



Standard Practice for Field Collection of Soil Samples for Subsequent Lead Determination¹

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1. Scope

1.1 This practice covers the collection of soil samples from areas in and around buildings and related structures using coring and scooping methods.

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 lead hazard activities.

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. Referenced Documents

2.1 ASTM Standards:²

E 1605 Terminology Relating to Lead in Buildings

E 1613 Test Method for Determination of Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), or Graphite Furnace Atomic Absorption Spectrometry (GFAAS) Techniques

E 2239 Practice for Record Keeping and Record Preservation for Lead Hazard Activities

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

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3. Terminology

3.1 *Definitions*—For definitions of terms not appearing here, see Terminology E 1605.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *soil collection container*—a sealable rigid walled container or a resealable plastic bag for holding and transporting the soil sample from the field to the laboratory.

3.2.1.1 *Discussion*—The volume must be sufficient to hold the entire collected sample.

4. Summary of Practice

4.1 Soil samples are collected using coring or scooping methods.

5. Significance and Use

5.1 Although this practice is intended for the collection of soil samples from areas in and around buildings, this practice may also be used to collect soil samples from other areas and environments.

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

5.3 These 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) and Flame Atomic Absorption Spectrometry (FAAS) (see Test Method E 1613).

6. Materials and Equipment

6.1 *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.

6.1.1 The coring 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 soil sample 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.

6.2 *Plastic Centrifuge Tubes*, for use in scooping or in serving as soil collection containers; 50 mL capacity with tight fitting cap.

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

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

6.5 *Steel or Plastic Measuring Tape*.

6.6 *Plastic Gloves*, powderless.

6.6.1 Use of plastic gloves minimizes potential contamination of the collected soil from powders used in “powdered” gloves.

6.7 *Indelible (Permanent) Marking Pen*.

6.8 *Wipes*, for use in cleaning sampling tools.

6.8.1 The background lead level of wipes shall not exceed 5 mg (see Note 2).

6.8.2 Laboratory analysis on replicate blank wipes should be conducted to determine background lead levels prior to use in the field.

NOTE 2—Although it is not required that wipes used for cleaning sampling equipment conform to the requirements of Specification E 1792, wipes that meet this specification have background lead levels not exceeding 1 of µg.

6.9 *Drinking Water (Optional)*, for use in cleaning sampling tools.

6.10 *Trash Bags*.

7. Lead Contamination

7.1 Lead contamination problems during field sampling can be severe and can affect soil analysis results.

7.2 Minimize contamination through adherence to the following recommendations:

7.2.1 Change gloves frequently,

7.2.2 Collect each sample wearing a new pairs of gloves,

7.2.3 Clean sampling equipment and measuring tapes frequently with wipes, drinking water, or both, and

7.2.4 Do not handle soil collection containers until just prior to use.

8. Procedure for Core Sampling

8.1 *General Comments*:

8.1.1 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 3).

NOTE 3—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.

8.2 The following procedure is for collection of soils using a coring method at a given sample location within a sampling site.

8.2.1 Don a pair of clean, powderless plastic gloves (see 6.6.1).

8.2.2 If needed, clean the coring tool using wipes, drinking water, or both.

8.2.3 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.

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

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.

8.2.5 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.

8.2.6 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.

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

8.2.8 Collect two more soil cores within a 0.3 m (1 ft) diameter circle around the first core using the same procedure described in 8.2.2-8.2.7. Place (that is, composite) these cores into the same soil collection container used for the first soil sample.

8.2.9 Label the soil collection container with sufficient information to uniquely identify the sample.

8.2.10 Discard the gloves in the trash bag.

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

9. Procedures for Scoop Sampling

9.1 *General Comments*:

9.1.1 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.

9.1.2 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.

9.2 The following procedures are for collection of soils using scoop sampling methods.

9.3 *Scoop Sampling Using a Plastic Centrifuge Tube:*

9.3.1 Don a pair of clean, powderless, plastic gloves (see 6.6.1).

9.3.2 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 7).

NOTE 7—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.

9.3.3 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 9.3.2. 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.

9.3.4 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.

9.3.5 Label the plastic centrifuge tube with sufficient information to uniquely identify the sample.

9.3.6 Discard the gloves in the trash bag.

9.4 *Scoop Sampling Using a Spoon:*

9.4.1 Don a pair of clean, powderless, plastic gloves (see 6.6.1).

9.4.2 Using a measuring tape and a clean spoon, dig a small test hole adjacent to the sampling location to the depth of 1.5 cm. Use this hole as a visual aid during soil collection to help limit collection to a depth of 1.5 cm.

9.4.3 Clean the spoon using wipes, drinking water, or both.

9.4.4 Collect soil into a soil collection container by scooping with the spoon down to the depth indicated by the test hole (see 9.4.2). Continue to collect soil until a cylindrical hole of approximately 5 cm diameter and 1.5 cm depth has been created.

9.4.5 Collect soil from two more locations within a 0.3 m (1 ft) diameter circle around the first sample location using the same procedure described in 9.4.1-9.4.4. Place (that is, composite) these scoop samples into the same soil collection container used for the first sample.

9.4.6 Label the soil collection container with sufficient information to uniquely identify the sample.

9.4.7 Discard the gloves in a trash bag.

9.4.8 Don a pair of clean, powderless, plastic gloves. Clean the spoon using wipes, drinking water, or both. Discard the wipes and gloves in a trash bag.

10. Record Keeping

10.1 Records shall be maintained in accordance with Practice E 2239, and shall include a copy of the field collection report.

11. Report

11.1 Field data related to sample collection shall be documented in a sample log form or field notebook (see Note 8).

NOTE 8—Field notebooks are useful for recording field data even when preprinted sample data forms are used.

11.2 At a minimum, the field collection report shall include the following information:

11.2.1 Project or client name, address, and city/state location,

11.2.2 General sampling site description,

11.2.3 The specific collection protocol used for each sample,

11.2.4 For each sample collected, an individual and unique sample identifier and date of collection, and

11.2.5 For each sample collected, the name of the person collecting the sample and the sampling location from which the sample was removed.

12. Keywords

12.1 coring; lead; sample collection; scooping; soil

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