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Risk Reduction and Environmental Stewardship— Remediation Services Project

Standard Operating Procedure

for **Sample Collection from Split- Spoon Samplers and Shelby-Tube Samplers**

NES Approved

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Revision Log

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Sample Collection from Split-Spoon Samplers and Shelby-Tube Samplers

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List of Acronyms and Abbreviations

| | |
|---------|---|
| FTL | field team leader |
| LANL | Los Alamos National Laboratory |
| PPE | personal protective equipment |
| PTL | Project Team Leader |
| QP | quality procedure |
| QPPL | Quality Program Project Leader |
| RRES-RS | risk reduction and environmental stewardship—remediation services project |
| SMO | sample management office |
| SOP | standard operating procedure |
| SSHASP | site-specific health and safety plan |
| VOC | volatile organic compound |

Sample Collection from Split-Spoon Samplers and Shelby-Tube Samplers

1.0 PURPOSE

This standard operating procedure (SOP) states the responsibilities and describes the process for collecting soil and sediment samples using either split-spoon samplers or Shelby-tube samplers for the Los Alamos National Laboratory (LANL), Risk Reduction and Environmental Stewardship, Remediation Services (RRES-RS) Project.

2.0 SCOPE

2.1 All **RRES-RS Project participants** shall implement this mandatory SOP.

2.2 **Subcontractors** performing work under the RRES-RS Project's quality program shall follow this SOP.

OR

2.3 **Subcontractors** may use the subcontractor's procedure as long as the substitute meets the requirements prescribed by the RRES-RS Project Quality Management Plan, and the RRES-RS Project Quality Program Project Leader (QPPL) and a RRES-RS Project technical staff person approve the procedure before the subcontractor begins the designated activity.

3.0 TRAINING

3.1 **RRES-RS Project participants** shall train to and use the current version of this SOP; contact the author if the SOP text is unclear.

3.2 **RRES-RS Project participants** using this SOP shall document training in accordance with QP-2.2.

3.3 The responsible **Project Team Leader (PTL)** shall monitor the proper implementation of this procedure and ensure that the appropriate personnel complete all applicable training assignments.

4.0 DEFINITIONS

4.1 *Data management, data steward*—A steward participates as a member of the RRES-RS Project Data Management Team. Members of this team provide expertise in data management activities as they pertain to one or more RRES-RS-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.

- 4.2 *Sample Management Office*—The SMO is the organization responsible for receiving and shipping RRES-RS Project samples. SMO staff handles the receipt, coordination, and temporary records management of RRES-RS Project analytical data record packages.
- 4.3 *Shelby tube*— A single-piece metal tube, of thin gauge, which is forcefully driven into the soil or sediment at the bottom of a borehole to collect an undisturbed subsurface soil or sediment sample.
- 4.4 *Split-spoon sampler*— A multi-piece sampler which is threaded onto the end of a drill rod or hand auger and forcefully driven into the soil or sediment at the bottom of a borehole to collect an undisturbed subsurface soil or sediment sample.
- 4.5 *Site-specific health and safety plan (SSHASP)*—Health and safety plan that is specific to a site or RRES-RS-related field activity that has been approved by an RRES-RS Project 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.

5.0 RESPONSIBLE PERSONNEL

The following personnel are responsible for activities identified in this procedure:

- Data Steward
- Field Team Leader
- Field Team Member
- Geologist
- Project Team Leader
- Quality Program Project Leader
- RRES-RS Project Participants
- Sample Management Office Staff

6.0 BACKGROUND AND PRECAUTIONS

- 6.1 **RRES-RS Project participants** shall use this SOP in conjunction with an approved SSHASP.
- 6.2 Background
 - 6.2.1 Split-Spoon Sampler
 - 6.2.1.1 A split-spoon sampler is used to take subsurface soil or sediment samples by forcefully driving the sampler into

the soil or sediment at the bottom of a borehole. Samples may be retrieved along the entire length of the borehole to obtain an unbroken record of the subsurface layers, or samples may be retrieved at selected intervals.

- 6.2.1.2 The split spoon is threaded onto the end of the drill rod and lowered to the bottom of the boring by a heavy steel cable connected to the drilling mast. The sampler is forced into the soil by a drive weight that is dropped repeatedly onto the drive head located at the top of the drill rod. In some designs, the split-spoon sampler is threaded onto a drill stem and placed inside a hollow stem auger. As the auger is rotated and lowered, the split-spoon sampler is advanced along with the drill bit, using the drill rig's drive weight.
- 6.2.1.3 The sampler is driven into the soil to a depth about six inches shorter than the length of the sampler itself. Split-spoon samplers are available in a variety of lengths and diameters for use in a variety of applications. Occasionally, bedrock or extremely compacted sediments are encountered which make further advance of the sampler extremely difficult or impossible without damage to the sample. This condition is known as "refusal" and is defined as a "penetration of less than one foot for 100 blows" (a blow is the act of striking a drive rod with a drive weight). Six inches for 50 blows is also commonly recognized as "refusal." Upon "refusal," either abandon the borehole or remove and replace the sampler with a drill bit.
- 6.2.1.4 A hand auger may also perform split-spoon sampling. The split spoon is threaded onto the end of a hand-driven drill rod, in place of the auger/bit. The split spoon is advanced into the borehole by manually turning the hand auger. In all other respects, hand-augured, split-spoon sampling is identical to hydraulically-driven, split-spoon sampling.

6.2.2 Shelby-Tube Sampler

The Shelby tube is a similar type of sampling apparatus. The split spoon is a multi-piece sampler; the Shelby tube is a single-piece metal tube of thinner gauge. Like the split spoon, soil is forced into the Shelby tube and stored inside. However, because the

Shelby tube is typically advanced hydraulically, it allows the capture of a relatively undisturbed sample. Due to the Shelby tube's thinner walls and sharp cutting edge, the Shelby tube requires much less effort to push into the soil. Take care not to compress the soil sample by forcing the tube in deeper than its own length.

6.3 Precautions

This procedure is limited to the activities of collecting soil and sediment samples for (1) field monitoring and laboratory analysis of concentrations of hazardous and radioactive constituents, (2) soil/sediment physical characteristics, or (3) 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.

7.0 EQUIPMENT

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

8.0 PROCEDURE

Make any deviations from this SOP in accordance with QP-5.7 and/or SOP-01.01.

8.1 Perform Pre-Operation Activities

The **field team members** shall perform the following activities:

- 8.1.1 Coordinate sampling efforts with a data steward and the Sample Management Office (SMO); the data steward and/or the SMO may give guidance regarding sample containers and preservation.
- 8.1.2 Label all bottles and acquire all necessary documentation (SOP-01.02, and SOP-01.04).
- 8.1.3 Properly decontaminate all sampling equipment (e.g., clean brass liners and Shelby-tube samplers in the laboratory prior to use; in the field, rinse the liners and samplers with deionized water prior to use) before assembling the sampler (SOP-01.08).
- 8.1.4 Note in the field notebook the exact location and location identification number of the sample-collection hole.
- 8.1.5 If possible, photograph the location.
- 8.1.6 Mark the location with stakes that include the location identification number.

8.2 Perform Sampling

The **field team members** shall discuss, understand, and fully document in field notebooks and/or daily logs the sample-collection strategy and rationale, performing sampling activities as follows.

8.2.1 Collect and place the split-spoon sampler or Shelby-tube sampler on a secure bench, table, or rack.

8.2.2 If using a split-spoon sampler, proceed to step 8.2.3; if using a Shelby-tube sampler, do one of the following:

- Immediately cap the ends of the Shelby tube, tape the caps to ensure retention, and submit the entire tube to the laboratory.

OR

- Extrude the sample into a clean stainless-steel bowl and package the sample, as necessary.

Note: For volatile organic compound (VOC) samples, either seal the tube and ship intact, or use an En Core sampler, and associated sample container, to extract the VOC sample(s), according to the current version of the En Core Technical Manual/Operating Instructions, prior to capping the Shelby tube.

8.2.3 If using a split-spoon sampler, separate the split-spoon sampler tube (a flat-blade screwdriver is useful), exposing either the sample or brass liners.

Note: If VOC analysis is required, use liners with the split-spoon sampler to collect the VOC sample.

8.2.3.1 If using liners, run a knife between the liners to separate the tube and perform the following:

- Immediately seal the ends of the liner with Teflon film and cap the ends.
- The **field team member** shall log the sample information in the field notebook or borehole log at this time.
- The **geologist** shall also record the borehole identification number, run number, depth interval, and percent recovery, as appropriate.

8.2.3.2 If not using liners, immediately collect the VOC sample from the open split-spoon sampler using the En Core sampling tool and associated sample container.

8.2.3.3 For composite samples (where VOCs and SVOCs are not analytical parameters), use a decontaminated stainless steel spoon (or other appropriate sampling tool) to collect small amounts of soil or sediment from several discrete points within the split-spoon sampler.

8.2.3.4 Place the soil or sediment in a decontaminated stainless steel or plastic bucket or a plastic ziploc bag.

8.2.4 Mix the soil or sediment several times until the material is well mixed and homogeneous.

Note: One may select randomly, at regular intervals, or based on visual inspection the sampling points for the composite sample.

8.2.5 Alternatively, place the entire core into a decontaminated stainless steel or plastic bucket and mix until the sample is homogenized.

8.2.6 Collect field duplicates in one of the two following ways:

- Composite the soil in a decontaminated stainless-steel or plastic bucket (a *composited* field duplicate).

OR

- Sample from an adjacent location (a *collocated* field duplicate).

Note: Collect collocated-field duplicates from adjacent liners. Follow the site-specific sampling plan and document the duplicate collection process in the field notebook and/or in daily logs.

8.3 Perform Post-Operation Activities

Field team members shall perform the following activities:

8.3.1 Decontaminate the outside of the sample containers.

8.3.2 Bag the samples in a Ziploc bag.

8.3.3 At the sampling site, place the samples in a cooler containing ice as specified by the site-specific sampling plan.

8.3.4 Following each sampling event, wash the split-spoon sampler with high-purity, laboratory detergent and double rinse the components with deionized water, methanol, 0.1N nitric acid, and/or another rinse solution, as appropriate, or as specified in the site-specific sampling plan.

9.0 LESSONS LEARNED

- 9.1 Before performing work described in this SOP, **RRES-RS Project participants** should go to the Department of Energy Lessons Learned Information Services home page, located at <http://www.tis.eh.doe.gov/II/II.html>, and/or to the LANL Lessons Learned Resources web page, located at http://www.lanl.gov/projects/lessons_learned/, and search for applicable lessons.
- 9.2 During work performance and/or after the completion of work activities, **RRES-RS Project participants**, as appropriate, shall identify, document, and submit lessons learned in accordance with the LANL, Lessons Learned System located at http://www.lanl.gov/projects/lessons_learned/.

10.0 RECORDS

The **Field Team Leader** shall submit the following records to the Records Processing Facility, in accordance with QP-4.4:

- Daily Activity Log
- Chain of Custody/Request for Analysis Forms
- Sample Collection Logs
- Borehole Log (if developed)

11.0 REFERENCES

To properly implement this SOP, **RRES-RS Project participants** should become familiar with the contents of the following documents located at http://erinternal.lanl.gov/home_links/Library_proc.shtml:

- RRES-RS Project, Quality Management Plan
- QP-2.2, Personnel Orientation and Training
- QP-4.4, Record Transmittal to the Records Processing Facility
- QP-5.7, Notebook Documentation for Environmental Restoration Technical Activities
- SOP-01.01, General Instructions for Field Investigations
- SOP-01.02, Sample Containers and Preservation
- SOP-01.04, Sample Control and Field Documentation
- SOP-01.08, Field Decontamination of Drilling and Sampling Equipment
- En Core Sampling Technical Manual/Operating Instructions

12.0 ATTACHMENTS

The **user** of this SOP may locate all forms associated with this procedure at <http://erinternal.lanl.gov/Quality/user/forms.asp>.

Attachment A: Equipment and Supplies Checklist for Sample Collection Using Split-Spoon and Shelby-Tube Samplers, 1 page

[Using a token card, click here to record "self-study" training to this procedure.](#)

If you do not possess a token card or encounter problems, contact the RRES-ECR training specialist.

