

SOP #SRC-OGDEN-02

Surface Soil Sampling

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TECHNICAL STANDARD OPERATING PROCEDURE

SURFACE SOIL SAMPLING

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for surface soil sampling, to be used by employees of USEPA Region 8, or contractors and subcontractors supporting USEPA Region 8 projects and tasks. This SOP describes the equipment and operations used for sampling surface soils in areas which will produce data that can be used to support risk evaluations. Deviations from the procedures outlined in this document must be approved by the USEPA Region 8 Remedial Project Manager, Regional Toxicologist or On-Scene Coordinator prior to initiation of the sampling activity.

2.0 RESPONSIBILITIES

The Field Project Leader (FPL) may be an USEPA employee or contractor who is responsible for overseeing the soil sampling activities. The FPL is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and the Project Plan. It is the responsibility of the FPL to communicate with the Field Personnel regarding specific collection objectives and anticipated situations that require any deviation from the Project Plan. It is also the responsibility of the FPL to communicate the need for any deviations from the Project Plan with the appropriate USEPA Region 8 personnel (Remedial Project Manager, Regional Toxicologist or On-Scene Coordinator).

Field personnel performing surface soil sampling are responsible for adhering to the applicable tasks outlined in this procedure while collecting samples. The field personnel should have limited discretion with regard to collection procedures, but should exercise judgment regarding the exact location of sample collection, within the boundaries outlined by the FPL.

3.0 EQUIPMENT

- Thin-walled tube sampler - thin-walled metal or teflon tube (also called a Shelby tube) used to recover relatively undisturbed soil samples. Augers are available at various depths, and soil cores may range in length from 6 inches to 24 inches.
- Soil augers - Various models of soil augers are acceptable and selection of the specific brand and make of tool will be recommended by the contractor implementing the field work. Augers must be made of stainless steel, and should be capable of retrieving a cylindrical plug of soil 2 inches in diameter and 2 inches deep. In all cases the procedures recommended by the manufacturers should be followed with regard to use of the auger.
- Trowels - for extruding the soil sample from the auger. For samples that will be analyzed for trace metals, avoid the use of chrome plated trowels, as they may interfere with the analysis.
- Collection containers - as specified in the Project Plan.
- Gloves - for personal protection and to prevent cross-contamination of samples. May be

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plastic or latex; should be disposable and powderless.

- Field clothing and Personal Protective Equipment - as specified in the Health and Safety Plan.
- Sampling flags - used for identifying soil sampling locations.
- Field notebook - a bound book used to record progress of sampling effort and record any problems and field observations during sampling.
- Three-ring binder book- to store necessary forms used to record and track samples collected at the site. Binders will contain the Field Data Sheet, Site Diagram, and sample labels. Example forms are provided in the Sample Documentation SOP.
- Permanent marking pen - used to identify sample containers and for documentation of field logbooks and data sheets.
- Measuring tape or pocket ruler - used to measure the length of soil core in the soil coring device.
- Trash Bag - used to dispose of gloves and any other non-hazardous waste generated during sampling.

4.0 SURFACE SOIL COLLECTION

4.1. Collection of soil cores for non-volatile chemical analysis

Surface soil will be collected from each of the areas identified in the Project Plan. Samples will be collected with an auger and Thin Wall Tube Sampler. This system consists of a “T” shaped handle auger fitted with a sample tube capable of collecting soil cores that are at least 6 inches in depth. The sample collection tube must be constructed of teflon, or other non-reactive material, to avoid contamination of the soil sample.

A new pair of plastic gloves are to be worn at each boring location. Each soil boring location must be recorded on the site diagram prior to collecting the sample. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter) that can be easily removed by hand. After the sampling tube is fitted to the auger, push the auger into the soil by a continuous and rapid motion, without impacting or twisting. In no case shall the tube be pushed further than 6 inches.

After reaching the desired depth, slowly and carefully remove the auger from the boring. Measure the length of the core and record on the Field Data Sheet. Carefully remove the soil from the auger, and place directly into the sample container. Affix one sample ID label to the sample container, and one to the Field Data Sheet.

Decontaminate sample equipment as described in Section 8.0.

4.2. Collection of soil cores for volatile analysis

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Use a new pair of disposable gloves for each sample. Record the sample location on the site diagram. Repeat the same procedure as described in Section 4.1, placing the soil core directly into a sample container that is designed for volatile organic analysis. Affix one sample ID label to the sample container, and one to the Field Data Sheet.

If sampling equipment is to be re-used, follow the decontamination procedures outlined in Section 8.0 before collecting the next sample.

4.3. Collection of surface soil samples using a soil auger

Place the soil coring tool on the ground and position it vertically. Holding the tool handle with both hands, apply pressure sufficient to drive the tool approximately 2 inches into the ground while applying a slight twisting force to the coring tool. Remove the tool by pulling up on the handle while simultaneously applying a twisting force. If the sample was retrieved successfully, a plug of soil approximately two inches long should have been removed with the coring tool.

Hold the soil coring tool horizontally or place it on the ground. Using a clean spatula or knife, remove the soil collected at depth greater than two inches from the end of the sampling tool. Use a trowel to extrude the soil from the auger, pushing the two-inch soil plug from the coring tool so that it falls directly into the container.

If sampling equipment is to be re-used, follow the decontamination procedures outlined in Section 8.0 before collecting the next sample.

Care should be taken to avoid tracking soil from one area to another. As samples are taken sequentially, care should also be taken not to contaminate an area yet to be sampled with the residue of the sample that is currently being taken. In general one should move in a single direction through the sampling area. If an area is known or suspected of having a higher concentration of contaminants, all other considerations being equal, it should be sampled last to prevent cross contamination.

Decontaminate equipment as described in Section 8.0.

5.0 SAMPLE CONTAINERS AND LABELING

Following the procedures outlined in Section 4.0, soil borings will be collected directly into sample containers, and shipped to the participating laboratory. For each soil core, two sample identification labels are required. One label is placed on the Field Data Sheet and the other label is affixed to the sample container.

Sample labeling will occur as prescribed below:

- 1) Place a pre-printed label onto the sample container (See Project Plan).
- 2) Place a pre-printed label onto the Field Data Sheet.
- 3) This procedure will be repeated for each soil core collected using clean sample containers and unique sample ID numbers.

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Do not allow samples to freeze; place all samples directly onto wet ice (4°C). Ship samples under chain-of-custody, protected with suitable resilient packing material to reduce shock, vibration, and disturbance.

6.0 SITE CLEAN-UP

All soil boring holes will be back-filled with site soil or clean topsoil. If any rinse water used for sample decontamination is generated in the course of sample collection, it must be disposed of as specified in the Project Plan. Wherever possible, soil should be replaced in the sampling hole.

All marker flags (if reused) should be decontaminated by wiping off with towels and/or baby wipes before re-use.

Disposable PPE and other non-hazardous waste generated during sampling activities will be placed in a trash bag and taken to a waste receptacle at the field office to prevent disturbance by animals and dispersion by wind. These wastes will be disposed along with trash at a municipal landfill.

Soils and decontamination rinsate waste generated during sampling activities will be placed in DOT-compliant drums in accordance with 40 CFR 265 Part I. All non-hazardous waste will be disposed of in municipal waste bins.

7.0 RECORD KEEPING AND QUALITY CONTROL

Each field crew will carry a three-ring binder book that contains the riparian soil data sheet, site diagram, and sample labels. In addition, a field notebook should be maintained by each individual or team that is collecting samples, as described in the Project Plan. Each soil sample location must be recorded on the site diagram. Each sample should have an ID number affixed to the sample container, and the duplicate label must be affixed to the data sheet. Deviations from this sampling plan should be noted in the field notebook, as necessary.

For each location, the notebook information must include:

- a. date
- b. time
- c. personnel
- d. weather conditions
- e. sample identification numbers that were used
- f. descriptions of any deviations to the Project Plan and the reason for the deviation.

Samples taken from soils with visible staining or other indications of non-homogeneous conditions should also be noted. Field personnel will collect the proper type and quantity of quality control samples as prescribed in the Project Plan.

8.0 DECONTAMINATION

Because decontamination procedures are time consuming, having a quantity of sampling tools sufficient to require decontamination at a maximum of once per day is recommended. All sampling equipment must be decontaminated prior to reuse as prescribed in the Project Plan.

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9.0 GLOSSARY

Project Plan - A written document that spells out the detailed site-specific procedures to be followed by the FPL and the field personnel. In this case, the Project plan consists of the Phase 3 Sampling and Analysis Plan.

10.0 REFERENCES

Mason, B.J. 1983. Preparation of soil sampling protocol: Techniques and strategies. EPA - 600/4-83-020.

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American Society for Testing and Materials, 1985. Thin-Walled Tube Sampling of Soils. Method D-1587-83, Annual Book of Standards.

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