamination

5-21000-OPS-FO.4, Heavy Equipment Decontamination

5-21000-OPS-FO.13, Containerization, Preserving, Handling and Shipping of Soil and Water Samples

5-21000-OPS-GT.1, Logging of Alluvial and Bedrock Material

5-21000-OPS-GT.5, Plugging and Abandonment of Boreholes

5-21000-OPS-GT.6, Monitoring Well and Piezometer Installation

5-21000-OPS-GT.10, Borehole Clearing

