Designation: ~~E1727 – 16~~ E1727 – 20

Standard Practice for Field Collection of Soil Samples for Subsequent Lead Determination[1]

This standard is issued under the fixed designation E1727; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

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

1.2 This practice ~~is~~may not be suitable for collection of soil samples from areas that are paved or otherwise covered with grass, mulch, or the like. See Guide E2115 or Practices E2271/E2271M or E3074/E3074M.

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~~ values given in parentheses ~~are for information only.~~after SI units are provided for information only and are not considered standard.

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~~ safety, health, and ~~health~~environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1356 Terminology Relating to Sampling and Analysis of Atmospheres
D4840 Guide for Sample Chain-of-Custody Procedures
D7659 Guide for Strategies for Surface Sampling of Metals and Metalloids for Worker Protection
E1605 Terminology Relating to Lead in Buildings
E1726 Practice for Preparation of Soil Samples by Hotplate Digestion for Subsequent Lead Analysis

[1] This practice is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.12 on Sampling and ~~Analysis,~~Analysis of ~~Lead,~~Lead for Exposure and Risk Assessment.

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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~~standard's Document Summary page on the ASTM website.

E1613E1979 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) TechniquesPractice for Ultrasonic Extraction of Paint, Dust, Soil, and Air Samples for Subsequent Determination of Lead
E2115 Guide for Conducting Lead Hazard Assessments of Dwellings and of Other Child-Occupied Facilities
E2239 Practice for Record Keeping and Record Preservation for Lead Hazard Activities
E2271/E2271M Practice for Clearance Examinations Following Lead Hazard Reduction Activities in Multifamily Dwellings
E3193 Test Method for Measurement of Lead (Pb) in Dust by Wipe, Paint, and Soil by Flame Atomic Absorption Spectrophotometry (FAAS)
E3203 Test Method for Determination of Lead in Dried Paint, Soil, and Wipe Samples by Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES)
E3074/E3074M Practice for Clearance Examinations Following Lead Hazard Reduction Activities in Single Family Dwellings, in Individual Units of Multifamily Dwellings, and in Other Child-Occupied Facilities

3. Terminology

3.1 *Definitions*—For definitions of terms not appearing here, see ~~Terminology~~Terminologies D1356 and E1605.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *soil collection ~~container~~—container, n—*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 subsample or 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 bare 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 (0.6 in.) of soil surface.

5.3 These samples are collected in a manner that will permit subsequent digestion using sample preparation techniques such as Practices E1726 or E1979 and determination of lead using laboratory analysis techniques such as Test ~~Method~~Methods ~~E1613~~E3193 or E3203.

6. Materials and Equipment

6.1 *Soil Coring Tool,* minimum diameter of 2.5 cm (1 in.), 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 (0.6 in.) from the far end of the coring tool. It is used to remove all except the top 1.5 cm (0.6 in.) of the soil core from the coring tool. The other plunger (without a stop) is used to remove the remaining 1.5 cm (0.6 in.) 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 *Containers, Sealable, Rigid Walled,* for use in scooping or in serving as soil collection containers, 50 mL.

6.2.1 Screw-top plastic centrifuge tubes are an example of a suitable resealable rigid-walled container.

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 *Cloths,* clean for use in cleaning sampling tools.

6.9 *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 pair of gloves,

7.2.3 Clean sampling equipment and measuring tapes frequently with cloths, clean 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 of samples from dense, hard, or sticky soils. Coring methods are not intended for collection of samples 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.

8.2 The following procedure is for collection of samples of bare 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 Clean the coring tool using cloths, clean water, or both, if needed.

8.2.3 Press or drive the coring tool into the bare soil to be sampled to a depth of approximately 5 cm (2 in.), rotate once or twice to cut the core, and remove. Check that the core is intact. If the core is not intact, discard it and repeat beginning at 8.2.2.

8.2.4 Using a clean plunger equipped with a stop that limits extension of the plunger to within 1.5 cm (0.6 in.) from the far end of the coring tool, push the bottom approximately 3.5 cm (1.3 in.) section of the core out of the tool.

8.2.5 Using a clean plunger (without stop), push the remaining 1.5 cm (0.6 in.) section of the core sample into a soil collection container.

8.2.6 Collect a minimum of two more bare soil cores within a 0.3 m (1 ft) diameter circle around the location where the first core was taken using the same procedure (8.2.5). Place each of these cores into the same soil collection container used for the first core.

8.2.6.1 If the soil collection container used is a plastic bag, place the bag containing the sample in an additional bag, that is, double-bag the sample.

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

8.2.8 Discard the gloves in the trash bag.

8.2.9 Don a pair of clean, powderless plastic gloves. Clean the coring tool and plungers using cloths, clean water, or both, until visibly clean. Discard the cloths 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 hard 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 soil samples using scoop sampling methods.

9.3 *Scoop Sampling Using a Rigid-Walled Container:*

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 container needed to collect approximately the top 1.5 cm (0.6 in.) of bare soil using a measuring tape (see Note 3).

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

9.3.3 Insert the open end of the container into the bare soil at the sampling location to the desired depth as determined in 9.3.2. Collect the soil into the container by pushing or pulling it through the soil surface while maintaining the burying depth in the soil. Move the container a distance of 10 cm to 20 cm ~~(4 to 8 in.)~~ (4 in. to 8 in.) across the soil surface to complete collection of the soil.

9.3.4 Remove the container from the ground and wipe off the outside of the container with a gloved finger. Place the sample into a soil collection container.

9.3.5 Collect a minimum of two more bare soil samples within a 0.3-m (1-ft) diameter circle around the location where the first scoop sample was taken using the same procedure (9.3.2 – 9.3.4). Place each of these scoop samples into the same soil collection container used for the first one.

9.3.5.1 If the soil collection container used is a plastic bag, place the bag containing the sample into an additional bag, that is, double-bag the sample.

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

9.3.7 Discard the gloves in the trash bag.