

STANDARD OPERATING PROCEDURE
Soil Sampling, Including Auger and Surface Soil Procedures

KEY WORDS

Soil, auger, composite sampling, soil cores

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1.0 INTRODUCTION

1.1 Purpose

To define the method for taking soil samples for chemical or other analyses at different depths using an auger or from the surface using a stainless steel tube. The procedures contained in this document are to be used by field staff when collecting and handling soil samples in the field.

Note: To protect laboratory facilities from contamination, keep sampling equipment on a clean table, plastic, or tarps when in the field. Inside facilities, the counters must be covered with paper or plastic to keep surfaces clean during processing or lab work.

2.0 MATERIALS

2.1 Materials for auger sampling:

- 2.1.1 Stainless steel soil auger (3" diameter bucket)
- 2.1.2 Soil auger extensions pre-labeled in 6" increments (enough to reach desired sampling depth)
- 2.1.3 Soil auger handle
- 2.1.4 7/8" open-end wrenches (2)
- 2.1.5 4" diameter heavy walled polyvinyl chloride (PVC) sleeve cut into 7" to 1' length (1 or more)
- 2.1.6 Rubber mallet (1 or more)
- 2.1.7 2" x 4" wood cut into 1' length (1 or more)
- 2.1.8 18" x 24" plastic bags (1 per sample)
- 2.1.9 5-gallon buckets with handles (2)
- 2.1.10 5-gallon water cooler with spigot at the bottom for deionized (DI) water
- 2.1.11 Tap water in a 5-gallon container if a faucet is not available
- 2.1.12 Wash brushes
- 2.1.13 Liquid dish soap
- 2.1.14 Isopropyl alcohol
- 2.1.15 500 mL wash bottle for the alcohol
- 2.1.16 Disposable gloves
- 2.1.17 Folding table, tarp, or plastic for the ground

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- 2.1.18 1 pint wide mouth mason jars (1 per sample), pre-labeled with the location and depth or a sample number that is cross-referenced with the same information
- 2.1.19 Shovel
- 2.1.20 Chain of Custody forms

2.2 Materials for surface sampling:

- 2.2.1 1/2" ID (internal diameter) stainless steel tubes cut into 6" lengths (1 per composite sample)
- 2.2.2 1/2 pint wide mouth mason jars (1 per composite sample), pre-labeled with sample number
- 2.2.3 Rubber mallet
- 2.2.4 Disposable gloves
- 2.2.5 Shovel
- 2.2.6 Folding table, tarp, or plastic for the ground
- 2.2.7 Chain of Custody forms
- 2.2.8 Cleaning supplies listed from 2.1.9 to 2.1.16

3.0 PROCEDURES

3.1 Procedure for auger sampling (Figure A)

- 3.1.1 Set up a folding table or use a tarp or plastic on the ground as a work space to prevent contamination of materials and equipment such as sampling jars and the boxes they may be stored in.
- 3.1.2 To prevent the core from collapsing in light soils, place the PVC sleeve over the site to be sampled and drive it into the ground approximately 6" or more using the rubber mallet and the 2" x 4" piece of wood as the interface between the sleeve and the impacting rubber mallet. The top of the sleeve should not be more than 1-2 inches above the soil. A permanent marker can be used to mark the soil surface level inside the PVC, if measuring depth is difficult.

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- 3.1.3 Place a clean auger (see 3.1.6) in the sleeve. Turn the handle to advance the auger until it fills with soil. Pull the auger up and tap the soil into an 18" x 24" plastic bag. Return the auger to the sleeve and continue turning until the top of the auger is level with the soil surface (6"). Again, pull the auger up and tap all the soil into the same bag. Surface soils tend to be compacted and when augering they "fluff," thus it may be necessary to fill the auger multiple times to remove the full 6" depth of soil. For soils below the surface, it is usual to fill the auger once per 6" depth.
- 3.1.4 While wearing disposable gloves, hold the top of the plastic bag closed and shake the soil to mix it thoroughly. Use the pre-labeled jar to take a sample from the bag by pouring the mixed soil into the jar. Put the lid on the jar and place it in an ice chest with dry ice.
- 3.1.5 To prevent contamination from the 0" to 6" soil, knock off the soil that is stuck to the inside of the PVC sleeve with a gloved hand and scoop it out of the bottom of the hole before taking the second sample.
- 3.1.6 Clean the auger bucket by first tapping the bucket with a mallet to remove any residual soil, then place the auger bucket inside the soapy 5-gallon bucket of water and scrub it with a brush. After that, rinse the auger bucket inside a 5-gallon bucket of DI water using a second brush. Then spray the auger bucket with isopropyl alcohol, and finally rinse the auger bucket again with DI water dispensed from the spigot of the water cooler.
- 3.1.7 Place a clean auger into the sleeve and advance 6". Pull the auger out of the sleeve and, while holding the auger in a horizontal position, use the mallet to knock 1" to 2" of soil from each end of the auger to remove potentially contaminated soil. Tap the remaining soil into an 18" x 24" plastic bag.
- 3.1.8 Repeat steps 3.1.4, 3.1.6 and 3.1.7 until the desired depth is reached. Wrenches may be needed to add extensions to the auger. Cleaning the sleeve, step 3.1.5, is only necessary after the surface 6" sample is taken.
- 3.1.9 If the samples are for chemical analysis, fill out a Chain of Custody for each sample ([SOP ADMIN006](#)). If the samples are for another analysis (texture, bromide, etc.), fill out the appropriate forms.
- 3.1.10 Transport the samples for pesticide analysis to the warehouse on dry ice and store in a freezer. Store samples as appropriate for other types of analyses.

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3.2 Procedure for soil surface sampling

- 3.2.1 Set up a folding table or use a tarp or plastic as a work space to prevent contamination of materials and equipment.
- 3.2.2 Rinse the stainless steel tube with alcohol and rinse with DI water to ensure the tubes are clean from their last use.
- 3.2.3 Use rubber mallet to drive the stainless steel tube into the ground to the desired depth.
- 3.2.4 Insert the blade of a shovel into the soil a few inches away from the tube at an angle so that the blade passes just below the tube. Lightly rotate the shovel to release the tube from the soil to prevent the soil confined within the tube from falling out.
- 3.2.5 Tap the tube with a mallet above the jar to knock the soil into the jar.
- 3.2.6 Use the same tube to take additional soil cores to the same depth. These will be composited in the same sample jar. Depending on the analysis desired and the method used, a minimum amount of soil is needed (usually 100 g or more). Typically, 3 to 5 cores are necessary to have sufficient soil for one composite sample.
- 3.2.7 Put the lid on the jar and place it in an ice chest with dry ice.
- 3.2.8 Place the stainless steel tubes in a plastic bag for cleaning later. Use a new tube for each composite sample and repeat steps 3.2.2 through 3.2.7.
- 3.2.9 If the samples are for chemical analysis fill out a Chain of Custody for each sample ([SOP ADMIN006](#)).
- 3.2.10 Transport the samples as in 3.1.10.
- 3.2.11 Wash stainless steel tubes with liquid dish soap, alcohol, and DI water as in 3.1.6. Store them in a box or bag for future use.

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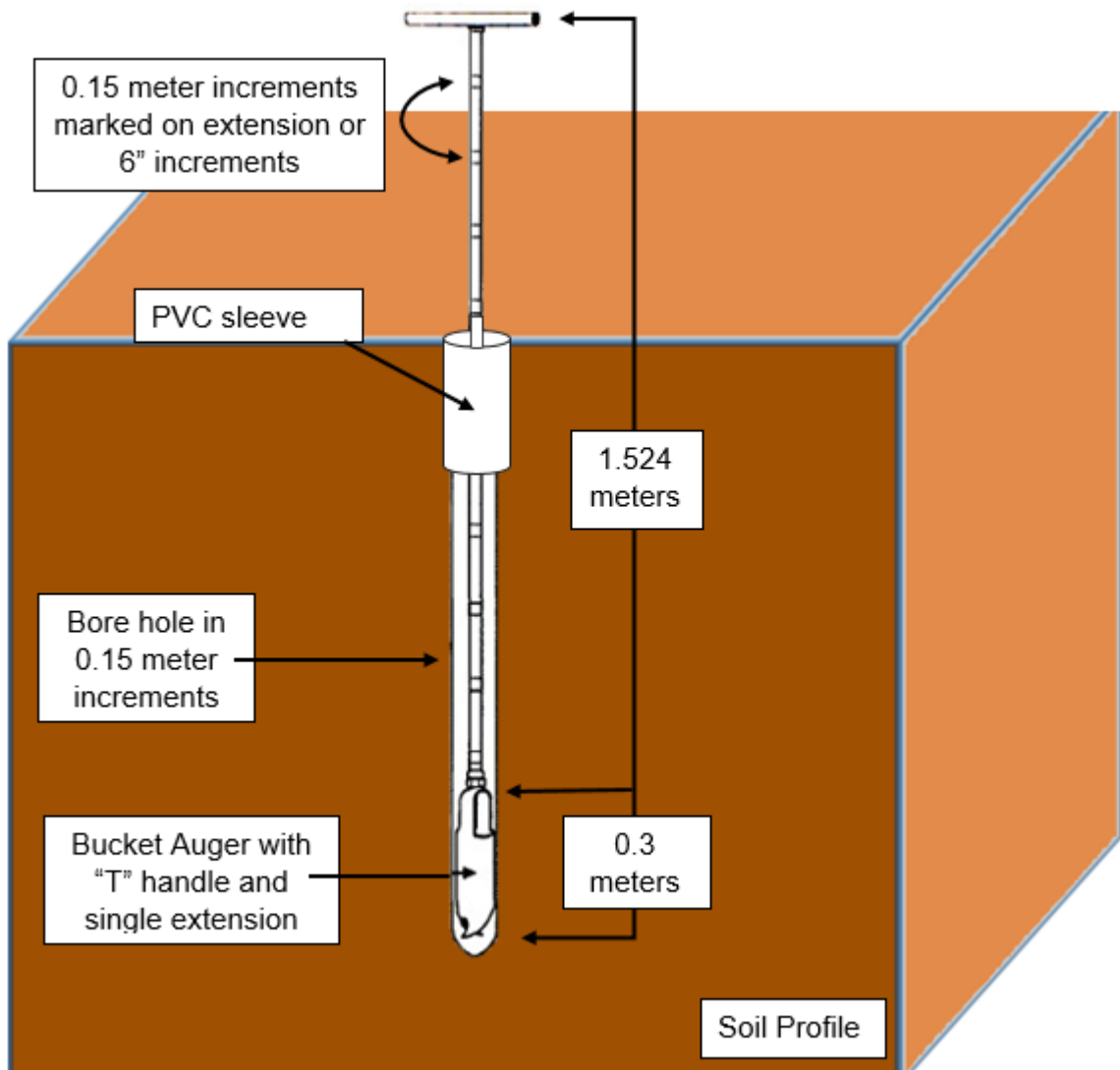


Figure A. Sampling a soil column with a bucket auger.