



Designation: E 1727 – 99

An American National Standard

Standard Practice for Field Collection of Soil Samples for Lead Determination by Atomic Spectrometry Techniques¹

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1. Scope

1.1 This practice covers the collection of soil samples using coring and scooping methods. Soil samples are collected in a manner that will permit subsequent digestion and determination of lead using laboratory analysis techniques such as Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), and Graphite Furnace Atomic Absorption Spectrometry (GFAAS).

1.2 This practice is not suitable for collection of soil samples from areas that are paved.

1.3 This practice does not address the sampling design criteria (that is, sampling plan that includes the number and location of samples) that are used for risk assessment and other purposes. To provide for valid conclusions, sufficient numbers of samples must be obtained as directed by a sampling plan.

1.4 This practice contains notes that are explanatory and are not part of the mandatory requirements of this practice.

1.5 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 Definitions:

2.1.1 *sampling location*—a specific area within a sampling site that is subjected to sample collection. Multiple sampling locations are commonly designated for a single sampling site.

2.1.2 *sampling site*—a local geographical area that contains the sampling locations. A sampling site is generally limited to an area that is easily covered by walking.

2.1.3 *soil collection container*—a container for holding and transporting the soil sample from the field to the laboratory. A

sealable rigid walled container or a resealable plastic bag can be used. The internal volume must be sufficient to hold the entire collected sample.

3. Summary of Practice

3.1 Soil samples are collected using coring or scooping methods.

4. Significance and Use

4.1 This practice is intended for the collection of soil samples in and around buildings and related structures for the subsequent determination of lead concentration, such as described in the HUD Guidelines.² This practice may also be used to collect soil samples from other environments for lead analysis.

4.2 This practice limits soil collection to approximately the top 1.5 cm of soil surface.

5. Apparatus and Materials

5.1 *Soil Coring Tool*, minimum diameter of 2.5 cm, or as agreed upon by the parties requesting and collecting the samples, lead-free, for use in coring. The tool shall be capable of being forced into hard ground without damage to a depth of at least 5 cm (2 in.) and have a mechanism to remove the core from the tool to permit discarding all but the top 1.5 cm (0.6 in.) of the soil core (see Note 1).

NOTE 1—A number of devices can be used or modified for use as soil coring tools. For example: professional stainless steel coring tools equipped with plastic liners, steel pipe, plastic pipe, or small sapling (tree) planters. Removal of the soil core is generally performed using a pair of plungers cut to fit the inside diameter of the coring device. One plunger is equipped with a stop that limits extension of the plunger to within 1.5 cm from the far end of the coring tool. It is used to remove all except the top 1.5 cm of the soil core from the coring tool. The other plunger (without a stop) is used to remove the remaining 1.5 cm of the soil core from the coring tool. The coring procedure in this practice assumes the coring tool has been equipped with these two types of plungers.

5.2 *Plastic Centrifuge Tubes*, for use in scooping; 50 mL with tight fitting cap. These tubes are not prohibited from serving as soil collection containers.

¹ This practice is under the jurisdiction of ASTM Committee E-6 on Performance of Buildings and is the direct responsibility of Subcommittee E06.23 on Lead Paint Abatement.

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² *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, U.S. Department of HUD, Washington, DC, June 1995.

5.3 *Spoon*, lead-free, for use in scooping.

5.4 *Plastic Bags*, for use as soil collection containers; approximately 1 L or 4 L (1 qt or 1 gal) resealable plastic bags.

5.5 *Steel or Plastic Measuring Tape*.

5.6 *Plastic Gloves*, powderless.

5.7 *Permanent Ink Marker*.

5.8 *Wipe*—Disposable towlettes moistened with a wetting agent. This towel is used to clean sampling equipment. Wipe brands or sources selected for use shall contain insignificant background lead levels. Rinsing with drinking water will also assist in cleaning sampling equipment.

6. Procedure for Core Sampling

6.1 The following procedure is for collection of soils using a coring method at a given sample location within a sampling site. Coring methods are effective for collection from dense, hard, or sticky soils. Coring methods are not intended for collection of loose, sandy soils (see Note 2).

NOTE 2—Coring methods are more effective than scooping methods for the collection of reproducible replicate samples. Coring methods have the advantage of sampling a reproducible cross-sectional area and depth.

6.1.1 Don a pair of clean, powderless, plastic gloves (see Note 3).

NOTE 3—Lead contamination problems during field sampling can be severe and can affect soil analysis results. Contamination can be minimized through adherence to the following recommendations: change gloves frequently. Collection of each new sample should be conducted with a new pair of gloves. Powderless gloves are recommended to minimize contamination of the collected soil from powders used in “powdered” gloves. Clean sampling equipment and measuring tapes frequently with wipes or water. Do not handle soil collection containers until just prior to use.

6.1.2 If needed, clean the coring tool using wipes or drinking water. Check the stop on the core plunger (the one with a stop) to ensure that the plunger tip stops at a distance of 1.5 cm from the end of the coring tool or the portion of the tool that collects the soil core. Adjust the stop if needed.

6.1.3 Place a directional arrow on the outside of the tool with the head pointed toward the ground (see Notes 4-6). Grip the coring tool firmly between two hands and drive the tool into the soil surface at the designated sampling location with the directional arrow point facing down using a slight twisting motion to a depth of approximately 5 cm (2 in.).

NOTE 4—The directional arrow is used to identify which end of soil core is the top (that is, the surface of the ground). Its use will avoid inadvertent loss of the top of the soil core when the plungers are used to remove and collect the soil sample.

NOTE 5—Use of a professional stainless steel coring tool equipped with plastic liners may require insertion of a plastic liner and assembly. Follow the manufacturers instruction for proper setup using these types of coring tools, prior to driving the tool into the ground. For coring tools that use liners, the directional arrow must be marked on the liner, not the tool.

NOTE 6—For extremely hard soils (that is, hard packed or frozen), a hammer or other similar device may be needed to drive the tool into the ground. If conditions do not allow for full penetration to 5 cm, make every effort to penetrate to a depth of at least 1.5 cm. If the penetration is less than 1.5 cm, documentation generated for the sample should indicate the approximate depth achieved.

6.1.4 Twist and snap the coring tool to one side and carefully remove the tool from the ground while retaining the soil core in the tool.

6.1.5 Insert a clean plunger (with stop) into the top end of the liner. (The bottom end is indicated by the arrow head drawn on the tool. The top end is the opposite opening.) Push out all but 1.5 cm of the soil core from the tool with the plunger. Using a gloved finger, wipe off the excess soil protruding from the tool. Discard the soil pushed out of the tool.

6.1.6 Using a clean plunger (without stop), push the remaining 1.5 cm section of the core sample into a soil collection container.

6.1.7 Collect two more soil cores within a 0.3 m (1 ft) diameter circle around the first core using the same procedure described in 6.1.2-6.1.6. Composite these cores into the same soil collection container. Label the soil collection container with sufficient information to uniquely identify the sample. Discard the gloves in the trash bag after all three cores have been collected and composited.

6.1.8 Don a pair of clean, powderless, plastic gloves. Clean the coring tool and plungers using wipes or drinking water until visibly clean after each use. Discard the wipes and gloves in a trash bag.

7. Procedure for Scoop Sampling

7.1 The following procedures are for collection of soils using scoop sampling methods. For scoop sampling, collect soils at a given sample location within a sampling site using one of the methods. Scooping methods are effective for collection from semisoft, sticky, and loose, sandy soils (see Note 2). Scooping methods are not intended for the collection of soils from very hard or frozen soils.

NOTE 7—The scooping methods described here may result in collection bias toward increased amounts of surface soil as opposed to subsurface soil because of the curvature of the collection tools.

7.1.1 Scoop Sampling Using a Plastic Centrifuge Tube:

7.1.1.1 Don a pair of clean, powderless, plastic gloves (see Note 3).

7.1.1.2 Determine the proper burying depth of the tube needed to collect approximately the top 1.5 cm of soil using a measuring tape and a plastic 50-mL centrifuge tube (see Note 8).

NOTE 8—For example; if the plastic centrifuge tube is about 3 cm in diameter, then the proper burying depth during scooping is to insert the tube into the soil until the soil surface is about even with the center of the tube.

7.1.1.3 Remove the cap of the plastic centrifuge tube and insert the open end of the tube into the soil at the sampling location to the desired depth as determined in 7.1.1.2. Collect the soil into the tube by pushing or pulling the tube through the soil surface while maintaining the burying depth of the tube in the soil. Move the tube a distance of 10 to 20 cm (4 to 8 in.) across the soil surface to complete collection of the soil into the tube.

7.1.1.4 Remove the tube from the ground and wipe off any excess soil clinging to the outside of the tube and cap threads with a gloved finger. Replace the cap. Label the plastic