

ASBESTOS SAMPLING BULLETIN
September 30, 1994

Supplementary Guidance on Bulk Sample Collection and Analysis
U.S. EPA, OPPT/CMD (7404)

I. Introduction

Recent Notices in the Federal Register (59 FR 542, Jan. 5, 1994; and (59 FR 38970, Aug. 1, 1994), announced clarifications regarding the analysis of bulk samples obtained from multi-layered systems to determine the presence of asbestos. As part of a public outreach effort, the Environmental Protection Agency (EPA) developed this supplemental guidance bulletin. The public should take note that the contents are presented as guidance. This guidance does not change current regulatory requirements of the 1987 Asbestos in Schools Rule (AHERA). Local education agencies (LEAs) may choose to adopt the recommended guidance as a matter of policy offering added precaution and protection for workers and building occupants, and also to avoid the possibility of non-compliance with EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations.

This bulletin was developed by EPA primarily for two reasons:

- 1) to provide guidance regarding the adoption and use of an improved method for the analysis of asbestos in bulk samples ("Test Method -- Method for the Determination of Asbestos in Bulk Building Materials," EPA/600/R-93/116, July 1993). The improved method is especially useful for detecting the presence of asbestos in asbestos-containing floor tiles, but it also provides better analytical results in building materials that may contain asbestos at low concentrations.

- 2) to clarify EPA's guidance and requirements for the collection and analysis of bulk samples of multi-layered materials, particularly in schools. EPA recommends that multi-layered samples that have been found to be non-asbestos-containing for the EPA "Asbestos in Schools Rule" (AHERA) be resampled before disturbing them, unless lab reports are available documenting that all layers were previously sampled and analyzed. Resampling (if elected) should be done according to the guidelines set forth previously in a January 5, 1994 NESHAP Federal Register Notice, an Aug. 1, 1994 AHERA Federal Register Notice, and in the improved analytical method to avoid potential violation of the asbestos NESHAP regulations.

Note that under the AHERA and NESHAP regulations, LEAs can assume that certain materials are asbestos-containing and manage them as such. This continues to be an acceptable alternative to sampling or resampling.

Both EPA's AHERA program for schools and the EPA asbestos NESHAP program recommend the adoption of the improved bulk sample analysis method published by EPA's Office of Research and Development in July 1993 (EPA/600/R-93/116). EPA developed the improved analytical method to address certain materials:

- that are known to contain asbestos fibers, but in which the asbestos percentage is "low" (< 10%);

- where the presence of asbestos is obscured by a matrix binder of some kind (e.g., vinyl or asphalt floor tiles);

- in which small, thin fibers are present, but are frequently not detected at the magnification and resolution limits of polarizing light microscopes.

The improved method builds on the previous (1982) "Interim" polarizing light microscope (PLM) method. As before, it begins with a careful examination of the sample using a stereo-microscope, then proceeds

(as before) to the examination of sample specimens under a polarizing light microscope. In most cases, these steps will be sufficient to characterize a sample as asbestos-containing (asbestos present > 1%) or non-asbestos-containing (no asbestos detected, or 1% or less in the sample).

The improved method includes additional procedures required for the reliable analysis of certain bulk building materials, such as steps for the elimination of the obscuring matrix materials (quantitative analysis of the sample is improved by the use of comparative standard samples having known quantities of asbestos matrix materials), as well as specifying use of transmission electron microscopy (TEM). These additional steps comprise the chief improvements in the new method. The Agency believes that adoption of the improved method should remedy the analytical problems frequently encountered when testing materials such as resilient floor tile (vinyl or asphalt), mastic, and "layered" building materials using the 1982 "Interim" PLM method.

Finally, the results obtained from following recent guidance on "layered samples" and use of the improved sampling procedures for certain problem materials should, where it is possible to do so, facilitate following EPA's "manage in place" guidance for asbestos operations and maintenance (O&M) programs, (EPA "Green Book," July 1990).

II. Issues of Concern

There are two principal issues addressed in this guidance.

Issue 1. The possible misidentification of certain "problem" materials as non-asbestos-containing, with subsequent failure to include them under a surveillance and O&M program. These "problem materials" include asbestos-containing floor tiles, and certain multi-layered building materials.

The 1982 EPA "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (40 CFR 763, Appendix A to Subpart F) was limited in that it did not provide guidance for analyzing materials that contain thin (i.e., <0.25 micrometer) asbestos fibers. As a consequence, floor tiles analyzed according to the 1982 method and for which negative results were reported may actually contain undetected asbestos in the form of thin fibers below the limits of resolution of the polarized light microscope.

The improved method provides acceptable procedures for reducing matrix materials so that fibers may be made available for microscopic analysis. It also addresses the thin fiber limitation of the 1982 method by providing directions for the use of transmission electron microscopy (TEM) as needed.

The improved method also directs laboratories to analyze the individual layers or strata of a multi-layered sample and to report a single result for each layer. The 1982 "Interim Method," in contrast, provided that the analytical result for a multi-layered sample with discrete layers be reported as one result across all layers. (Although the analyst was directed to identify the presence of discrete layers as seen under stereo-microscopic examination of the bulk sample, and to identify and quantify asbestos fiber content in each layer.) Because the 1982 method allowed the result to be reported as one number, multi-layered samples which may have contained asbestos in a single layer may have been reported by laboratories as non-asbestos-containing.

Thus, under the recommended improved test method, more than one result will be reported for multi-layered samples, and a multi-layered sample which previously was determined to be non-asbestos-containing may actually have layers which will be classified as asbestos-containing based on the presence of asbestos in greater than one percent. The January 5, 1994 NESHAP notice in the Federal Register directs the attention of the regulated community to their requirement to analyze multi-layered samples in this manner for compliance with NESHAP.

The recognition, sampling, and analysis of "layered" building materials may be of particular importance when known or assumed asbestos-containing building materials (ACBM) are left in place. AHERA requires the management of known or assumed ACBM under a school's asbestos operations and maintenance program. EPA issued guidance in July, 1990 ("Managing Asbestos in Place," the "green book") that recommends similar programs in any building or facility where asbestos-containing materials (ACM) are present.

For example, if a planned renovation or remodeling is scheduled, and if the outer surface (i.e., the surface exposed to the room's interior) of a wall or ceiling system is an asbestos-containing layer, that fact should be known prior to some disturbance such as sanding in preparation for painting. Similarly, if an underlying layer of a wall or ceiling system is going to be disturbed (e.g., making a penetration to install light fixtures or heating/cooling ducts), that fact should be known before a service or maintenance worker cuts or drills into the wall or ceiling, and should affect how that work is performed. (See the 1992 guidance manual, "Asbestos Operations & Maintenance Work Practices," published by the National Institute of Building Sciences.)

Issue 2. Possible (unknowing) violations of the asbestos NESHAP by LEAs.

EPA's asbestos NESHAP program has also made "applicability determinations" regarding plaster/stucco or skim coat layers applied over wallboard systems. As stated above, the EPA Asbestos NESHAP position was summarized in a notice of clarification recently published in the Federal Register (January 5, 1994). That notice in the Federal Register directs the attention of the regulated community to the NESHAP requirement to analyze multi-layered samples and report results for discrete layers.

Schools operating under the requirements of AHERA have been, and continue to be, subject to EPA's asbestos NESHAP compliance requirements, when involved in renovation or demolition activities where RACM (regulated ACM) will be disturbed. EPA believes that the August 1994 Federal Register notice clarifies LEA responsibilities under the asbestos NESHAP, and that this guidance regarding the use of the improved sampling and analysis method will further clarify the situation and reduce the potential for possible violations of the asbestos NESHAP.

III. Examples of Materials of Concern

Building materials typically containing thin asbestos fibers (e.g., floor tiles) or asbestos in low concentration (< 10%) are the subject of this guidance.

Also, plaster wall or ceiling systems, resilient flooring systems (flooring, mastic, underlayment), and wallboard systems are examples of layered building materials subject to this guidance.

EPA does not regard a sheet of "plasterboard" by itself ("sheetrock," "wallboard," "gypsum board") as a multi-layered material. EPA is not adding a requirement to sample a section of plasterboard as such (see definition in APPENDIX) as a "layered" material under either AHERA or NESHAP regulations.

Lack of knowledge about the possible asbestos content of different strata in layered materials can lead to increased exposure risk under certain circumstances. In this guidance bulletin, EPA is attempting to address the concern for sampling layered materials in a manner so as to reduce risk, as well as the need to comply with recent NESHAP interpretations. The Jan. 5, 1994 Federal Register asbestos NESHAP clarification should be consulted with regard to materials such as joint compound, texturing materials, etc. added to the surface of wallboard, and when those materials would be subject to EPA's NESHAP regulation.

NOTE: Section V of this guidance bulletin offers a suggested strategy for distinguishing between joint compound found at joints in wallboard systems or when the material was applied as a skim coat; i.e., for

determining whether "joint compound" has been applied as a "skim coat" over a wall surface (as referred to in the NESHAP Jan. 5, 1994 FR notice.)

IV. Helpful Sampling Techniques

LEA "designated persons," accredited asbestos Building Inspectors, consultants, and others should follow previous EPA published requirements and guidance with regard to techniques for obtaining bulk samples of building materials in order to analyze them for the presence of asbestos. This information was presented both in guidance documents (such as the 1985 Pink Book and the Purple Book), and in the 1987 AHERA "Asbestos in Schools" Rule Sec. 763.86, 763.87 (see "References.") The techniques are also discussed in approved training courses for accrediting Building Inspectors.

To clarify EPA's guidance, it is important for the sampling device (core borer, knife, etc.) to penetrate all layers of the sample to the substrate. As discussed in Section II, it may be important to know whether discrete layers of a multi-layered sample contain asbestos. Service and maintenance workers may need to perform their work on exposed surface layers that contain asbestos. Or, their task may require them to penetrate non-asbestos layers into or through underlying asbestos-containing layers. Knowledge of where asbestos occurs in a multi-layered sample is important as a means of reducing the potential for asbestos exposure, and in selecting proper work practices to do so. It is also important to know the asbestos content of individual layers, of course, for NESHAP compliance purposes.

Thus, the person who obtains the sample for analysis may need to use professional judgement based on an on-site situation. If a bulk sample remains intact through all layers, and the inspector judges that the sample will remain intact until it reaches the analytical laboratory, the sample may not need to be separated into its respective layers until the laboratory analyst does so. However, if a bulk sample crumbles or breaks down at the time of sample collection, the sample collector may be required to take separate samples from discrete layers at the site, and carefully identify them and their position in the multi-layered system for proper and useful reporting by the laboratory.

EPA guidance regarding the need to keep layers separate as a particular sample is collected, therefore, depends on several factors. They include the professional judgement of the accredited individual who takes the sample, the physical condition and integrity of the material making up discrete layers of a multi-layered sample, the possible importance of reporting asbestos content of an exposed surface layer vs. inner layers of a system (depends on planned activity, such as in O&M tasks), and being in compliance with regulatory requirements.

The 1993 bulk sample guidance bulletin stresses the need for taking sufficient sample volumes of the material to be analyzed. Sufficient sample volumes differ for different material types. Since the quantity of the sample can affect the analytical sensitivity, EPA's recommendations in the July 1993 method should be noted.

V. Suggested Sampling Strategy for Dealing with Joint Compound vs. a Skim Coat/Add-on Application

(NESHAP Compliance Issue: Sampling needs to be conducted to determine if materials are joint compound or a skim coat application of the compound over a wall surface.) Be aware that materials applied to ceilings might differ from materials used on walls, and that original construction and later renovations can result in the application of different materials at different times. Joint compound applied to drywall installations prior to 1980 is more likely to contain asbestos than with installations after that date.

A. SAMPLING STRATEGY --

1. JOINT COMPOUND: Sample where joints are expected (take a minimum of 3 samples). For example,

- a. Inside or outside corners
 - b. Wallboard joint intervals; i.e., 4 feet from corners on wall stud. Use stud locator or knock on wall to locate stud (listen for "solid" sound). Look at walls above suspended ceiling panels; unpainted joints covered by joint compound are often discernable there.
 - c. Note that joint compound is often applied to fill depressions around nailheads; consider the "spottiness" of that type of application.
2. **ADD-ON MATERIALS:** Sample where joints are NOT expected (take a minimum of 3 samples). For example,
- a. Between corners and wallboard joint intervals. Locate by knock on wall, listen for "hollow" sound.
3. **KEEP GOOD RECORDS** of sample locations for later evaluation of results. Note: A laboratory cannot distinguish joint compound at joints from the same material used as a skim coat. Therefore, it is very important that individuals collecting samples clearly describe the sample composition so that the analytical laboratory knows whether to report the results as individual layers or as a "composite" result for non-layered material. (See B-1, B-2 below.)

B. ANALYSIS OF SAMPLES IN LABORATORY, and DATA ANALYSIS BY THE SAMPLER/ASSESSOR

All samples with outer layer having > 1% asbestos on wallboard will be noted. When this situation applies, then the following must be considered:

- 1. If only joint sampling areas show layers with > 1% asbestos, then material is joint compound.
 - a. Combine (weighted) analytical results into composite result for each sample.
 - 1) If result is $\leq 1\%$, no management is necessary.
 - 2) If result is $> 1\%$, the material is RACM (NESHAP) and management is necessary.
- 2. If samples from both joint sampling area and non-joint areas show layers with > 1% asbestos, then the material should be considered "skim coat" or add-on material.
 - a. Do not composite (average) the results; report the results for each layer. Provide a description of each layer in the report, to include their location in relation to each other.
 - b. Material so located should be treated as separate RACM layers according to the asbestos NESHAP, and management is necessary.

VI. References

- 1. Advisory Regarding Availability of an Improved Bulk Sample Analysis Test Method; Supplementary Information on Bulk Sample Collection and Analysis; 59 FR 38970, Federal Register, Aug. 1, 1994.
- 2. Asbestos-Containing Materials in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials (pink book), U.S. EPA 560/5-85-030a, October 1985.

3. Asbestos-Containing Materials in Schools; Final Rule and Notice (ASHERA Rule), 40 CFR Part 763, October 1987.
4. Asbestos NESHAP Clarification Regarding Analysis of Multi-layered Systems, 59 FR 542, Federal Register Jan. 5, 1994.
5. Guidance for Controlling Asbestos-Containing Materials in Buildings (purple book), U.S. EPA 560/5-85-024, 1985.
6. Guidance Manual: Asbestos Operations and Maintenance Work Practices, National Institute of Building Sciences (NIBS), Washington, D.C., September 1992.
7. Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials (green book), U.S. EPA 20T-2003, July 1990.
8. National Emission Standards for Hazardous Air Pollutants for Asbestos (Asbestos NESHAP Rule), 40 CFR 61, subpart M, November 1990.
9. Test Method: Method for the Determination of Asbestos in Bulk Building Materials, U.S. EPA 600/R-93/116, July 1993.

APPENDIX: Definitions

Binder: With reference to a bulk sample, a component added for cohesiveness, such as plaster, cement, glue, vinyl, asphalt, etc.

Bulk sample: For the purposes of this guidance, representative portion of building material taken at one distinct location for qualitative and quantitative identification of asbestos. In a multilayered system, one needs a representative portion of each layer.

Discrete: Individually distinct, visually recognizable.

Layer: Stratum; one thickness of some material laid or lying over or under another thickness of the same or different material.

Material: The substances or constituents of which something is composed or can be made. Various materials are used in building construction, such as sand, wood, metal, plaster, cement, asbestos, etc.

Matrix: Material in which asbestos fibers are enclosed or embedded.

NESHAP: "National Emission Standards for Hazardous Air Pollutants;" EPA's asbestos NESHAP regulation, at 40 CFR 61 Subpart M (especially for demolition and renovation activities).

Plaster: A pasty composition comprised largely of water, lime, and sand, that hardens on drying and is used for coating building components such as walls, ceilings, and partitions. Asbestos fibers or other fibrous materials sometimes have been mixed into the plaster to give particular properties.

* "acoustical" plaster -- plaster specially formulated and applied (sprayed or trowelled on) so as to deaden or absorb sound.

- * "browncoat" plaster -- also called "scratch coat;" a base coating of plaster, usually applied over perforated plaster board, wooden lath or wire mesh.
- * "topcoat" plaster -- a surface finish layer of plaster, usually white and smooth; may contain sand to produce a grainy surface.

Plasterboard: A board used in large sheets as a backing or as a substitute for plaster in walls and consisting of several plies of paper, fiberboard, or felt, usually bonded to a hardened gypsum plaster core. ("gyp[sum] board," "drywall," "wallboard," "sheetrock")

PLM: Polarized light microscopy; a technique for analyzing bulk building material samples for presence of asbestos. The sample is illuminated by polarized light and viewed under an optical microscope.

Sample: To take a sample of or from some material, especially to judge the quality or composition of that material.

Separable: Capable of being separated.

Skim coat: A thin layer or coating of one material (e.g., plaster, stucco, joint compound) applied over another.

Stratum: Layer; one of a series of layers, levels, or gradations in an ordered system; a bed or layer.

Stucco: A fine plaster used in the decoration and ornamentation of interior walls. (Also, a material usually made of Portland cement, sand, and a small amount of lime, applied to form a hard covering for exterior walls.)

Substrate: The underlying support, foundation, or base (wood lath, wire screen, concrete, etc.) to which something else (e.g., plaster) is applied.

System: An integrated group of building components which form an organized functional unit, such as a wall system, or ceiling system, or floor system.

TEM: Transmission Electron Microscopy and related techniques; will enable specific identification of thin asbestos fibers.



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