Designation: E 1728 – 99

# Standard Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques[1]

This standard is issued under the fixed designation E 1728; 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 settled dusts on hard surfaces using a wipe sampling method. 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), Flame Atomic Absorption Spectrometry (FAAS), and Graphite Furnace Atomic Absorption Spectrometry (GFAAS).

1.2 This practice is used to collect samples for subsequent determination of lead on a loading basis (micrograms of lead per area sampled). This practice cannot be used to collect samples for subsequent determination of lead on a concentration basis (micrograms of lead per gram of settled dust collected).

1.3 This practice is not intended for collection of settled dust samples from rough or porous surfaces such as upholstery and carpeting.

1.4 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.

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

1.6 The values stated in SI units are to be regarded as the standard.

1.7 *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 *batch*—a group of field or quality control (QC) samples that are collected or processed together at the same site using the same reagents and equipment.

2.1.2 *field blank*—a wipe that is exposed to the same handling as field samples except that no sample is collected (no surface is actually wiped). Analysis results from field blanks provide information on the analyte background level in the wipe combined with the potential contamination experienced by samples collected within the batch resulting from handling.

2.1.3 *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.

2.1.4 *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.

2.1.5 *wipe*—disposable towelettes moistened with a wetting agent (see 2.1.5.1 and 2.1.5.2). These towelettes are used to collect the sample and to clean sampling equipment. Wipe brands or sources selected for use shall not contain significant background lead levels (see 2.1.5.1). Wipe brands or sources selected for use shall be of adequate width and thickness to perform the collection procedure (see 2.1.5.2).

2.1.5.1 *Discussion 1*— Laboratory analysis on replicate blank wipes should be used to determine background lead levels prior to use in the field. Brands of wipes that contain aloe should be avoided due to increased potential of significant background lead in these wipes. Background lead levels less than 5 µg per wipe are considered insignificant for most investigative purposes.

2.1.5.2 *Discussion 2*— A thin wipe having dimensions of approximately 15 by 15 cm is recommended. Use of multiple or extra-thick wipes can cause problems with laboratory analysis activities. Use of wipes with smaller dimensions may not be capable of holding settled dust contained within the sampling area.

2.1.6 *wipe sampling kit*—a sealable rigid walled container with 50 mL minimum volume (see discussion below) and a separate container of clean uncontaminated wipes for use in collecting samples. One container of bulk packed wipes is typically used for collection of multiple samples.

2.1.6.1 *Discussion*—Use of a resealable plastic bag for holding and transporting the settled dust wipe sample is not recommended due to the potential losses of settled dust within

[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.

Current edition approved Dec. 10, 1999. Published March 2000. Originally published as ES 30 – 94. Last previous edition E 1728 – 95.

the plastic bag during laboratory handling. Quantitative removal and processing of the settled dust wipe sample by the laboratory is significantly improved through the use of sealable rigid walled containers.

## 3. Summary of Practice

3.1 Wipe samples of settled dust are collected on hard surfaces from areas of known dimensions with moistened disposable towelettes using a specified pattern of wiping.

## 4. Significance and Use

4.1 This practice is intended for the collection of settled dust samples in and around buildings and related structures for the subsequent determination of lead loading (micrograms of lead per area sampled) such as described in the HUD Guidelines.[2] This practice may also be used to collect settled dust samples from other environments for lead analysis.

4.2 Use of different pressures applied to the sampled surface along with use of different wiping patterns contribute to collection variability. Thus, the sampling results can vary between operators performing collection from identical surfaces as a result of collection variables. Collection for any group of sampling locations at a given sampling site is best when limited to a single operator.

4.3 This practice is limited to collection of settled dust samples from hard, relatively smooth nonporous surfaces. This practice is not intended for collecting settled dust samples from surfaces with substantial texture such as rough concrete, brickwork, textured ceilings, and soft fibrous surfaces such as upholstery and carpeting, to name a few.

## 5. Apparatus and Materials

5.1 *Sampling Templates*—A 30 by 30 cm (approximately 1 $ft^2$) reusable aluminum or plastic, or disposable cardboard or plastic template, (full-square, rectangular, square "Ushaped," rectangular "U-shaped," and "L-shaped") or alternative area that have accurately known dimensions (see Notes 1 and 2).

NOTE 1—It is recommended to collect settled dust from a minimum of a 10 by 10 cm area[3] to provide sufficient material for laboratory analysis. Use of templates or collection areas larger than 30 by 30 cm may be appropriate for surfaces that have little or no visible settled dust. A smaller sampling area (for example, 10 by 10 cm) is desired for surfaces with high levels of visible settled dust.

NOTE 2—Templates should be thin (less than 3 mm), and be capable of lying flat on a flat surface.

5.2 *Wipes*—See 2.1.5 for definition.

5.3 *Resealable Rigid Walled Containers*, 50-mL minimum volume. Screw-top plastic centrifuge tubes are an example of a suitable rigid walled container.

5.4 *Steel or Plastic Measuring Tape*.

5.5 *Plastic Gloves*, powderless.

5.6 *Disposable Shoe Covers*, optional.

## 6. Procedure

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

NOTE 3—Lead contamination problems during field sampling can be severe and affect settled dust analysis results. Contamination can be minimized through adherence to the following recommendations:

(*1*) Change gloves frequently. Collection of each new sample must be conducted with a new pair of gloves. Powderless gloves are recommended to minimize contamination of the collected settled dust from powders used in "powdered" gloves.

(*2*) Clean sampling equipment and measuring tapes frequently with wipes or water.

(*3*) Do not open sampling kits (rigid walled containers and bulk packed wipes) until just prior to use.

(*4*) Use of disposable shoe covers between different buildings and removal of them prior to entering vehicles can be helpful to minimize inadvertent transfer of settled dust from one location to another.

6.2 At the beginning of a sampling period (or if a new bulk-packed container of wipes is opened), remove a minimum of the top three wipes from the container (wipe off gloved fingers with each wipe as they are removed). Use succeeding wipes from the container for sample collection (see Note 4).

NOTE 4—This procedure will minimize the risk of inadvertent contamination from dust settling into the wipe container and eliminate the potential inadvertent use of partially dried out wipes.

6.3 Use one of the following two procedures for collecting settled dust samples from each sampling location. For wide flat locations, use the template-assisted sampling procedure. For small locations (for example, a window sill or door jamb), use the confined-area sampling procedure.

6.4 Collect field blanks at a frequency of 5 % (or 1 for every 20 field samples collected). The minimum number of field blanks to collect for each batch of wipes used (each new sampling kit opened) is three. Designate the first wipe (after removal of a minimum of three wipes, see 6.2) and the last wipe as a field blank. In addition, designate a field blank during the course of collection at a given site (that is, from the middle of the wipes used to collect settled dust samples). Identify these field blanks in a manner that correlates them with the samples collected using the same batch of wipes at the same site. Utilization of a previously used batch of wipes at a new sampling site shall be conducted in the same manner as a new batch of wipes (that is, sample collection at each sampling site must include a minimum of three field blanks).

6.4.1 *Template-Assisted Sampling Procedure*:

6.4.1.1 Carefully place a clean template on the surface in a manner that minimizes disturbance of settled dust at the location. Either tape or place a heavy object on the outside edge of the template to prevent the template from moving during sample collection.

6.4.1.2 Using an open flat hand with the fingers together, wipe the selected surface area, side to side, in a overlapping "S" pattern while applying pressure to the finger tips (see Fig. 1). Wipe so that the entire selected surface area is covered (see Notes 3-5).

NOTE 5—Perform the wiping procedure using the fingers, not the palm of the hand.

6.4.1.3 Fold the wipe in half with the sample side folded in

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

[3] Eller, P. M. and Cassinelli, M.E., eds., *NIOSH Manual of Analytic al Methods*, 4th ed., Method No. 9100, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Cincinnati, OH, 1994.