

# Appendix 13.3:

## Collecting Soil Samples for Lead Determination

### 1. Definitions

- A. *Bare soil* means soil or sand not covered by grass, sod, other live ground covers, wood chips, gravel, artificial turf, or similar covering.
- B. *Dripline/foundation area* means the area within 3 feet of the building wall surrounding the perimeter of a building.
- C. *Play area* means an area of frequent soil contact by children of less than 6 years of age as indicated by, but not limited to, such factors as the following: the presence of outdoor play equipment (e.g., sandboxes, swing sets, and sliding boards), toys, or other children's possessions, observations of play patterns, or information provided by parents, residents, care givers, or property owners.

### 2. Selecting Sampling Locations

#### A. Locations for composite samples.

Collect composite soil samples from bare soil in three locations, if bare soil is present in these locations: (1) play areas, (2) non-play areas in the dripline/foundation area, and (3) non-play areas in other parts of the yard. The number of samples to be collected depends on the size and characteristics of the property. See section II.G.3 of chapter 5 for recommendations.

#### B. Subsample locations.

The number of subsamples in a composite soil sample should be no more than ten. Generally, subsamples should be no closer to each other than 1 ft. (0.3 m) and no farther apart than 3 ft. (1.0 m), but exceptions to this general rule are not infrequent, due to wide variations in the pattern and extent of bare soil. The location and number of subsamples depends on the pattern and extent of bare soil in the area being sampled. In a relatively small contiguous area of, say, 10 sq. ft. (1.0 sq. m), a risk assessor might take one subsample from the center and one subsample from each of two different directions from the center for a total of three. If the area is larger, however, it would be reasonable to take more subsamples, more or less evenly spaced to represent the area. Or, if there is quite a bit of bare soil scattered in a linear pattern along the dripline/foundation area and extending all around the building, the risk assessor would most likely take 10 subsamples, more or less evenly spaced.

### 3. Alternative Collection Methods, General

Soil samples are collected with either a coring tool or a scooping technique. A coring tool is generally a tube of one-half to one inch in diameter that can be forced into the ground, with a plunger that, after the tube is removed from the ground, can push out all but the desired amount of soil. That which remains in the tube is then pushed out into a sample container. The coring method is the preferred method if soil characteristics allow, because it provides subsamples of uniform and reproducible size. It is not workable, however, if the soil is loose or sandy.

The scooping method employs a spoon or small scoop or centrifuge tube with which one collects a small amount of surface soil. Compared to the use of a coring tool, the scooping method may result in bias toward collecting greater amounts of soil close to the surface relative to below the surface because of the curvature of the scooping device. This method must be used, however, if the soil is loose or sandy, but extra care must be taken to assure that the subsamples are of uniform size.

Neither coring nor scooping may be feasible if the soil is frozen or very hard packed. In such cases efforts must be made to defrost or loosen the soil.

### 4. Equipment, Materials and Supplies

- A. *Coring tool.* There are several devices that may be used as a coring tool. Whatever is used, it must be strong enough to be pushed into the soil at hand, it should have a plunger to push out all soil in the tube but the desired sample and another plunger (or other mechanism) to push out the sample itself, and it must be cleanable. Coring tools often come with a "T" handle that can be attached to the tool or probe and used to push it into the ground, twisting if necessary to cut through roots or packed earth. A hammer attachment is also available on some coring tools to drive the probe into the ground. Professional coring tools come with disposable plastic liners. In soft soils, a disposable new plastic syringe at least one-half inch in diameter, with the end cut off, can be used for each composite sample.
- B. *Spoons, or plastic centrifuge tubes (50 mL), for scooping.*
- C. *Non-sterilized, non-powdered, disposable gloves.* Gloves should be non-powdered, because powder may contaminate the sample.
- D. *Wipes.* Wet wipes, such as baby wipes, with insignificant background levels of lead should be used to clean sampling equipment.
- E. *Plastic zip-type resealable bags that do not leak,* for soil sample containers. The bags should be between 1 quart to 1 gallon (or 1 to 4 liters), depending on amount of soil in the sample. Plastic centrifuge tubes with tight fitting caps may also be used as sample containers.
- F. *Measuring tape or ruler* (cleanable, and of adequate length to determine subsample locations).
- G. *Permanent ink marker.*
- H. *Pre-printed labels.*
- I. *Sample collection form.*
- J. *Laboratory submittal form.* This should be provided by the laboratory. Most laboratory submittal forms are also requests for analysis (an agreement between the submitter and the laboratory) and constitute a chain of custody record.
- K. *Trash bags or other receptacle* (do not use pockets or trash containers at the residence).
- L. *Site plan sketch* on which to indicate location of samples.

## 5. Core Sampling Procedure for Collecting a Composite Soil Sample

- A. Decide where the composite sample will be taken and identify the location on the site plan sketch.
- B. Decide where subsamples will be collected and mark the approximate locations.
- C. Don a new pair of clean, disposable, non-powdered gloves. A new pair of gloves should be put on before collecting each composite sample.
- D. Select a soil sample container (a plastic zip-type resealable bag, a centrifuge tube with a tightly fitting cap, or similar container) and affix a label with a pre-printed sample number on the container, or write the number on the container with the permanent ink marker. The date of sample collection should also be on the sample container. Write the sample number on the site plan sketch next to the location of the composite sample.
- E. Clean the coring tool, the plungers, and the end of the measuring tape if they have not been cleaned since the last sample collection. Clean with wet wipes.
- F. Check that one plunger of the coring tool is set correctly with a stop to remove all soil from the core except a sample from the top 1/2 inch (1.3 cm) of surface soil. Another plunger, without a stop, should be available to remove the sample.
- G. Drive the coring tool into the soil surface to a depth of approximately 2 inches (5 cm). No special effort should be made to collect visible paint chips. If paint chips are present, they should not be avoided and should be included in the sample. When sampling play areas, avoid including grass, twigs, stones, and other debris in the sample.
- H. Twist and remove the coring tool from the soil, retaining the soil in the tool.
- I. Using the plunger with the stop, push out all the soil except the top 1/2 inch (1.3 cm). Wipe off any excess soil from the probe, using a gloved finger.
- J. Using the plunger without the stop, push the soil sample out of the core into the labeled soil sample container.
- K. Collect the other subsamples, using steps "F" through "J," depositing all the subsamples into the same container.
- L. Tightly close the container, using the zip-type resealable bag or twist-cap as applicable.
- M. Check to make sure the container is correctly labeled and that the sample number appears correctly on the site plan sketch.
- N. Don a new pair of clean, disposable, non-powdered gloves and clean the coring tool and plungers with wet wipes. Discard the wipes and gloves in the trash bag for proper disposal away from the site.

## 6. Scooping Procedure for Collecting a Composite Soil Sample

### A. Scoop sampling using a spoon:

1. Don a new pair of clean, disposable, non-powdered gloves.
2. Select a soil sample container (a plastic zip-type resealable bag, a centrifuge tube with a tightly fitting cap, or similar container) and affix a label with a pre-printed sample number on the container, or write the number on the container with the permanent ink marker. The date of sample collection should also be on the sample container. Write the sample number on the site plan sketch next to the location of the composite sample.
3. Clean the spoon, if it hasn't been cleaned since the last composite sampling. Use wet wipes to clean.
4. Using the clean spoon and the measuring tape, dig a small test hole near the subsample location to a depth of 1/2 inches (1.3 cm). Use this hole as a visual aid in collecting subsamples to the correct depth of 1/2 inches (1.3 cm).
5. Collect soil into the sample container by scooping soil out of a hole 1/2 inches (1.3 cm) deep and approximately 2 inches (5 cm) in diameter.
6. Collect all subsamples in like manner, compositing all subsamples into the same container.
7. Tightly close the soil sample container, using the zip-type resealable bag or twist-cap as applicable.
8. Check to make sure the container is correctly labeled and that the sample number appears correctly on the site plan sketch.
9. Don a new pair of clean, disposable, non-powdered gloves and clean the spoon with wet wipes. Collect the wipes and gloves in the trash bag for proper disposal away from the site.

### B. Scoop sampling using a plastic centrifuge tube:

1. Don a new pair of clean, disposable, non-powdered gloves.
2. Select a soil sample container (a plastic zip-type resealable bag, a centrifuge tube with a tightly fitting cap, or similar container) and affix a label with a pre-printed sample number on the container, or write the number on the container with the permanent ink marker. The date of sample collection should also be on the sample container. Write the sample number on the site plan sketch next to the location of the composite sample.
3. Using the measuring tape and an unlabeled closed centrifuge tube, determine how deep to place the tube on its side in order to collect a sample that includes soil at a depth of 1/2 inches (1.3 cm). Mark the sides of the tube when it is at the correct depth. This centrifuge tube is the collection tube for the composite sample.
4. Remove the cap of the collection tube and insert its open end into the soil at the location of the subsample to the desired depth, as indicated by the mark on the side of the tube. Push or pull the tube through the soil, maintaining the desired depth, for approximately 4 to 5 inches (10 to 13 cm).

5. Remove the collection tube from the soil and pour the soil subsample into the labeled soil sample container. Alternatively, use the tube as the subsample container. Most laboratories accept a number of subsamples in tubes that they then composite into the sample that is prepared for extraction and analysis.
6. Using the collection tube, collect other subsamples, following steps 4 and 5.
7. Tightly close the soil sample container, using the zip-type resealable bag or twist-cap as applicable.
8. Check to make sure the container is correctly labeled and that the sample number appears correctly on the site plan sketch.

## 7. Reporting and Laboratory Submittal

- A. Complete the sample collection form, such as Form 5.5, in chapter 5. The form should include the client name and address, an explanation of the sample collection method used, an individual and unique sample number and date of collection for each composite sample, and the name of the person who collected each sample.
- B. Attach the site plan sketch to the sample collection form.
- C. Complete the laboratory submittal form, making sure that the sample numbers match those on the sample containers.
- D. Submit the samples with the laboratory submittal form.

## 8. Additional Information

Additional information on soil sampling methods can be found in E1727 Standard Practice for Field Collection of Soil Samples for Subsequent Lead Determination (<http://www.astm.org/Standards/E1727.htm>), and in the EPA report, *Residential Sampling for Lead: Protocols for Dust and Soil Sampling*, March 1995 (EPA 747-R-95-001) available from the National Lead Information Center (<http://www.epa.gov/lead/pubs/nlicdocs.htm>; document number 440) or EPA's National Environmental Publication Information System (<http://nepis.epa.gov>) at <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20012QUZ.txt>. [Accessed 7/28/2012; these sites may be moved or deleted later.]