

**SURFACE SOIL SAMPLING PROCEDURES  
MANUAL - FERNALD RI/FS**

**10/31/87**

**ASI/WMCO  
21  
PROCEDURES**

# **SURFACE SOIL SAMPLING PROCEDURES MANUAL**

**FERNALD RI/FS**

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SURFACE SOIL SAMPLING  
PROCEDURES MANUAL

Fernald RI/FS

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**TITLE:** Methodology for Decontamination  
of Surface Soil Sampling Equipment for the  
Remedial Investigation/Feasibility Study (RI/FS)  
at the Fernald Feed Materials Production Center (FMPC)

1.0 PURPOSE

This procedure provides the methodology to decontaminate the soil sampling equipment (sampling equipment) to be used in the RI/FS to be conducted at the FMPC. The sampling equipment includes the cookie cutter and auger soil samplers.

2.0 SCOPE

This procedure applies to decontamination of the sampling equipment to be used for surface soil sampling for the FMPC RI/FS.

3.0 RESPONSIBILITY

- 3.1 It is the responsibility of the Soil Sampling Team Leader or his designee to see that this procedure is followed during the field program phase.
- 3.2 It is the responsibility of the Soil Sampling Team Leader or his designee to delegate the performance of this procedure to personnel that are experienced with this procedure and use of the sampling equipment.
- 3.3 It is the responsibility of the person performing this procedure to follow it and report unusual occurrences to the Soil Sampling Team Leader or his designee.

4.0 REFERENCES

- 4.1 ASTM C998-83, Standard Method for Sampling Surface Soil for Radionuclides.

5.0 REQUIREMENTS

5.1 EQUIPMENT AND MATERIALS

- 5.1.1 Methodology for Decontamination of Surface Soil Sampling Equipment for the Remedial Investigation/Feasibility Study (RI/FS), at the Fernald Feed Materials Production Center (FMPC)

- 5.1.2 Nonphosphate detergent
- 5.1.3 Bottle brush
- 5.1.4 Tap water
- 5.1.5 Deionized water
- 5.1.6 Decontamination basins
- 5.1.7 Methanol
- 5.1.8 Paper towels
- 5.1.9 Aluminum foil
- 5.1.10 Plastic bags
- 5.1.11 Field log book

6.0 PROCEDURE

- 6.1 The sampling equipment shall be decontaminated at the designated site.
- 6.2 The sampling equipment shall be cleaned with tap water, a nonphosphate detergent, and a bottle brush.
- 6.3 The sampling equipment shall be rinsed with:
  - o tap water
  - o deionized water
  - o methanol (for HSL analysis only)
  - o deionized water (for ASL analysis only)
- 6.4 Dry the soil sampling equipment with clean paper towels and wrap the decontaminated equipment in aluminum foil and store in a clean plastic bag.
- 6.5 A single water sample shall be collected from the final deionized water rinse for a group of samplers to check for contamination. The sample shall be collected in an appropriate polyethelene (plastic) or glass radiological bottle.

Radiological samples will be preserved with nitric acid (HNO<sub>3</sub>) to a pH of less than two. HSL samples will be collected with the following requirements:

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	<u>CONTAINER</u>	<u>VOLUME REQUIRED</u> (ml)	<u>PRESERVATION</u>
<b>Inorganics</b>			
Metals	Plastic or glass	200	HNO <sub>3</sub> <2 Cool 4°C, NaOH to pH>12, 0.6g Ascorbic Acid (a)
Cyanide	Plastic or glass	1000	
<b>Organics</b>			
Volatiles	Glass, Teflon-lined septum	40	Cool 4°C, 0.008% Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (a)
Semi-Volatiles	Glass, Teflon-lined septum	1000	Cool 4°C 0.008% Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (a)
PCBs/ Pesticides	Glass, Teflon-lined septum	1000	Cool 4°C 0.008% Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (a)

(a) Will only be used in the presence of residual chlorine.

- 6.6 Screw the cap onto the sample bottle, and seal with custody tape.
- 6.7 Complete a sample label and attach it to the sample bottle.
- 6.8 Place the sample bottle into a plastic bag to minimize potential for contamination or spillage.
- 6.9 Complete the Sample Collection Log.
- 6.10 Complete the Chain-of-Custody Record.
- 6.11 Complete the Request for Analysis form. The last rinse sample will be analyzed for the following parameters:

For radiological samples:

- o Gamma spectral analysis
- o Isotopic uranium
- o Isotopic thorium
- o Isotopic plutonium
- o Sr-90
- o Tc-99
- o Np-237
- o Ra-226
- o Ra-228

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For HSL samples:

- o Inorganics
- o Volatiles
- o Semi-volatiles
- o PCBs/Pesticides

6.12 Each piece of sampling equipment shall have a unique identification number assigned to it. Record the identification numbers of the equipment decontaminated and the rinsate sample number in the field log book.

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**TITLE:** Methodology to Conduct Surface Soil Sampling  
for Radiological Analysis Outside the Production Area  
for the Remedial Investigation/Feasibility Study (RI/FS)  
at the Fernald Feed Materials Production Center (FMPC)

1.0 PURPOSE

This procedure provides instruction to provide uniform sampling techniques when using a cookie cutter sampler for obtaining 2-inch interval soil samples to a depth of 6 inches for the RI/FS to be conducted at the FMPC.

2.0 SCOPE

This procedure applies to surface soil sampling with a cookie cutter sampler to areas outside the FMPC Production Area.

3.0 RESPONSIBILITY

- 3.1 It is the responsibility of the Soil Sampling Team Leader or his designee to see that this procedure is followed during the field program phase.
- 3.2 It is the responsibility of the Soil Sampling Team Leader or his designee to delegate the performance of this procedure to personnel that are experienced with this procedure and the cookie cutter soil sampler.
- 3.3 It is the responsibility of the person performing this procedure to follow it and report unusual occurrences to the Soil Sampling Team Leader or his designee.

4.0 REFERENCES

- 4.1 ASTM C998-83, Standard Method for Sampling Surface Soil for Radionuclides.

5.0 REQUIREMENTS

5.1 EQUIPMENT AND MATERIALS

- 5.1.1 Methodology to Conduct Surface Soil Sampling for Radiological

- 5.1.2 Forms
  - o Field Activity Daily Log (1)
  - o Sample Collection Log (1)
  - o Sample Labels (20)
  - o Chain-of-Custody Record (6)
  - o Request for Analysis (6)
- 5.1.3 Custody tape
- 5.1.4 Polyethylene bags (40)
- 5.1.5 Cardboard containers (40)
- 5.1.6 Cookie cutter sampler handle (1)
- 5.1.7 Cookie cutter bits (20)
- 5.1.8 Disposable latex gloves (40 pair)
- 5.1.9 Backpacks (2)
- 5.1.10 Grass clippers
- 5.1.11 Compass
- 5.1.12 Field log book
- 5.1.13 Disposable alcohol wipes
- 5.1.14 Stainless steel bowls (3)
- 5.1.15 Stainless steel knives (3)
- 5.1.16 Sheets of polyethylene (10)

6.0 PROCEDURE

6.1 ZONE 3 - 1000-FOOT GRID POINT SAMPLES

- 6.1.1 Collect required supplies and equipment including a portable radio from the trailers.
- 6.1.2 Inform the Site Manager or his designee of the intended sampling locations. Notify by radio if a change from the specified sampling locations occur.

- 6.1.3 Begin field work. Periodically update the Field Activity Daily Log to indicate the location sampled, the unique sample number, and other relevant information.
- 6.1.4 Locate the designated grid point to be sampled. The areas to be sampled are located in Zone 3. A 1000-foot grid has been surveyed prior to sampling. The grid points will be marked with wooden stakes. A compass may be used to help locate the stakes hidden by dense vegetation.
- 6.1.5 The sampling team shall consist of two members. One person (the sampler) shall handle the cookie cutter sampler handle while the other person (the notekeeper) shall handle the cookie cutter bits and the sample containers.
- 6.1.6 Disposable latex gloves shall be worn while collecting and handling the samples. The notekeeper shall wear clean gloves for each sample. The sampler shall wear clean gloves for each sampling location.
- 6.1.7 Using grass clippers, the sampler shall trim any existing vegetation from the sample location. Do not uproot vegetation or disturb the soil. Place a sheet of polyethylene at the sample location to prevent the cookie cutter sampler handle from coming in direct contact with the ground.
- 6.1.8 At each sample location, three soil samples shall be taken, at the following depth increments:
- o First sample - 0 to 2 inches deep
  - o Second sample - 2 to 4 inches deep
  - o Third sample - 4 to 6 inches deep
- 6.1.9 The sampler shall hold the cookie cutter sampler handle while the notekeeper shall insert the clean cookie cutter bit into the cookie cutter sampler handle. A clean bolt shall be inserted through the sampler handle and cookie cutter bit. A nut is placed on the exposed end of the bolt, and tightened to hold the cookie cutter bit in place.
- 6.1.10 At the sample location, the sampler shall take the soil sample by driving or pounding the clean cookie cutter bit with the cookie cutter sampler handle vertically into the soil to the depth specified in Step 6.1.8.
- 6.1.11 If the sample is not a QA sample, proceed to Step 6.1.12. If the sample is to be a QA duplicate or triplicate, 2 or 3 adjacent cores must be taken to provide sufficient sample quantity for

analysis.

- 6.1.12 The sampler shall remove the cookie cutter bit from the soil with the cookie cutter sampler handle, and remove the bolt from the cookie cutter bit.
  - 6.1.13 The notekeeper shall remove the cookie cutter bit from the cookie cutter sampler handle and extract the soil sample into a clean plastic bag for a non-QA sample, or a clean stainless steel bowl for a QA sample.
  - 6.1.14 For a non-QA sample, proceed to Step 6.1.17. If the sample is a QA sample, the notekeeper shall reinsert the cookie cutter bit into the cookie cutter sampler handle and the sampler shall bolt it in place. Repeat Steps 6.1.10 through 6.1.14 once more for a QA duplicate, or twice for a QA triplicate.
  - 6.1.15 After the appropriate number of cores have been composited, the notekeeper shall mix the composite sample thoroughly using a stainless steel knife.
  - 6.1.16 For a QA duplicate, the notekeeper shall split the sample into two plastic bags; for a QA triplicate into three plastic bags. Repeat Steps 6.1.17 through 6.1.22 for each sample bag.
  - 6.1.17 The notekeeper shall close the plastic bag and seal with custody tape.
  - 6.1.18 Place the plastic bag into a cardboard container. Attach custody tape over the lid of the cardboard container and the container itself.
  - 6.1.19 Complete a sample label and attach it to the cardboard container. The sample label shall include the same unique sample number which was obtained from the prenumbered Sample Collection Log.
  - 6.1.20 Place the used cookie cutter bit, nut and bolt into a plastic bag for transport to the decontamination facility. Place the used gloves into another plastic bag for disposal.
  - 6.1.21 Complete the Sample Collection Log. The Sample Collection Log has been prenumbered with unique sample numbers. One sample number shall be assigned to each sample. Record field observations into the field logbook, along with pertinent information from the Sample Collection Log. Each cookie cutter bit is assigned a unique identification number. Record the bit number used in the field logbook.
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- 6.1.22 Complete the Chain-of-Custody Record.
- 6.1.23 The cookie cutter sampler handle shall be wiped down between samples using disposable alcohol wipes. All visual contamination shall be removed. The next soil sample is taken by carefully placing a clean cookie cutter bit with the cookie cutter sampler into the hole left from the previous sample.
- 6.1.24 The sample is taken by repeating Steps 6.1.8 through 6.1.23.
- 6.1.25 Repeat Steps 6.1.4 through 6.1.25 for each location to be sampled.
- 6.1.26 Decontaminate the sampling equipment according to Procedure ASI-1000 at the designated decontamination site.
- 6.1.27 The Request for Analysis form shall be completed before the samples are delivered to the Sample Coordinator. The soil samples are to be analyzed for the following parameters:
  - o Gamma spectral analysis
  - o Isotopic uranium
  - o Isotopic thorium
  - o Isotopic plutonium
  - o Sr-90
  - o Tc-99
  - o Np-237
  - o Ra-226
- 6.1.28 Package (Sample Packaging and Shipping Procedure, Fernald RI/FS) the soil samples and deliver to the Sample Coordinator for shipment to the designated laboratory. The completed Chain-of-Custody and Request for Analysis forms shall be packaged with the soil samples. The yellow copy of the forms shall be delivered to the ASI Fernald Office Central Filing System.
- 6.1.29 At the end of the day, complete the Field Activity Daily Log. Return the completed form to the Site Manager or his designee.
- 6.1.30 Inform the Sample Coordinator of the supplies required for the next day's sampling.

**TITLE:** Methodology to Conduct Surface Soil Sampling  
for Radiological Analysis Inside the Production Area  
for the Remedial Investigation/Feasibility Study (RI/FS)  
at the Fernald Feed Materials Production Center (FMPC)

1.0 PURPOSE

This procedure provides instruction to provide uniform sampling techniques when using an auger sampler for obtaining 6-inch interval soil samples to a depth of 18 inches for the RI/FS to be conducted at the FMPC.

2.0 SCOPE

This procedure applies to surface soil sampling with an auger sampler to areas inside the FMPC Production Area.

3.0 RESPONSIBILITY

- 3.1 It is the responsibility of the Soil Sampling Team Leader or his designee to see that this procedure is followed during the field program phase.
- 3.2 It is the responsibility of the Soil Sampling Team Leader or his designee to delegate the performance of this procedure to personnel that are experienced with this procedure and the cookie cutter soil sampler.
- 3.3 It is the responsibility of the person performing this procedure to follow it and report unusual occurrences to the Soil Sampling Team Leader or his designee.

4.0 REFERENCES

- 4.1 GJ/TMC-13, Procedures for Sampling Radium Contaminated Soils, 1985.

5.0 REQUIREMENTS

5.1 EQUIPMENT AND MATERIALS

- 5.1.1 Methodology to Conduct Surface Soil Sampling for Radiological Analysis Inside the Production Area for the Remedial

Investigation/Feasibility Study (RI/FS) at the Fernald Feed  
Materials Production Center (FMPC)

5.1.2 Forms

- o Field Activity Daily Log (1)
- o Sample Collection Log (1)
- o Sample Labels (20)
- o Chain-of-Custody Record (6)
- o Request for Analysis (6)

5.1.3 Custody tape

5.1.4 Polyethylene bags (40)

5.1.5 Cardboard containers (40)

5.1.6 Auger handle (1)

5.1.7 Auger bits (20)

5.1.8 Disposable latex gloves (40 pair)

5.1.9 Backpacks (2)

5.1.10 Grass clippers

5.1.11 Compass

5.1.12 Field log book

5.1.13 Disposable alcohol wipes

5.1.14 Stainless steel bowls (3)

5.1.15 Stainless steel knives (3)

5.1.16 Sheets of polyethylene (10)

6.0 PROCEDURE

6.1 ZONE 1 - BIASED SOIL SAMPLING

- 6.1.1 Collect required supplies and equipment including a portable radio from the trailers.

- 6.1.2 Inform the Site Manager or his designee of the intended sampling locations. Notify by radio if a change from the specified sampling locations occur.
- 6.1.3 Begin field work. Periodically update the Field Activity Daily Log to indicate the location sampled, the unique sample number, and other relevant information.
- 6.1.4 Sample locations are determined from the radiation measurement survey. Samples will be taken in areas identified as exceeding the reference level of 35.0 pCi/g for uranium-238. Within large areas identified for biased sampling, a grid will be established with the same orientation as the 100-foot grid established for the radiation measurements survey. Soil sample locations on the grid will be selected using a random approach that assures all areas of the grid have the same probability of being selected and assures that a statistical representation of the area will be obtained. In addition, biased samples will be taken within each identified area which exhibit the highest surface radiation measurements of radionuclides in that area.
- 6.1.5 The sampling team shall consist of two members. One person (the sampler) shall handle the auger handle while the other person (the notekeeper) shall handle the auger bits and the sample containers.
- 6.1.6 Disposable latex gloves shall be worn while collecting and handling the samples. The notekeeper shall wear clean gloves for each sample. The sampler shall wear clean gloves for each sampling location.
- 6.1.7 Using grass clippers, the sampler shall trim any existing vegetation from the sample location. Do not uproot vegetation or disturb the soil. Place a sheet of polyethylene at the sample location to prevent the cookie cutter sampler handle from coming in direct contact with the ground.
- 6.1.8 At each sample location, three soil samples shall be taken, at the following depth increments:
- o First sample - 0 to 6 inches deep
  - o Second sample - 6 to 12 inches deep
  - o Third sample - 12 to 18 inches deep
- 6.1.9 The sampler shall hold the auger handle while the notekeeper shall screw a clean auger bit onto the handle.
- 6.1.10 At the sample location, the sampler shall take the soil sample by turning the auger handle vertically into the soil to the depth

specified in Step 6.1.8.

- 6.1.11 The sampler shall remove the auger bit from the soil with the handle.
- 6.1.12 The notekeeper shall remove the auger bit from the sampler handle and extract the soil sample into a clean plastic bag for a non-QA sample, or a clean stainless steel bowl for a QA sample. For a non-QA sample, proceed to Step 6.1.14.
- 6.1.13 For a QA duplicate, the notekeeper shall mix the sample thoroughly using a stainless steel knife, and then split the sample into two plastic bags; or for a QA triplicate into three plastic bags. Repeat Steps 6.1.14 through 6.1.19 for each sample bag.
- 6.1.14 The notekeeper shall close the plastic bag and seal with custody tape.
- 6.1.15 Place the plastic bag into a cardboard container. Attach custody tape over the lid of the cardboard container and the container itself.
- 6.1.16 Complete a sample label and attach it to the cardboard container. The sample label shall include the same unique sample number which was obtained from the prenumbered Sample Collection Log.
- 6.1.17 Place the used auger bit into a plastic bag for transport to the decontamination facility. Place the used gloves into another plastic bag for disposal.
- 6.1.18 Complete the Sample Collection Log. The Sample Collection Log has been prenumbered with unique sample numbers. One sample number shall be assigned to each sample. Record field observations into the field logbook, along with pertinent information from the Sample Collection Log. Each auger bit is assigned a unique identification number. Record the bit number used in the field logbook.
- 6.1.19 Complete the Chain-of-Custody Record.
- 6.1.20 The sampler handle shall be wiped down between samples using disposable alcohol wipes. All visual contamination shall be removed. The next soil sample is taken by carefully placing a clean auger bit with the handle into the hole left from the previous sample.
- 6.1.21 The sample is taken by repeating Steps 6.1.8 through 6.1.20.

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6.1.22 Repeat Steps 6.1.4 through 6.1.22 for each location to be sampled.

6.1.23 Decontaminate the sampling equipment according to Procedure ASI-1000 at the designated decontamination site.

6.1.24 The Request for Analysis form shall be completed before the samples are delivered to the Sample Coordinator. The soil samples are to be analyzed for the following parameters:

- o Gamma spectral analysis
- o Isotopic uranium
- o Isotopic thorium
- o Isotopic plutonium
- o Sr-90
- o Tc-99
- o Np-237
- o Ra-226
- o Ra-228

6.1.25 Package (Sample Packaging and Shipping Procedure, Fernald RI/FS) the soil samples and deliver to the Sample Coordinator for shipment to the designated laboratory. The completed Chain-of-Custody and Request for Analysis forms shall be packaged with the soil samples. The yellow copy of the forms shall be delivered to the ASI Fernald Office Central Filing System.

6.1.26 At the end of the day, complete the Field Activity Daily Log. Return the completed form to the Site Manager or his designee.

6.1.27 Inform the Sample Coordinator of the supplies required for the next day's sampling.

Procedure ASI-1003 to be added at a later date.

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FERNALD RI/FS  
PROCEDURE

Sample Packaging and Shipping

Samples must be carefully packaged to avoid breakage or cross-contamination. The following sample packaging procedure will be followed:

- Sample container lids are never to be mixed. Sample lids will stay on the original container until time of sampling (only open sample container at the time of sampling). The original sample containers will arrive in the field in packages (e.g., coolers) with custody tape affixed at the appropriate access points. When the sample container packages are received in the field, the chain-of-custody form for shipping the empty containers to the field will be appropriately marked to state if the custody seal was affixed when the package arrived.
- After a sample is placed in a plastic/glass container, the sample container will be secured with a custody seal and placed in a plastic bag to minimize the potential for contamination from vermiculite or other packing material. Sample containers may be placed between cardboard inserts and will not need to be placed in plastic bags (e.g., subsurface soil sample jars are placed back in their original shipping container, a cardboard box with cardboard inserts). Upon arrival at the laboratory, the QC Coordinator, or designee, will examine the contents of the shipping container and will document on the chain-of-custody record if any sample containers do not have the custody tape affixed.
- Shipping coolers with plastic/glass containers will be filled initially with approximately three (3) inches of vermiculite or suitable substitute (non-combustible, absorbent packing material). Under no circumstances will locally obtained material (sawdust, sand, etc.) be used. Do not use earth or ice as packing materials.

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- o The secured sample containers will be placed in the cooler in such a way so they do not touch one another. Use additional container protection (e.g., new, unused paint cans), if necessary. (Keep cooler closed except when placing sample in cooler).
  
  - o "Blue ice" or some other artificial icing material will be used. If unavoidable, ice may be used provided that it is placed in a plastic bag. Ice is not to be used as a substitute for packing material.
  
  - o Remaining space in the cooler will be filled with inert packing material.
  
  - o The original chain-of-custody and request-for-analysis records will be placed in a plastic bag and taped to the bottom of the cooler lid. (Chain-of-custody and request-for-analysis procedures are in Section 7.0 of the QAPP).

Samples will be properly packaged and labeled for shipment and dispatched to the appropriate laboratory for analysis. Separate chain-of-custody and request-for-analysis records will be prepared for each laboratory. The following requirements for shipping containers will be followed:

- o United States Department of Transportation (DOT) regulations covering the transport of hazardous materials are contained in the Code of Federal Regulations (CFR) Title 49, Parts 17-0-179. Field personnel should acquaint themselves with the general provisions of these requirements and with IT's Manual of Practice: Sample Packaging and Shipment.
  
- o Shipping containers are to be padlocked or custody-sealed for shipment, as appropriate. The packing custody seal is to consist of filament tape wrapped around the container and a custody seal affixed at appropriate access points. In this way, access to the container can be gained only by cutting the filament tape and breaking the seal.

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- Shipping cooler containers will be secured by field personnel with a proper custody seal, marked with indelible pen or ink, and addressed to the appropriate laboratory.

Field personnel will make arrangements for transportation of samples. When custody is relinquished to a shipper, field personnel will telephone the receiving laboratory custodian to report the expected time of arrival of the sample shipment and the existing time constraints (holding times) for sample analysis.