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Environmental Programs Directorate
Corrective Actions Projects

Standard Operating Procedure

for **HAND AUGER AND THIN-WALL TUBE SAMPLER**

APPROVAL SIGNATURES:

Subject Matter Expert:	**Organization**	**Signature**	**Date**
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Responsible Line Manager:	**Organization**	**Signature**	**Date**
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1.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) states the responsibilities and describes the process for collecting surface and subsurface soil samples with a hand auger and thin-wall tube sampler for the Los Alamos National Laboratory (LANL), Environmental Programs Directorate (ADEP).

- All ADEP participants shall implement this mandatory SOP.
- Subcontractors performing work under the ADEP's quality program shall follow this SOP.

  OR

- Subcontractors may use the subcontractor's procedure as long as the substitute meets the requirements prescribed by the ADEP Quality Management Plan, and the Associate Director Environmental Programs Quality Assurance Team Leader and a technical staff person approve the procedure before the subcontractor begins the designated activity.

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

- This procedure describes the selection and use of sampling methods and equipment at sites that may include contamination with hazardous or radioactive materials.
- The scope of this SOP is limited to the activities of collecting soil and sediment samples for:
  - Field monitoring and laboratory analysis of concentrations of hazardous and radioactive constituents,
  - Soil/sediment physical characterization, or
  - Geologic logging.

  This SOP does not address drilling activities, removal of time-sensitive geologic analytical samples, core documentation, lithologic description, packaging of core material, or temporary storage of borehole materials.
- ADEP participants shall use this SOP in conjunction with an approved Site-specific Health and Safety Plan (SSHASP) that addresses worker safety and the hazards associated with the use of the methods detailed in this procedure.
- Address health and safety hazards associated with the use of this equipment and methods in a SSHASP.
- Handle all waste generated from any sampling operations in accordance with the Characterization and Management of Environmental Programs (ADEP) Directorate.
- ADEP procedures can be found at ADEP website: http://int.lanl.gov/environment/all/qa/adep.shtml
- References:
  - EP-DIR-QAP-0001, Quality Assurance Plan for the Environmental Programs Directorate
  - EP-DIR-SOP-2011, Personnel Training and Qualifications
  - EP-DIR-SOP-4004, Record Transmittal and Retrieval Processes
  - SOP-5181, Notebook and Logbook Documentation for Environmental Directorate Technical and Field Activities

- EP-ERSS-SOP-5055, General Instructions for Field Investigations
- EP-ERSS-SOP-5056, Sample Containers and Preservation
- EP-ERSS-SOP-5057, Handling, Packaging, and Transporting Field Samples
- EP-ERSS-SOP-5058, Sample Control and Field Documentation
- EP-ERSS-SOP-5059, Field Quality Control Samples
- SOP-5238, Characterization and Management of Environmental Program Waste
- EP-ERSS-SOP-5061, Field Decontamination of Equipment
- EP-ERSS-SOP-5029, Drilling Plan Development
- EP-ERSS-SOP-5030, Contract Geophysical Logging
- SOP-12.01, Field Logging, Handling, and Documentation of Borehole Materials

2.2 Precautions

- Do not collect undisturbed-soil samples with a bucket auger; only collect a composite or disturbed sample with a bucket auger.
- Do not dig with a thin-wall tube sampler.
- Use a tube sampler to take subsurface soil or sediment samples by forcefully driving the sampler into soil or sediment. Retrieve samples, if appropriate, selected intervals, from depths obtainable by hand digging.
- Take a subsurface-undisturbed, soil sample by digging to approximately six inches above the required sample depth with a bucket auger; then collect the sample using a tube sampler. However, if a required sample interval is zero to six inches or six to 12 inches, and if no digging is required to obtain a distance of six inches above the sample interval, at least two drives of the sampler may be needed to obtain the sample. When obtaining a shallow (zero to six inches or six to 12 inches) sample, the difficulty depends primarily upon the soil's hardness and how many pebbles, etc., are present in the soil.
- To save time, use a manual or power post-hole digger to dig all but the last 12 inches to sample depth. Decontaminate the post-hole digger per EP-ERSS-SOP-5061. If gasoline is used at the site, take care to avoid contaminating any samples analyzed for volatile organic compounds (VOCs).
- Exercise proper back care when pulling a stuck auger out of a hole or when turning an auger for long periods.
- Wear work gloves in order to prevent blisters.

3.0 EQUIPMENT AND TOOLS

Attachment 1 provides a checklist of suggested equipment and supplies needed to implement this procedure.

Section 2.0 (above) includes some descriptions of commonly-used pieces of equipment, their advantage, and their limitations.

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Perform Pre-Sampling Activities		
Project Team Leader	1.	Monitor the proper implementation of this procedure and ensure that the appropriate personnel complete all applicable training assignments.
Field Team Member(s)	2.	Perform pre-sampling activities.
	3.	Acquire necessary documentation and label all bottles (see EP-ERSS-SOP-5055 and EP-ERSS-SOP-5058).
	4.	Ensure that all sampling equipment is properly decontaminated (see EP-ERSS-SOP-5061).
	5.	In the field notebook, note the exact location and location identification number of the sampled hole.
	6.	If applicable, photograph the location.
	7.	Mark the sampling location with stakes that include the location identification number.
4.2 Perform Sampling		
Field Team Member(s)	1.	Perform sampling. **NOTE**: Discuss, understand, and fully document in the field notebook and/or daily logs the collection strategy and rationale described in the relevant sampling and analysis plan, as well as the requirements for sample handling and decontamination between samples. Be prepared to manage borehole soil or rock in accordance with both the site-specific sampling plan and SOP-5238, if necessary.
	2.	Dig with a Bucket Auger in the following manner: • Assemble the auger with a two-, three-, or four-foot shaft. • Apply .5-inch Teflon tape to all threads to facilitate disassembly. • Press down and turn the auger, digging down six to 12 inches. • Lift the auger out of the hole and remove the soil from the auger bucket. **NOTE**: Experience shows how deep to dig with each bucket load without making the auger stick. • Adding additional shaft sections, repeat this step until the required depth (usually about six inches above the intended collection depth) is reached.

Field Team Member(s) (Continued)

3. Collect a sample with a Bucket Auger in the following manner:

- With a clean bucket, dig out enough soil for the sample.

NOTE: Granular soils may not stay in the bucket. There are different styles of buckets designed for clayey versus sandy soil or sediment. These buckets vary in their degree of soil containment; choose accordingly.

- Discard any soil that falls down the hole and, as such, did not come from the required sample depth.
- Put an adequate amount of sample material into a decontaminated, stainless-steel ~~or plastic~~ bucket and mix until the sample is homogenized. IPC-1

NOTE: When analyzing soils for VOCs, do not use a plastic bucket for mixing or holding the sampled soil.

- Fill the sample containers (see EP-ERSS-SOP-5056).
- For VOC samples collected in soil (unconsolidated material), use an ~~En Core~~ sampler and associated sample container to extract the VOC samples, following the current version of ~~En Core~~ technical manual/operating instructions.
- When collecting a composite sample, keep the pan of soil out of the sun and keep it covered with aluminum foil; collect all the aliquots as quickly as possible; do not decontaminate the auger between aliquots.

4. Collect with a Thin-Wall Tube Sampler in the following manner:

- Dig to the required depth using the bucket auger.
- Assemble the tube holder with the appropriate tube inside and attach the tube holder to the auger shaft, applying Teflon tape to the threads.
- Shove, twist, or pound the tube holder into the ground until it is full; when pounding, use a plastic hammer and take care not to damage the equipment.

NOTE: If the sample is taken from the surface, remove any rocks, sticks, or leaves before driving the sampler into the ground.

- Disassemble the tube holder, being careful not to let any soil fall out of the tube.
- Immediately cover the ends of the sample tube with two-inch Teflon film, then put plastic caps over the film.

NOTE: If appropriate, place tape over the caps to ensure retention before submitting the entire tube to the laboratory.

- Label the bottom end of the tube with "*Open This End.*"
- ~~For VOC samples, either seal and ship the tube intact or use an En Core sampler and associated sample container to extract the VOC samples, following the current version of En Core technical manual/operating instructions, prior to capping the tube.~~ IPC-1
- Place the thin-wall tube sampler on a secure bench, table, rack, or on plastic laid on the ground.

5. Label sample containers and complete documentation (see EP-ERSS-SOP-5058).

Field Team Member(s) (Continued)	6.	Enter the sample information in the field notebook according to SOP-5181 and in the collection log at this time, including sample location identification number, depth interval, etc.
	7.	Whenever a sample is collected for chemical analyses, initiate a custody record via the Chain of Custody/Request for Analysis Form and affix a sample label to the sample container, according to EP-ERSS-SOP-5058.
	8.	Whenever a soil sample is collected, enter a complete description of the soil in either a sample collection log (see EP-ERSS-SOP-5058) or, if several intervals of soil are collected from one location, a daily drilling summary (see EP-ERSS-SOP-5029).

4.3 Collect Field Duplicates

Field Team Member(s)	1.	Collect field duplicates according to EP-ERSS-SOP-5059.

4.4 Perform Post-Sampling Activities

Field Team Member(s)	1.	Decontaminate the outside of sample containers.
	2.	Bag the samples in Ziploc bags.
	3.	Pack samples in a cooler at the sampling site, ensuring that the cooler contains ice, as specified by the site-specific sampling plan.
	4.	Transport the cooler full of samples to the Sample Management Office (SMO) (see EP-ERSS-SOP-5057).
	5.	Decontaminate equipment according to EP-ERSS-SOP-5061.
	6.	Fill all hand-augered holes as directed by the work plan and or Waste Characterization Strategy Form; leave any open holes in a safe and secure manner by appropriately covering or barricading, prior to demobilization from the site. IPC-2
	7.	Check that all sampling locations are properly staked and that location identifications are readily visible on the location stakes.

4.5 Records Management

Field Team Leader	1.	Maintains and submits records and/or documents generated by this procedure to the Records Processing Facility according to EP-DIR-SOP-4004, Records Transmittal and Retrieval Process. • Daily Activity Logs • Chain of Custody/Request for Analysis Forms • Sample Collection Logs • Completed Daily Drilling Summary Reports, as applicable. • Completed records from SOP-12.01 (Attachments A-J, as necessary) • Field Notebooks

5.0 DEFINITIONS

Bucket auger—*A* hand-held steel auger that can be used for digging or for sample collection. Most bucket augers consist of the auger bucket, shafts of various lengths, and a T-grip handle. All parts are either threaded and screwed together or held together with pins.

Data management, data steward—A steward participates as a member of the EP Data Management Team. Members of this team provide expertise in data management activities as they pertain to one or more ADEP-related scientific disciplines: chemistry, statistics, hydrology, geology, environmental science, engineering, and/or computer science. The major responsibility of the data steward is to ensure the quality, accuracy, and completeness of the ER Project technical database.

Sample Management Office—The SMO is the organization responsible for receiving and shipping ADEP Samples. The SMO staff handles the receipt, coordination, and temporary records management of analytical data record packages.

Site-specific Health and Safety Plan—Health and safety plan that is specific to a site or ADEP-related field activity that has been approved by a ADEP health and safety representative. This document contains information specific to the project including scope of work, relevant history, descriptions of hazards by activity associated with the project site(s), and techniques for exposure mitigation (e.g., personal protective equipment [PPE]) and hazard mitigation.

Thin-wall tube sampler—A one-piece metal tube, of thin gauge, which is forcefully driven into soil or sediment with a bucket auger's handle (or similar piece of equipment) at a particular sample location to collect an undisturbed surface soil or sediment sample. The sample is loaded into the stainless-steel tube by propelling the sampler into the soil, usually with a corkscrew action. The tube is the sample container and cannot be reused. The tube is generally used in conjunction with a bucket auger. They cannot be used in extremely hard soil.

6.0 PROCESS FLOW CHART

To be included at a later date.

7.0 ATTACHMENTS

Attachment 1 Equipment and Supplies Checklist for Sampling Soil with Hand Augers and Thin-Wall Tube Samplers.

Attachment 2 Auger and Sampler Assembly Diagram

8.0 REVISION HISTORY

Revision No. *(Enter current revision number, beginning with Rev.0)*	**Effective Date** *(DCC inserts effective date for revision)*	**Description of Changes** *(List specific changes made since the previous revision)*	**Type of Change** *(Technical [T] or Editorial [E])*
0	3/16/92	New Procedure	All
1	8/26/98	Unknown	Unknown
2	8/9/01	Revised SOP to new procedure format and updated all technical requirements.	All
3	1/14/2004	Minor changes. New template and RRES-RS Project organization; no peer review required (QP-4.2).	All
3, IPC 1	4/9/07	Deleted statement in Section 1.0.	Page 4
4	6/25/2010	This document supersedes SOP-06.10 R3 IPC1; assigned new document control number; updated organization information and references to procedures.	E
4, IPC-1	9/15/2010	Updated Section 4.2.3 to clarify the sample collection process; deleted reference to En Core in Section 4.2.4 and on Attachment 1.	Page 5 & 9
4, IPC-2	5/20/2011	Updated Section 4.4, step number 6. to specify the process of filling, and or securing hand augured holes at sampling sites if required.	Page 6

ATTACHMENT 1:

SOP-06.10, R4-1

Equipment and Supplies Checklist for Sampling Soil with Hand Augers and Thin-Wall Tube Samplers

Records Use only

Check	Item Description	Quantity
☐	Hand auger, auger bucket, T-bar handle, extensions	
☐	Sealing materials (plastic end caps, Teflon™ seals, non-adhesive silicon or Teflon™ tape, Ziploc™ bags)	
☐	Thin-wall tube sampler	
☐	Work table surface	
☐	Knife/blade	
☐	Sampling tools	
☐	Buckets	
☐	Decontamination supplies	
☐	Deionized water	
☐	Chain of Custody/Request for Analysis Forms	
☐	Sample Collection Logs	
☐	Any SSHASP-required PPE	
☐	Any additional supplies listed in associated procedures, as needed	
☐	~~En Core~~ sampling tool and appropriate sample containers*	
☐	Current ~~En Core~~ sampling technical manuals/operating instructions (from SMO)*	
	* For VOC samples only	

IPC-1

ATTACHMENT 2:

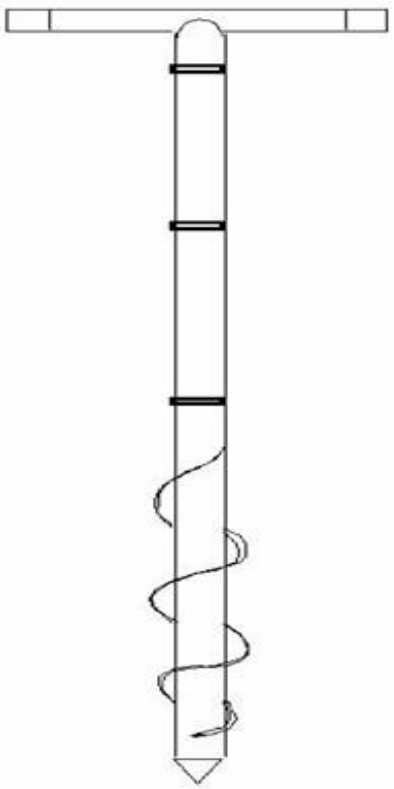
SOP-06.10, R4-2

Auger and Sampler Assembly Diagram

Records Use only

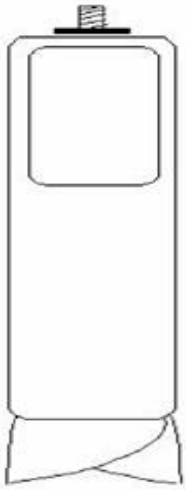
Los Alamos NATIONAL LABORATORY EST.1943

Auger and Sampler Assembly Diagram



Sampling Assembly

Thin-Walled Sampler



Auger Bucket