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Environment & Remediation Support Services

Standard Operating Procedure

for **OPERATIONAL GUIDELINES FOR TAKING SOIL AND WATER SAMPLES IN EXPLOSIVE AREAS**

APPROVAL SIGNATURES:

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1.0 PURPOSE AND SCOPE

The purpose of this procedure is to describe the responsibilities and processes for taking surface and subsurface soil samples and water samples in the high explosives (HE) corridor for the Los Alamos National Laboratory (Laboratory) Environment & Remediation Support Services (ERSS).

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

This procedure is used in conjunction with an approved Site-Specific Health and Safety Plan (SSHASP). Also, consult the SSHASP for information on and use of all PPE.

Since the mid-1940s, the Laboratory has performed explosives development, processing, and testing operations at several TAs at the Laboratory. Because of the inherently hazardous behavior of explosive compounds, much more stringent safety requirements apply to explosives handling and operations than to most other chemical process operations. During the many years of explosives development, explosives and devices containing explosives may have been scattered or deposited both inside and outside of the hazard circles. Also, during the mid-1940s, depleted uranium, other radionuclides, and energetic materials were used in the research, development, and testing of weapons components in the HE corridor. Therefore, extreme caution is required for all field operations in the areas where there are or were explosives operations.

2.2 Precautions

Exposure to explosives is unknown for some locations within the HE corridor; however, contamination remains a remote possibility in these locations.

Some locations have a high probability of HE contamination, whether homogeneous or heterogeneous in nature. These locations include firing mounds, streambeds, and/or drainages from sites with known contamination, and outfalls from HE-processing facilities.

Some areas of the HE corridor may contain radionuclides, and it is possible that both HE and radiation contaminate the soil.

High-energy explosives and components containing high-energy explosives can be found in many colors and forms in which their presence may not be obvious. The following are some hazards associated with sampling in high-energy explosives areas:

- Striking high-level HE soil with metal objects or other hard surface items;
- Screwing crystals of explosives between the lid and the lip of sample glass bottles;
- Handling pieces and chunks of weathered explosives;
- Detonating HE components or pieces; and
- Initiating explosives by impact, pinch point, heat, sparks, or flames.

Any amount of explosive in a soil sample can represent a safety hazard. Weathered explosives and explosives exposed to other substances are potentially sensitive. Strict guidelines have been established for taking and handling samples potentially contaminated with HE; for collection and removal of items, devices, or components of weapons assembly; and for transporting hazardous samples.

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3.0 EQUIPMENT AND TOOLS

None.

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Pre-Operational Activities

Field Team
Leader

1. Contact the appropriate host groups for a review of all the proposed work and to complete the application for a facility-work request per LIR 230-03-01.5, "Facility Management Work Control."

2. Ensure that required SOPs, policies, and safety devices (e.g., shields, machine guards, remote setup, and PPE) are in place before sampling at locations with low-to-negligible HE contamination, HE contamination, or HE and radioactive contamination.

3. Ensure that a health physics monitor and Radiological Control Technician (RCT) or radiological screening personnel are present for sampling at areas with HE and radioactive contamination.

4. Ensure that the HE representative visually inspects and the RCT or radiological screening personnel scan any chunks of explosives components, materials, or objects found during sampling before the materials are transferred from the field.

5. Ensure that ERSS Staff Members do not collect samples from pure explosives or explosive components.

6. Call the assigned HE Representative to arrange for host-group personnel to collect, package, label, and transport samples from pure explosives or explosive components.

7. Ensure that the removal of any material from the site is authorized by the host unit and conducted in accordance with host unit, Supply Chain Management Division, Packaging and Transportation Group (SUP-5), and US Department of Transportation (DOT) requirements.

[NOTE: Unauthorized removal of any material from the sites is prohibited.]

8. Ensure that ERSS Staff Members do not handle or treat samples that field test positive for HE or samples collected from within a heterogeneous area.

9. Ensure that HE-contaminated samples and samples collected from within a heterogeneous area submitted to DX-2 or to another host group, HE-certified laboratory, including approved field laboratories, in accordance with the transportation and handling specification of the work plan or SSHASP.

10. Ensure that dosimeter badges are worn by personnel in areas suspected of being contaminated with radiation.

Field Team Leader
(Continued)

11. Ensure that an RCT or health physics monitor scans all personnel, equipment, vehicles, and supplies before they leave an area known to be contaminated with radioactive material.

[NOTE: Further requirements for work in areas of potential radiation exposure are outlined in the SSHASP.]
12. Ensure that whenever possible the tools used to collect samples are aluminum, plastic, or other host-group approved material that will not produce a spark when struck against rocks, concrete, or metallic objects.

[NOTE: The host group may choose to authorize tools not covered by their procedures to facilitate this work.]
13. Ensure that containers used to store HE-contaminated samples shall be made of glass or non-leachable plastic with a Teflon™-coated lid or host-group approved alternative.
14. If the sampling event or analyses require the use of utility trailers, portable laboratories, and/or any other equipment or device that may be a source of heat or produce open flames or sparks, obtain a special permit for the equipment or devices from the host group.
15. Coordinate equipment reviews with the host group and ensure that appropriate special work permits are obtained before beginning the sampling event.
16. Ensure the review of equipment and methods required for subsurface sampling on an individual basis in the same manner that excavation and trenching work by contractors in the HE corridor is reviewed.

4.2 Conduct Pre-Sampling Activities

Project Leader

1. Ensure that either the sampling plan or a summary of the sampling plan is made available to the facility manager and that the plan or summary made available specified the sample locations, types of sampling (surface, subsurface, or water), depth of sampling (if sampling is subsurface), quantity of samples, and analytes.
2. If subsurface sampling is requested, ensure that the sampling plan or summary made available to the facility manager provides a detailed description of the method and type of equipment that will be used to extract the samples.

Field Team Leader

3. Interface with the authorized host-group personnel upon approval of the sampling plan.

4.3 Perform Initial Contamination Characterization

Field Team Leader	1.	Obtain from authorized host-group personnel an identification of homogenous and heterogeneous soil sample areas within the sampling site.
	2.	Ensure that an authorized HE representative from the host group is present during the pre-assessment.
HE Rep.	3.	Visually examine and employ a host-group approved field analytical method (e.g., HE spot test kit, D TECH, EnSys) to perform field analysis of contamination in homogenous soil mixtures at the sampling site.
	4.	Use the results of the visual examination, HE spot test, or other field test to characterize the level of HE contamination as follows: <ul style="list-style-type: none"> • No contamination (explosives-free): Field test results are negative and corroborated by visual examination; and • HE contaminated: Visual examination shows HE material and/or one or more of the field or HE spot tests are positive. <p>[NOTE: Visual examination, HE spot testing, and other field testing methods still leave a margin of error when attempting to detect HE in soil.]</p>
	5.	For samples that spot-test positive for HE or that are collected from heterogeneous areas, do the following: <ul style="list-style-type: none"> • arrange packaging, labeling, and transportation of the sample to DX-2 or a host-group approved laboratory for analysis, or • contact SUP-5 at 665-8628 for help with off-site shipping.
Field Team Leader	6.	Using the field results and the quantitative analytical results for samples submitted to DX-2, categorize areas within the sampling site by their potential for contamination as follows: <ul style="list-style-type: none"> • no HE contamination (explosives-free areas); • low-to-negligible HE contamination; • HE contamination; and • HE and radioactive contamination.

4.4 Collect Samples

Field Team Members	1.	To conduct drilling operation in the HE corridor, follow procedure EP-ERSS-SOP-5029, Drill Plan Development, and procedure EP-ERSS-SOP-5030, Contract Geophysical Logging.
	2.	To sample surface water, follow procedure EP-ERSS-SOP-5067, Surface Water Sampling.

Field Team Members
(Continued)

3. To collect soil samples, follow procedure EP-ERSS-SOP-5065, Spade and Scoop Method for Collection of Soil Samples.

[NOTE: Remote drilling may be required at locations where significant amounts of subsurface contamination are possible.]

4.5 Transport Samples

Field Team Leader

1. Obtain written approval from authorized host-group or division personnel for the removal from the HE corridor of homogeneous samples containing >5% HE and heterogeneous samples collected from pure explosives or explosive components.
2. Call the HE representative to arrange for packaging, labeling, and transportation of homogeneous samples in which the total explosive content is >5% and heterogeneous samples collected from pure explosives or explosive components.

HE Rep.

3. For homogeneous samples in which the total explosive content of the sample is >5% and for heterogeneous samples collected from pure explosives or explosive components, do the following:
 - arrange packaging, labeling, and transportation of the sample to DX-2 or a host-group approved laboratory, or
 - contact the SUP-5 at 665-8628 for help with off-site shipping.

HE Rep. and Field Team Leader

4. Be sure to follow existing Laboratory guidelines and any additional hazardous material shipment requirements specified for the specific location or by the host group for labeling, packaging, and transporting HE samples.
5. Follow DOT regulations for off-site transportation of HE samples.

Field Team Leader

6. If the quantitative analysis determines that the total explosive content of a sample is <5%, determine whether the sample can be shipped as a non-explosive environmental sample.
7. Transport samples taken from explosives-free areas as non-hazardous materials only if no other hazardous substances are present.

Field Team Members

8. Under the direction of the Field Team Leader, appropriately package and label samples taken from explosives-free areas.

4.6 Records

- Field Team Leader 1. Submit the following records generated by this procedure to the Records Processing Facility:
- Chain-of-Custody/Request for Analysis Forms;
 - Field notebooks or daily activity logs;
 - Sample Collection Logs;
 - Completed Document Signature Forms; and
 - All associated correspondence.

5.0 PROCESS FLOW CHART

Flow chart is to be included at a later date.

6.0 ATTACHMENTS

None

7.0 REVISION HISTORY

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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>
0.0	2/9/07	Reformatted and renumbered, SOP-01.07	E

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