

Rocky Flats Environmental Technology Site

4-S64-ER-OPS-GT.39

REVISION 0

PUSH SUBSURFACE SOIL SAMPLE

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DOE RFFO/ER Submittal Required: Yes No NA

Environmental Protection Agency Review Required: Yes No NA

Responsible Organization: Environmental Restoration Program Division Effective Date: 8-16-96

CONCURRENCE BY THE FOLLOWING DISCIPLINES IS DOCUMENTED IN THE PROCEDURE HISTORY FILE:

- Data Management and Reporting Services
- Environmental Operations Management
- Occupational Safety
- Industrial Hygiene and Safety
- Environmental Documentation
- Industrial Area OU Closure
- Group 1 Closures
- Group 5, 6, & 7 Closures

USE CATEGORY 4

ORC review not required

The following have been incorporated in this revision:

95-DMR-000089

Periodic review frequency: 1 year from the effective date

Background Information: No site procedure exists that will fulfill the requirements of this document. Good management practice requires methods to collect a discrete soil sample at depth and recover it for visual inspection and analysis using the Geoprobe or equivalent hydraulic methodology.

LIST OF EFFECTIVE PAGES

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1-14		

TOTAL NUMBER OF PAGES: 14

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1. PURPOSE

This procedure describes the activities to collect a discrete soil sample at depth and recover it for visual inspection and analysis, using the Geoprobe or equivalent hydraulic methodology.

2. SCOPE

This procedure applies to all Rocky Flats Environmental Technology Site (Site) Environmental Restoration Program Division (ERPD) 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. OVERVIEW

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

The sampler remains sealed (closed) by a piston tip as it is being advanced. The piston is held in place by a reverse-threaded stop-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, are 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 recovered from the hole and the liner containing the soil sample is removed.

4. LIMITATION AND PRECAUTIONS

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

Personnel installing the probe shall be familiar with the site-specific Field Sampling Plan (FSP).

4. **LIMITATION AND PRECAUTIONS (continued)**

Ensure that all equipment is protected from the ground surface with clear plastic sheeting when drilling inside an Individual Hazardous Substance Sites (IHSS), Additional Area of Concern (AAC), or Potential Area of Concern (PAC).

All drilling and sampling activities shall be conducted in accordance with the projects site-specific HASP.

All down-hole drilling and sampling equipment will be decontaminated after each boring is complete.

All sampling equipment will be decontaminated between individual sampling points to minimize cross-contamination.

The drill rig and above ground equipment shall be decontaminated between work areas.

Ensure that any work being performed in or beside a paved road have a signalman with orange vests to direct traffic when appropriate.

5. **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 Engineer 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 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

5.2.1 Special Tools and Equipment

Field Engineer

[1] Ensure the following equipment is available (as required) to support the sampling:

- Piston stop-pin, O-ring
- Cutting shoe
- Drive head
- Sample tube
- Piston tip
- Piston rod
- Clear plastic liner
- Brass liner
- Stainless steel liner
- Teflon liner
- Cutting shoe wrench
- End caps
- Teflon tape
- Probe rod(s)
- Drive cap
- Pull cap
- Extension rod
- Extension rod coupler
- Extension rod handle
- Extruder
- Extension rod jig
- Pre-probe
- Vise grips
- Open-ended wrench
- 1-inch adjustable wrench
- Drilling rig or hydraulic pushing rig
- Drill bit
- Pin flag or stakes
- Plastic beaker

5.2.2 Consumables

Field Engineer

[1] Ensure that the following material is available (as required) to support boring completion and abandonment:

- Granular bentonite
- Deionized water
- Concrete

6. INSTRUCTIONS

6.1 Field Preparation

Field Engineer

- [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.
- [3] Establish an exclusion zone according to the project HASP.
- [4] Verify the utilities location.

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, hard sands, or rubble.*

- [6] **IF** a pilot hole is required,
THEN perform the following:
 - [A] Obtain a large bore pre-probe.
 - [B] Push the pre-probe to create a pilot hole to a depth just above the sampling interval.
 - [C] **IF** surface pavements are present,
THEN install 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.

6.2 Driving (continued)

- [4] Remove the drive cap and the probe rod.
- [5] Secure the drive head and re-tighten the stop-pin.
- [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,
THEN notify the Field Engineer 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.
- [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 sampler assembly.*

- [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 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.

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.

6.3 Sample Preparation (continued)

NOTE: *Once the stop-pin has been removed, the sampler is ready to be redriven.*

- [9] Remove and inspect the stop-pin for damage and ensure that it is attached to the bottom of the last extension rod.

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 until the top of the sampler is approximately 12 in. above the ground surface.
- [6] **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.
- [7] **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.
- [8] Detach the probe rod.
- [9] Unscrew the cutting shoe using the cutting shoe wrench if necessary.
- [10] Pull the cutting shoe out with the liner attached.
- [11] **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.

6.4 Sample Collection (continued)

- [12] **IF** the liner is brass, stainless steel, or teflon,
THEN cover the end of the sample tube with teflon tape.

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

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

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.*

- [13] Cap off the ends of the liner by using a black and red end cap.

- [14] **IF** the samples are to be removed from the liner in the field,
THEN go to Section 6.6.

- [15] 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.

6.5 Quality Control Samples

Sample collection will be the same as the steps in Section 6.4, for duplicate. These samples are intended to be as close to exact of the original samples as possible. They are obtained immediately adjacent to the planned samples that they are intended to duplicate.

User

- [1] Obtain duplicate and blank samples in accordance with the FSP.
- [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 Engineer 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.

6.6 Sample Removal in the Field (continued)

- [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 FSP and the HASP.

6.7 Equipment Decontamination

User

- [1] Decontaminate sampling equipment in accordance with 5-21000-OPS-FO.3, General Equipment and 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 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 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.

All abandoned borings will be marked in the field by a sonotube filled with concrete and a monument with location number and survey coordinates 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 which are not applicable.
- [3] Obtain an independent review and signature of the completed Daily Field Activity Report.

7. RECORDS

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

- [1] Ensure that the original and one copy, as required, of the following quality assurance records are transmitted to the ERPD Project File Center in accordance with 2-G18-ER-ADM-17.01, Records Capture and Transmittal:
 - Daily Field Activity Report

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 nonquality records generated by this procedure.

8. 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 and Decontamination

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

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

8. **REFERENCES (continued)**

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

