

SOP-5139

Revision: 1



Effective Date: JUN 24 2011

Next Review Date: 6/11/14

### Environment, Safety, Health & Quality Directorate

### Waste and Environmental Services

### Standard Operation Procedure

## Title: SAMPLING SOIL AND VEGETATION AT FACILITY SITES

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Derivative Classifier:  Classified  Unclassified

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The Waste and Environmental Services work is categorized as low hazard/risk operation. Any work to be performed in a Moderate or High Hazard Facility shall be coordinated through the appropriate Facility Manager.

## 1.0 PURPOSE AND SCOPE

The purpose of this procedure is to describe the process for collecting soil, sediment, and vegetation samples at facilities such as the Material Disposal Area G (Area G) at TA-54, the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility at TA-15, and the Plutonium Facility (PF) at TA-55 as per DOE Order 450.1, "Environmental Protection Program;" DOE Order 5400.5, "Radiation Protection of the Public and the Environment; and 435.1, "Radioactive Waste Management,". This procedure applies to the individual(s) assigned to collect samples from the facilities as part of the Facility Monitoring Program.

## 2.0 BACKGROUND AND PRECAUTIONS

### 2.1 Background

This document establishes the basic requirements for collecting soil, sediment and vegetation samples at certain facilities. Work performed under this procedure by LANL personnel will occur only after required training to applicable documents has been completed and documented.

### 2.2 Precautions

#### General Precautions:

Sample personnel must be on the Plan of the Day for each facility prior to working at the site and collecting samples. See Appendix 1 for general instructions to obtain permission to enter facilities.

Individuals are required to be trained in the following prior to performing this procedure:

- First aid;
- Cardiopulmonary Resuscitation (CPR);
- General Field Safety for All Employees;
- Site-specific training for Area G and DARHT (including the basic recognition of explosives).

A minimum of two (2) people is required to go out in the field.

#### Precautions related to sampling in high explosive areas (DARHT):

Exposure to explosives remains a remote possibility in some locations within the HE corridor at LANL (includes the DARHT area). For this reason, we will follow the protocol (Attachment 1) and EP-ERSS-SOP-5060 (Attachment 2), "Operational Guidelines for Taking Soil and Water Samples in Explosive Areas," for the collection of soil and sediment samples at the DARHT facility.

## 3.0 EQUIPMENT AND TOOLS

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| <ul style="list-style-type: none"> <li>• Tape measure;</li> <li>• Tape;</li> <li>• Ice chest with blue ice;</li> <li>• Ziplock™ sample bags (one-gallon size);</li> <li>• Permanent marker for labeling bags;</li> <li>• Chain-of-custody forms;</li> <li>• Personal Protective Equipment (e.g., safety glasses, safety/field shoes, rubber gloves, and hat).</li> <li>• Stainless steel soil ring (10-cm diameter), top, and ring-spatula (for soil sampling);</li> </ul> | <ul style="list-style-type: none"> <li>• 3-lb hammer (for soil sampling);</li> <li>• Soap/water solution (for washing ring), water (rinsing), paper towels (for soil sampling);</li> <li>• 500-mL polyethylene bottles (for soil and/or sediment sampling);</li> <li>• 500-mL amber glass bottles (for soil and/or sediment sampling);</li> <li>• Disposable polyethylene scoops (for grab sampling);</li> <li>• Gardening shears (for vegetation sampling).</li> <li>• Face shield</li> </ul> |
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## 4.0 STEP-BY-STEP PROCESS DESCRIPTION

### 4.1 Preparatory Activities

Sampler or Field Team Leader (FTL)	1.	Submit sampling information (location IDs, number of samples, type of samples) to the SMO and obtain Chain of Custody forms and labels from the Sample Management Office.
	2.	Make arrangements with the particular facility to get on the plan of the day for sampling. At DARHT, in particular, follow protocol (Attachment 1) and SOP-5060 (Attachment 2), 4.1 Pre-Operational Activities (ensure and obtain the proper authorization from the host-group and HE representative to collect soil samples that may be potentially contaminated with HE.)
	3.	Conduct a hazard review in accordance with Attachment 3, Hazard Review for Facility Soil and Vegetation Sampling.
	4.	Check the condition of the vehicle and the fuel level.
	5.	Identify a Point-of-Contact to provide pertinent information of destination, expected time-in, and methods of notifying the field team.
	6.	When leaving Los Alamos County, notify the group office to place you on travel status.
	7.	Ensure you have a working cell phone and a pager.

### 4.2 DARHT and PF Soil Composite Sampling Steps

Sampler or FTL	1.	Soil composite (surface) sampling for radionuclides and TAL elements is conducted at DARHT and the PF and the sampling locations are usually collected on the N, S, E and W sides of the facility outside of the perimeter fence line. In addition, one soil sample is collected at the firing point at DARHT. Refer to the latest Environmental Surveillance Report to learn of the specific sampling site locations.  (Note: At DARHT, follow SOP-5060, section 4.3 (all soil and sediment sample locations are required to be tested for high explosives using an approved field analytical method; e.g., HE spot test kit, D TECH, EnSys, Baytos or Spontarelli tests. For samples that spot test positive for HE, arrange packaging, labeling and transportation of the sample to DX-2 for HE analysis. If samples contain HE greater than 5%, do not ship.)
	2.	For composite soil samples, locate the center of the sampling area, and place a clean 10-cm (4-in.) diameter stainless steel ring on the surface. Cover the ring with the stainless steel top.
	3.	Using a 3-lb hammer, drive the stainless steel ring 5 cm (2.0 in.) deep into the ground at the center and corners of a square area, 10-m (33-ft) per side. After driving the ring-sampler at each point, remove soil next to the soil ring-sampler, slip the spatula underneath the ring, and lift the sample. Place each of the five sub-samples into a 1-gallon zip-lock bag.
	4.	Thoroughly mix the sub-samples in the zip-lock bag to form a composite sample. Pour the composite into a 500-mL poly bottle.
	5.	Seal each bottle with chain-of-custody tape. Label the bottle with the sample location, date, time, and your initials. Place each bottle into a 1-gallon zip-lock bag and then into ice chest.
	6.	Complete a chain-of-custody form with the appropriate sampling information. Maintain

proper chain-of-custody on the samples. See *Maintaining Custody of Samples*.

7. Wash ring, spatula, and top with the soap/water solution, rinse with water, and then dry with paper towels.
8. Once at the Lab, store the samples on ice or in a freezer until samples are shipped to the analytical laboratory.

#### 4.3 Area G Soil and DARHT soil and sediment grab sampling steps

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| Sampler or<br>FTL | <ol style="list-style-type: none"> <li>1. Soil and/or sediment grab sampling is conducted at Area G (soil) and DARHT (sediment) and the sampling locations are usually collected around the facility along and outside of the perimeter fence line. Refer to the latest Environmental Surveillance Report to learn of the specific sampling site locations. (Note: Sample numbers and locations at Area G are routinely changed from year to year and are based on funding and past sampling results.)</li> <li>2. Locate the sampling areas. Using a disposable polyethylene scoop, collect soil or sediment from the 0 to 6 inch depth. Place sample into a 500-mL polyethylene bottle for radionuclide and TAL analysis or into a 500-mL glass bottle for organic analysis. <ul style="list-style-type: none"> <li>• perennial streams: sample sediment in dune buildup behind boulders in the main channel</li> <li>• ephemeral streams: sample sediment in the center of the main channel</li> </ul> <p>(Note: At DARHT, follow SOP-5060, section 4.3 (all soil and sediment sample locations are required to be tested for high explosives using an approved field analytical method (HE spot test kit, D TECH, EnSys, Baytos or Spontarelli tests. For samples that spot test positive for HE, arrange packaging, labeling and transportation of the sample to DX-2 for HE analysis. If samples contain HE greater than 5%, do not ship.)</p> </li> <li>3. Seal each bottle with chain-of-custody tape. Label the bottle with the sample location, date, time, and your initials. Place each bottle into a 1-gallon Ziplock™ bag.</li> <li>4. Place the bags in the cooler with ice for transport back to the laboratory. Complete a chain-of-custody form with the appropriate sampling information. Maintain proper chain-of-custody on the samples. See <i>Maintaining Custody of Samples</i>.</li> <li>5. Once at the lab, store the samples on ice or in a freezer until samples are shipped to the analytical laboratory.</li> </ol> |
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#### 4.4 Vegetation Sampling Steps

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| Sampler or<br>FTL | <ol style="list-style-type: none"> <li>1. Vegetation samples at Area G, DARHT and the PF are usually co-located with the soil sampling sites. Refer to the latest Environmental Surveillance Report to learn of the specific sampling site locations for Area G, DARHT, and PF and the type of sampling required (overstory and understory). (Note: Sample locations are sometimes changed based on funding and past sampling results.)</li> <li>2. Understory (grasses and forbs) are collected by cutting the vegetation near the ground level with stainless steel sheers. Overstory (trees) are collected by cutting the end of tree branch tips (0 to 6 inches long) at chest level. Collect approximately three pounds of vegetation and place into a Ziplock™ bag. Label the bag with the sample location, date, time, and your initials.</li> <li>3. Place the bags in the cooler with ice for transport back to the Laboratory. Complete a chain-of-custody form with the appropriate sampling information. Maintain proper chain-of-custody procedures for samples until they are shipped to the analytical laboratory. See <i>Maintaining Custody of Samples</i>.</li> </ol> |
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4. Once at the Lab, store the samples on ice or in a freezer until samples are submitted to an analytical laboratory.

#### 4.5 Maintaining Custody of Samples

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| Sampler or<br>FTL | 1. | Document chain-of-custody for all samples used to demonstrate compliance.   |
|                   | 2. | Verify the possession and handling of samples is traceable at all times.<br>[NOTE: A sample is considered in custody if it is one of the following: <ul style="list-style-type: none"> <li>• In one's physical possession;</li> <li>• In one's view after being in one's physical possession;</li> <li>• In one's physical possession and then locked up so that no one can tamper with it; or</li> <li>• Kept in a secure area where access is restricted to authorized and accountable personnel only.</li> </ul> A secured area is an area that is locked (e.g., a room, cooler, vehicle, or refrigerator).] |
|                   | 3. | If the area cannot be secured, use a custody seal to secure the area or the sample container.   |

#### 4.6 Transferring Custody of Samples

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| Sampler or<br>FTL | 1. | Whenever samples are transferred into the custody of another person or organization, complete the "relinquished by/received by" and "date" sections of the form.<br>[NOTE: These sections of the form must provide a complete history of custody of the samples from collection to transfer to the analytical laboratory.] |
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#### 4.7 Broken Chain-of-Custody

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| Sampler or<br>FTL | 1. | Whenever there is a break in the chain-of-custody of a sample, document the failure by initiating a deficiency report in accordance with ISD 322-4, <i>Issues and Corrective Action Management Process</i> . |
|                   | 2. | Document the occurrence, evaluate the potential impact (if any) on the samples, and propose a fix to prevent recurrence.   |

#### 4.8 Emergency Actions to Take in the Event of Control Failure

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| FTL | 1. | Perform First Aid for cuts, as appropriate.   |
|     | 2. | For all injuries, provide first aid and see that the injured person is taken to Occupational medicine (only if immediate medical attention is not required) or to the nearest hospital. |
|     | 3. | Notify the individual's supervisor and group office as soon as possible.  |

#### 4.9 Records

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| FTL | 1. | Submit the following records generated by this procedure to the Records Processing Facility: <ul style="list-style-type: none"> <li>• Completed Chain of Custody form and RCT and HE documentation.</li> </ul> |
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### 5.0 PROCESS FLOW CHART

Flow chart is to be included at a later date.

## 6.0 ATTACHMENTS

- Attachment 1 EP-ERSS-SOP-5060, "Operation Guidelines for Taking Soil and Water Samples in Explosive Areas."
- Attachment 2 Los Alamos National Laboratory memo "DX-16, "Guidance for sample collection within the DX and ESA explosive use areas." December 7, 1993.
- Attachment 3 Hazard Review for Facility Soil and Vegetation Sampling (3 pages)

## 7.0 REVISION HISTORY

Revision No. <i>[Enter current revision number, beginning with Rev.0]</i>	Effective Date <i>[DCC inserts effective date for revision]</i>	Description of Changes <i>[List specific changes made since the previous revision]</i>	Type of Change <i>[Technical (T) or Editorial (E)]</i>
0	10/4/96	New Document	T
1	3/99	Reformatted in accordance with LIR300-00-01, Safe Work Practices.	E
2	4/01	Added new Section 9.0, Training.	T
3	4/02	Change in directorate.	E
4	4/03	Team name change to Environmental Surveillance.	E
5	5/12/04	Updated and reformatted document to conform with MAQ procedures.	E
6	4/11/05	Quick-change revision to convert HCP attachment to HR.	E
7	04/12/06	Quick-change revision to revise safety equipment requirements in HR.	E
0	1/30/08	Renumbered and reformatted to WES Division	E
1	6/24/11	Added HE soil sampling requirements at DARHT	T

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**APPENDIX 1  
PROTOCOLS FOR ACCESS TO FACILITY SITES**

Protocols for Access to Facility Sites

Records Use only



**A. The general access control procedure applicable for access to Area G at TA-54:**

1. Attend meeting for the plan of the day.
2. All personnel will badge in at Access Control.
3. Sampling crew will inform access control, where we will be sampling in case of an emergency. Personnel will keep in contact with access control by cell phone.
4. If we need a key to enter gates off Pajarito Road. Sampling crew will pick and sign for keys at Access Control. Keys will be return to Access Control before the end of work day.
5. Sampling crew will badge out at Access Control at the end of the day shift or when ever work is completed.

**B. The general access control procedure applicable for access to DARHT at TA-15.**

1. Check with Access Control on firing schedule at 667-6742.
2. Attend Plan of the day meeting at DARHT facility site.
3. Check in with Access Control for access into DARHT.
4. Sign visitor log book and exchange badge.
5. Meet with the Radiological Control Technician (RCT) and High Explosive (HE) representative and make arrangements for spot testing of radioactivity swipes and HE at proposed sampling sites and/or soil samples collected. Health Hazards precautions information will be make clear to all personnel on the sampling team.
6. Open perimeter gate make sure the gate is close before continuing to DARHT.
7. DARHT, Sign in and inform the Duty Officer that we will be sampling outside the controlled area.
8. Sign out at DARHT, and exit to Access control
9. Open perimeter gate and make sure gate is close before proceeding
10. Personnel and equipment that have been off the paved road must be monitored or other trained person prior to leaving the area.
11. Return exchange badge, sign out, and exist access control.
12. Return to work station.

**ATTACHMENT 2****HAZARD REVIEW FOR FACILITY SOIL AND VEGETATION SAMPLING**

## Hazard Review for Soil and Vegetation Sampling

Records Use only



<b>Work Tasks/Steps</b>	<b>Hazards, Concerns, and Potential Accidents; Likelihood/Severity</b>	<b>Controls, Preventive Measures (e.g., safety equipment, administrative controls, etc.)</b>	<b>Hazard Level (from IMP 300-00-00, Hazard Grading Matrix)</b>
Travel to sampling sites in the field.	Various field and outdoor hazards such as seasonal heat and cold extremes, wind, sun exposure, lightning, insects, reptiles, slips, falls, brush remote/moderate = low	Train to "General Field Safety for all Employees". Wear PPE that includes pants, long-sleeve shirt, safety glasses, steel toed safety shoes, and protective gloves.	Low
Collect samples around perimeter of TA-55.	Radionuclide contamination Occasional /moderate = low (Note: Knowledge of process of radionuclide contaminants at TA-55 show that they are within screening action levels and far below regulatory levels; there are no metals above background)	Follow all site-specific training and entry requirements.	Low
Enter DARHT to collect samples.	Radionuclides, Be, and HE contamination remote/ moderate = low (Note: Process of knowledge of radionuclide and Be contaminants at the DARHT site show that they are either not detected and/or within background concentrations. All HE samples have been at non-detectable levels)	Follow all site-specific training and entry requirements. Access control check-in required for DARHT. Note: because of the concern for Be and HE by the DARHT H&S people, they may require that soil sampling be conducted with a full face respirator or face shield if the ground is not moist. A spot test for HE will be conducted prior to sampling.	Low



<b>Work Tasks/Steps</b>	<b>Hazards, Concerns, and Potential Accidents; Likelihood/Severity</b>	<b>Controls, Preventive Measures</b> (e.g., safety equipment, administrative controls, etc.)	<b>Hazard Level</b> (from IMP 300-00-00, Hazard Grading Matrix)
Enter Area G to collect samples.	Radionuclide contamination remote/ moderate = low (Note: Knowledge of process of radionuclide contaminants at TA-54 show that they are within screening action levels and far below regulatory levels; there are no metals above background)	Follow all site-specific training and entry requirements. Facility-specific training is needed for Area G. Ensure you are on the area's "Plan of the day."	Low
Collect soil samples according to steps for soil sample collection in the chapter "Collecting Samples."	Smashing fingers, toes, head and eyes with soil sampling tool. Occasional /moderate = low	Review "Facility Soil and Vegetation Sampling" protocol for sampling procedures. Wear PPE.	Low
Collect sediment samples according to steps for sediment sample collection in the chapter "Collecting Samples."	Hammering injury (smashed fingers) & flying debris from use of ring and hammer Ergonomic injuries (repetitive motion) Occasional /moderate = low	Wear the minimum PPE as described above. Take a short break every hour.	Low
Collect vegetation samples according to steps for vegetation sample collection in the chapter "Collecting Samples."	Cutting fingers, dropping on toes, poking eyes with vegetation cutting shears Occasional /moderate = low	Use care when cutting with shears and clippers—wear protective (Kevlar) gloves.	Low

### **Wastes or Residual Materials**

Sample materials will be disposed by analytical laboratory.

### **Emergency Actions to Take in Event of Control Failure**

For cuts, perform first aid as appropriate. Go to hospital for serious injuries. Go to HSR-2 for evaluation. Notify supervisor ASAP.