

Appendix 13.1:

Wipe Sampling of Settled Dust for Lead Determination

Wipe samples for settled leaded dust can be collected from floors (both carpeted and uncarpeted), interior window sills, window troughs and other similar surfaces.

1. Wipe Sampling Materials and Supplies

- A. **Disposable, moistened towelettes or baby wipes.** Wipe material should meet the performance criteria found in ASTM E 1792, "Standard Specification for Wipe Sampling Materials for Lead in Surface Dust," or equivalent, as required by 40 CFR 745.63.
- B. **Non-sterilized, non-powdered disposable gloves.** Disposable gloves are required to prevent cross-sample contamination from hands. Use non-powdered gloves to preclude contamination of the wipe surface with powder from the gloves.
- C. **Hard-shell, non-sterilized resealable containers.** Use containers (such as screw-top, plastic centrifuge tubes), for storage and transporting wipe samples (interior must be capable of being rinsed in the laboratory to recover all the lead on the sample). Do not use plastic baggies to transport or temporarily hold wipe samples unless the laboratory agrees to accept samples in them beforehand.
- D. **Dust sample collection forms contained in these *Guidelines* or equivalent.** (See Forms 5.4 and 15.2.)
- E. **Masking tape, at least one inch wide, to demarcate wipe areas and/or to tape down templates.** Tape is required when templates are not available for a given wipe area, especially for narrow, confined areas, such as interior window sills and window troughs.
- F. **Labels for resealable containers and permanent marker.**
- G. **Trash bags or other receptacles (do not use trash containers at the residence).**
- H. **Measuring ruler or tape.** The measuring tool should be cleanable and capable of measuring to the nearest 1/16-inch or 1 mm.
- I. **Templates (optional).** Hard, smooth and cleanable, rectangular or square templates are recommended as a method of defining the area to be wiped on floors. (Masking tape is usually a more practical method for defining the wipe area on narrow interior window sills and window troughs.) Use either non-reusable laminated paper or cardboard, or reusable metal or plastic. Non-reusable, disposable templates are permitted so long as they are not used for more than a single surface. Templates help to assure an accurate measurement of the wipe area, can save time, and, for composite samples, help to assure uniformity of subsample areas. Templates must be larger than 0.1 sq. ft. (approximately 4 in. x 4 in. or 10 cm x 10 cm), but smaller than 2 sq. ft. (approximately 17 in. x 17 in. or 40 cm x 40 cm). Templates for floors are typically 1 sq. ft. or 900 sq. cm which is large enough to provide sufficient dust for analysis. Templates are usually not used for windows due to the variability in size and shape (use masking tape instead).

- J. **Rack, bag, or box to carry tubes (optional).**
- K. **Disposable shoe coverings (optional).** Wearing disposable shoe covers when walking from one sampling site (e.g., a building) to another helps minimize transfer of dust. Shoe covers should not be worn in vehicles. Never walk on the surface to be wiped.
- L. **Still or Video Camera (film, digital, or web) to record exact locations as well as sampling methods (optional).**

2. Single Surface Wipe Sampling Procedure

A. Outline the sample area.

1. The area to be sampled (i.e., the area to be wiped) must be a rectangle or square with measurable dimensions, so the area can be easily calculated.
2. If there is no visible dust on the surface, it is recommended that the wipe area be at least 1 sq. ft. (approximately 900 sq. cm) to obtain enough dust for analysis. If this amount of area is not available on an interior window sill or trough, make the wipe area as large as possible.

The size of the area wiped must be at least 0.1 sq. ft. (approximately 4 in. x 4 in. or 10 cm x 10 cm) in order to obtain an adequate limit of quantitation. This is because 20 µg/wipe is a typical reporting limit of laboratories using routine analytical methods, and 20 µg/0.10 square feet = 200 µg/ft², which is close to the EPA-HUD clearance criterion for interior window sills.

3. For floors and other large flat surfaces: Identify the sample area (the area to be wiped). The sample area for floor samples should be about 1 square foot (or approximately 900 sq. cm). Do not walk on or touch the sample area. It is recommended that reusable or disposable templates be used to define sample areas on large flat areas such as floors. If using a reusable template, clean it before use with one or more new wipes. Carefully place the clean template on the sample area and, to keep it from moving while wiping, tape the outside edges to the floor or weight down the template. Minimize disturbance of dust in the sample area.

If a template is not available, apply masking tape at least 1/2 inches wide to the perimeter of the sample area to form a square or rectangle. No measurement is required at this time. The tape should be positioned in a straight line and corners should be nominally at right angles.

4. For interior window sills, window troughs, and other narrow or confined rectangular surfaces: Identify the area to be wiped. If there is only one window in the room, select only half of a sill or trough, leaving the other half for a side-by-side sample if needed. Do not touch the area to be sampled. Apply two strips of adhesive tape across the sill to define a wipe area at least 0.1 square foot in size (approx. 4 inches x 4 inches or 10 cm x 10 cm), larger if possible. Templates are not recommended for window sills or troughs.

B. Inspect disposable wipes.

Inspect the wipes to determine if they are moist. If they have dried out, do not use them. When using a container that dispenses wipes through a “pop-up” lid, the first three wipes in the dispenser at the beginning of the day should be thrown away. The first wipes may be contaminated by the lid and are likely to have dried to some extent. Rotate the container before starting to ensure liquid inside the container contacts the wipes.

C. Prepare resealable containers.

Examine the hard-shell, resealable containers and make sure that they match the containers used for blind spiked wipe samples, if such samples are to be submitted to the laboratory. Partially unscrew the cap on an unused container to be sure that it can be opened.

D. Don gloves.

Don a new pair of disposable gloves. Use new gloves for each sample collected. It is not necessary to wipe gloved hands before sampling. Some people who are experienced in wipe sampling prefer to operate with just one gloved hand; some prefer a two-handed method. The single-gloved method is acceptable provided the ungloved hand does not touch the gloved hand, the wipe, the face of the template or tape that demarcates the wipe area, or the surface area to be wiped.

E. Sample floors and other large surfaces.

- ◆ Place container of wipes in the sample area.
- ◆ Select a wipe from its package and inspect it to make sure it is moist, clean, and free of fungus or other material. If it is acceptable, place the wipe at one corner of the area to be sampled with the wipe fully opened and flat on the surface.
- ◆ Make the first wipe pass, side-to-side.
- ◆ With the fingers together, grasp the wipe between the thumb and the palm. Press down firmly, but not excessively with the fingers and, if the wipe is large enough, the palm. If the sample area is a square or nearly a square, as should be the case with floor sampling, proceed to wipe side-to-side with as many “S”-like motions as are necessary to completely cover the entire sample area. (See Step 2F, below, for narrow, rectangular areas.) Exerting excessive pressure on the wipe will cause it to curl. Exerting too little pressure will result in poor collection of dust. Do not use only the fingertips to hold down the wipe, because there will not be complete contact with the surface and some dust may be missed. Attempt to pick up all dust from the sample area.
- ◆ Do not cross the template or the tape, but be sure to wipe the entire sample area. It is permissible to touch the template or tape with the wipe, but not the surface beyond.
- ◆ Make the second wipe pass, top-to-bottom.

- ◆ Fold the wipe in half with the contaminated side facing inward. (You may straighten the wipe by laying it on the sample area, contaminated side up, and folding it over.) Take care not to spill dust when folding. Once folded, place the wipe in the top corner of the sample area and press down firmly with the fingers (and the palm if the folded wipe is large enough). Repeat wiping the area with "S"-like or "Z"-like motions, but on the second pass, move in a top-to-bottom direction. Attempt to pick up all dust. Do not touch the contaminated side of the wipe with the hand or fingers. Do not shake the wipe in an attempt to straighten it out, since dust may be lost during shaking.
- ◆ Make the third wipe pass around the perimeter of the sampled area.
- ◆ Fold the wipe in half again with the dust collection side inward and repeat the wiping motion, pressing with the fingers and concentrating on collecting any remaining dust in the corners of the wipe area. If any visible dust remains, use a second wipe to collect the remaining dust, and clearly note the need to composite the wipes for analysis.
- ◆ Include spike samples in accordance with your quality assurance plan.

F. Sample interior window sills, window troughs, and other narrow rectangular areas.

If the surface is a narrow rectangle, two side-to-side passes must be made over the sample area, the second pass with the wipe folded so that the contaminated side faces inward. For an interior window sill or window trough, do not attempt to wipe the irregular edges presented by the contour of the window trough or the rounded inside edge of the interior sill. Avoid touching other portions of the window with the wipe. If there are paint chips or gross debris in the window trough, attempt to include as much of it as possible on the wipe. If it is apparent that all of the material cannot be picked up with one wipe, consider sampling only a part of the surface. Alternatively, field personnel may use a second wipe and insert it in the same container, but it is necessary first to consult with the analytical laboratory to determine if they can perform analysis of two wipes as a single sample. When performing single-surface sampling, do not use more than two single-surface wipes for each container. If heavily dust-laden, the wipe area should be smaller than if there is little or no visible dust.

G. Package the wipe sample.

After collecting as much dust as possible with the wipe, fold the wipe with the contaminated side facing inward again, and insert aseptically (without touching anything else) into the centrifuge tube or other hard-shelled container. If gross debris is present, such as paint chips in a window well, make every attempt to include as much of the debris as possible in the wipe.

H. Label the container.

Seal the centrifuge tube (or other equivalent rigid walled container) and label with the appropriate identifier. Record the laboratory submittal sample number on the field sampling form (see chapters 5 and 15). To avoid confusion, it is recommended that there be only one identifier for both the field and the laboratory.

I. Measure and record dimensions of wipe area.

After the sampling of an area has been completed, measure the dimensions of the surface area wiped to the nearest eighth of an inch using a tape measure or a ruler. Record specific measurements for each area wiped on the field sampling form. Do not estimate the surface area; measure it.

J. Prepare field blank.

Don new gloves. After collecting the last wipe sample in a dwelling unit (or in common areas within a building) but before decontamination (see Step 4, below), prepare a field blank sample. Remove a wipe from the package with a new glove, shake the wipe open, refold it in a manner similar to that used during the actual wipe sampling procedure, and then insert it into a centrifuge tube (or equivalent container used for the wipe samples) without touching any other surface or object. One blank wipe is collected for each dwelling unit or set of common areas sampled or, if more than one dwelling unit is sampled per day, one blank for every 20 field samples, whichever is less. Also, collect one blank for every lot of wipes used. Record the lot number, if available.

Analysis of the field blanks determines if the sample media is contaminated. Each field blank should be labeled with a unique identifier similar to the wipe samples so that the laboratory does not know which sample is the blank (i.e., the laboratory should be “blind” to the blank sample). A laboratory blank may also be submitted if the laboratory requests such a blank sample.

K. Complete form.

Fill out the appropriate field sampling forms (see form 5.4 or form 15.2 in these *Guidelines*) completely. Collect and maintain any field notes regarding type of wipe used, specific surface areas wiped, lot number, collection protocol, etc.

L. Dispose of Trash.

After sampling, remove all masking tape and put it in a trash bag. Before removing the last pair of disposable gloves, put all other contaminated gloves and other sampling debris used for the sampling period into a trash bag. Then remove the last pair of gloves and put them in the trash bag. Remove the trash bag when leaving the dwelling. Do not throw away gloves, wipes, etc. inside the dwelling unit where they could be accessible to young children. Besides being lead-contaminated, the plastic bag and gloves may be a suffocation hazard.

3. Composite Wipe Sampling

Whenever composite sampling is contemplated, consult with the analytical laboratory to determine if the laboratory is capable of analyzing composite samples and, if so, what wipes should be used and what annotation they add to analysis reports of composite samples. NLLAP accredited labs are required to note on the report that composite wipe analyses are not covered by their accreditation. This may cause problems with the admissibility of the data in any subsequent legal action. When conducting composite wipe sampling, the procedure stated above should be used with the following modifications:

- A. When outlining the sample areas (step 2.a, above), set up all of these areas before sampling. For each component type (i.e., floor, sill or trough), the size of the subsample areas should be equivalent, so that one room is not over-sampled.
- B. After preparing the centrifuge tube, complete the wiping procedure for each subsample (steps 2.d – 2.g, above). A separate wipe must be used for each subsample area sampled. After wiping each subsample area, carefully insert the wipe sample into the same centrifuge tube (no more than 4 wipes per tube).
- C. Once all subsamples are in the tube, label the tube. Record a separate measurement for each area that is subsampled on the field collection form (see form 5.4a or form 14.2a for a sample form). Finally, complete trash collection and disposal (step 2.p, above), making sure that no masking tape or other debris is left behind.

In addition to these procedural modifications, only composite samples from similar components. The following rules for compositing should be observed:

- ✦ Composite samples from carpeted and hard surfaces separately (e.g., a single composite sample should not be collected from both carpeted and bare floors).
- ✦ Composite samples from each different component separately (e.g., bare floors go with bare floors, carpeted floors go with carpeted floors, troughs go with troughs, etc.).
- ✦ Composite samples within a single dwelling and for from common areas within a single building.

4. Decontamination

After sampling, wash hands thoroughly with plenty of soap and water before getting into car. A bathroom in the dwelling unit may be used for this purpose, with the owner's or resident's permission. If there is no running water in the dwelling unit, wet wipes may be used to clean hands. Tools, such as reusable templates and measuring devices, should be wiped clean. During sampling, inspectors must not eat, drink, smoke, or otherwise cause hand-to-mouth contact.

5. Spiked Samples

Unless required, it is not necessary to submit spiked samples in normal practice, because laboratories certified under the National Lead Laboratory Accreditation Program (NLLAP) must participate in a proficiency testing program. However, if additional confidence in the laboratory's reliability is desired, samples spiked with a known amount of leaded dust may be inserted into the sample stream randomly by the person conducting field sampling to determine if there is adequate quality control of the digestion process at the laboratory. Dust-spiked wipe samples should be submitted blindly to the laboratory at the rate of no less than one for every fifty field samples. Any laboratory can spike wipes. The laboratory performing the analysis of the field samples can also prepare the spike sample as long as the person performing the field sampling makes the spike sample indistinguishable from the field samples. The person conducting the field sampling should take the spike sample prepared in the laboratory and re-label the container with an identifier similar to the other field samples. The spike sample wipe should not be put into another container. Spike samples should be made using the same lot as that used in the field, if convenient. You should consider preparing field spikes in addition to the spikes that are part of the laboratory quality assurance protocol.

6. Quality Assurance/Quality Control

A. Blank Samples

If more than 5 µg/wipe is detected for a blank sample collected in a specific housing development, discuss the situation with the laboratory before deciding whether to resample the site. Blank correction of wipe samples is not recommended.

B. Spiked Samples

Blind analysis of spiked samples must fall within 80 and 120 percent of the true value. If the laboratory fails to obtain readings within the QA/QC error limits:

1. Two more spikes should be sent immediately to the lab for analysis.
2. If the two additional spike samples fail, the analyses of all samples in the batch associated with the spike should be considered invalid.

A full review of laboratory procedures may be necessary. Additional samples may need to be collected from the dwelling units from locations equivalent to the locations previously sampled.

7. Other Information and Standards

See chapter 5 and chapter 15 for additional information on dust wipe sampling in practice. Additional standards for wipe sampling can be found by consulting:

- ♦ ASTM E 1728, "Standard Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination," (<http://www.astm.org/Standards/E1728.htm>);
- ♦ ASTM E 1792, "Standard Specification of Wipe Sampling Materials for Lead in Surface Dust," (<http://www.astm.org/Standards/E1792.htm>); and
- ♦ the EPA report, "Residential Sampling for Lead: Protocols for Dust and Soil Sampling," March 1995, (EPA 747-R-95-001), which is 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>).

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