

TROUBLE OVERHEAD

*Ceiling tiles
containing asbestos
often go undetected*

By Martin S. Rutstein, Ph.D.

Under the Asbestos Hazard Emergency Response Act (AHERA), ceiling tiles are suspect materials to be sampled at the judgment of the inspector. However, many inspectors may not know that asbestos-containing ceiling tiles (ACCT) were common construction materials in the early 1970s. Given the diversity of tile types in a school, the large surface area of tiles and lack of an awareness regarding potential asbestos materials, insufficient sampling density is likely to result in inspectors missing ACCT.

A sampling density numerically equivalent to that required for surfacing materials is necessary in order to identify ACCT. Subsequent refinement of tile distribution can be done by re-inspection using site-specific tile characteristics and polarized light microscopy (PLM) testing.

Interim abatement is possible through an operations and maintenance plan emphasizing temporary repairs, notification and monitoring. A preferable long-term solution is removal of the tiles utilizing full-containment engineering controls.

AHERA, 40 CFR 763, defines a new category of suspect materials in schools. Included within this category

of "miscellaneous materials" is a class of building materials known as "ceiling tiles." In paragraph 763.86, sampling densities are defined for all three categories of materials regulated under AHERA (surfacing, thermal system insulation and miscellaneous materials). Under sub-paragraph (c), the accredited inspector is required to sample miscellaneous materials, such as ceiling tiles, "in a manner sufficient to determine whether the material is or is not asbestos-containing materials (ACM)." Since there is no strict sampling protocol for surfacing materials, such as statistically random sampling at rates of three samples 1,000 square feet, the sampling density for ceiling tiles is left to the judgment of the inspector, which raises two serious concerns.

First, are ceiling tiles really a problem with respect to asbestos, and second, what sampling density should be used to determine if ceiling tiles are a problem?

Should ceiling tiles be considered a problem? As an instructor in an EPA-approved AHERA training course, I have developed the perception that most class participants do not believe ceiling tiles are an asbestos problem.

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hensive documentation of regulatory compliance, proper legal notification of staff/users and work records and monitoring logs, there is little to defend your position in the eyes of the public. Reputations are valuable assets that are difficult to repair once compromised.

Traditionally, libel-based legal action has been one of the few alternatives available in such circumstances. Critics of the current libel system have proposed a new system of resolving such disputes by "placing the emphasis on finding and publicizing the truth rather than on awarding damages," (*The Wall Street Journal*, Oct. 18, 1988).

No matter what the mechanism used to attempt to correct inaccurate media coverage, all approaches strongly depend on the existence of adequate documentation to define the truth. The lesson is clear—for media concerns, regulatory compliance, liability reduction and staff/user harmony—nothing serves as well as comprehensive documentation of timely responsible action.

Information is a double-edged sword as it relates to asbestos in buildings. Notification of the presence

of ACM in a structure can trigger concern, fear and often have a negative financial impact. Yet notification of the presence of ACM in a structure and responsible action to safely monitor and control its status is a large step toward providing a safe building environment and reducing the potential legal liability. There is little a facility owner or corporation can do to counter the media's attraction to the negative aspects of an asbestos effort. Demonstration of competency and responsible action are perhaps the best answers available when you're faced with the question of, "What are you doing about asbestos in your building?"

An appropriate defense in anticipation of media questions varies little from the appropriate defense in anticipation of legal action. The only difference is your story is being told to the public instead of to a jury. Either way, you must be prepared to tell your story accurately and sincerely. ■

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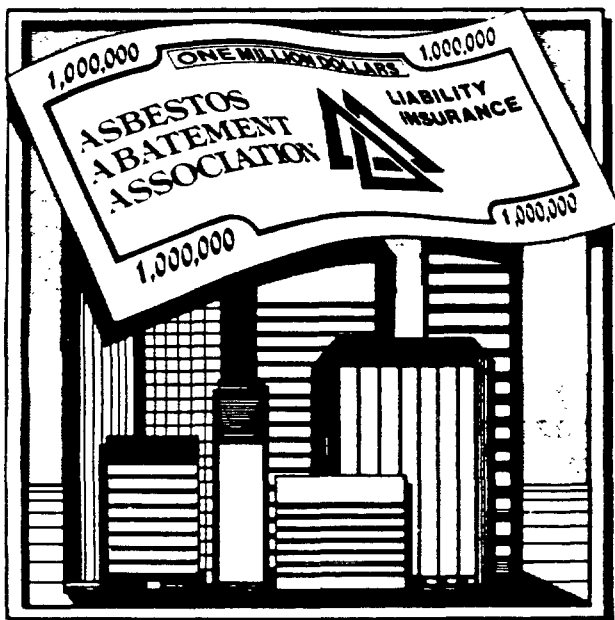
tion and implementation of asbestos-in-buildings programs to both the public and private sectors. His current work ranges from individual apartment units to general corporate-wide asbestos programs and includes the evaluation of past, current and proposed response to asbestos-related situations.

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Most students are very surprised to learn that ceiling tile sampling is an important part of a properly conducted AHERA inspection.

The book, *Asbestos Hazard Management*,¹ which should be considered a standard reference, includes excellent descriptions of the uses and occurrences of asbestos. In the book's table 3-8, "Asbestos Product Categories"

the ACCT were damaged and had a significant potential for future damage. This alone would suggest that greater sampling density should be followed. But what sampling density is necessary and what kind of tiles should be examined?

There are several types of ACCT. The common 12-inch by 12-inch perforated tiles typically contain cellulose and/or

following ways. It was often installed in the early 1970s. In architectural documents, the tile was specified as mineral wool tile or the equivalent; asbestos was not specified or identified. In one case, the architect told me he had specified an asbestos-free product.

The backside of the asbestos-containing tile has a glassy, almost clear and fibrous appearance. This contrasts sharply with the gray, more massive appearance of the non-asbestos tile. Unfortunately, the field appearance of "glassy, almost clear and fibrous" is not a uniform guide to the presence of asbestos. Some similar-looking tiles contain only cellulose mixed with the glass fibers. I suspect that the asbestos component was gradually replaced by cellulose during the manufacturing cycle. Also, some of the gray, more massive appearing tiles contain asbestos.

The only unequivocal way to detect the asbestos in these tiles is through proper analytical procedures. PLM without dispersion staining seems to be a more efficient way of identifying glass-asbestos mixtures. There is a relatively small amount of asbestos mixed with a glass matrix material with somewhat similar dispersion staining colors. Thus, PLM is easily the better method for identification.

I have encountered entire schools that have used ACCT (thousands of square feet) exclusively while other buildings have several tens of square feet of the tiles localized in distinct areas. I have also encountered schools that have several environmental "pockets" of ACCT. Under AHERA, any occurrence of ACM in a building material means that *all* such materials must be considered ACM unless proven otherwise. Thus, a scattered pocket or salient occurrence of ACCT means that all other ceiling tiles that look the same must be treated as ACM. This requires extraordinary efforts that are unwarranted by the actual risk. What then are the alternatives?

SAMPLING PROTOCOLS

Sampling of ceiling tiles should follow the density required for surfacing materials, three samples 1,000 square feet; five samples between 1,000 and 5,000 square feet; and seven samples/5,000 square feet. In addition, each additional 5,000 square-foot area should be similarly sampled. Finally, each homogenous

"The common 12-inch by 12-inch perforated tiles typically contain cellulose and/or glass and binder, however, some have been found to contain amosite."

and table 3-9, "Selected Asbestos Products and their End Uses," there are no references to asbestos in ceiling tiles. Table 6-1, "Asbestos-Containing Materials Found in Buildings" (compiled from several sources), also does not make any reference to ACCT. Why then, have ceiling tiles been included under AHERA? The answer is straightforward. Ceiling tiles are building materials, and therefore covered by 40 CFR 763 and second, asbestos was used in the manufacturing of some ceiling tiles.

Asbestos Hazard Management summarized the data (table 5-6) by suggesting that up to 2 percent of all buildings may have ACCT, however, the comparable number for sprayed-on or troweled-on ACM is 10 percent.

I believe that ceiling tiles should be considered a friable and suspect material. Until AHERA, however, ceiling tile inspections were largely simplistic because of the extent and variety of such tiles. With properly conducted AHERA inspections, the previously cited estimate of 2 percent will presumably turn out to be a low figure.

FIELD EVIDENCE

I first encountered ACCT in 1982 and, since that time, these tiles have not been uncommon in my school and building inspections. While ACCT are not present in every building, these materials do appear regularly, and I believe there is sufficient reason to be concerned about ceiling tiles. When I inspect schools under AHERA, I use the sampling protocols defined for surfacing materials. Were it not for the increased sampling density, the ACCT would have probably gone undetected. In several of the schools,

glass and binder, however, some have been found to contain amosite. In one incident, brown asbestos fibers could be seen protruding into the perforations, exposing the fibers to student-occupied spaces. In chemical terms, this episode was equivalent to having a universal reservoir of asbestos fibers capable of being released into the ambient environment. In addition, damage, including that caused by vibration, would have released even greater amounts instantaneously.

While most of the square brown tiles I have inspected have not been ACCT, the tiles positively identified make it legally necessary to professionally sample all such tiles, according to attorney Joseph J. Gamboi, who specializes in asbestos litigation with the New York law firm of Strook & Strook & Lavan.

Another variety of the 12-inch by 12-inch ceiling tile is the tongue-in-groove tile. This square tile typically has a rough surface and is most often composed of glass and binder. However, some contain a small percentage of chrysotile, therefore, all of these tiles must be viewed with suspicion.

Another common type of tile is the two-foot by four-foot lay-in tile (inclusive of variously sized dimensions cut to fit particular needs). Not all of the varieties of this type of tile contain asbestos. Unfortunately, there is an ACCT that is often indistinguishable under conditions of an initial field inspection from the non-asbestos-containing tile. The ACCT is typically amosite and/or chrysotile-bearing, with asbestos compositions ranging up to 15 percent.

The two-foot by four-foot ACCT differs from the typical non-ACCT in the

area of tiles should be sampled and each distinctive salient occurrence of tile should be sampled with at least three specimens (preferably from three different tiles).

Areas having several different types of tile require increased sampling densities and costs. However, the inspector would be acting unprofessionally if he or she did not sample

which often means the custodial staff will quickly perform the removal and then dispose of the ceiling tiles. Immediate and uncontrolled removal is unwise, very dangerous and probably illegal in most jurisdictions of the United States.

The ceiling tiles are old, typically very dry and very friable, particularly on unpainted and damaged surfaces.

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the distinctive materials, given the possibility that some of the tiles might be ACM. The sampling density can be increased, however, if one can justify limiting it to the AHERA-defined density since it is legally defined and thus, professionally prudent.

With the analytical results of the initial sampling, any occurrences of asbestos tile can be refined to delineate asbestos-salient or homogeneous areas. Sometimes there are distinctive facing patterns for the ACCT. I have found that in some schools, the long grooves parallel the long axis of the tile. In other buildings, however, the long axis of ACCT is perpendicular to the long axis of the tile. For some buildings, the groove pattern is the same for both ACCT and non-ACCT. I do not recommend the use of the facing pattern as an unequivocal characteristic, but merely suggest that it may be one of several useful field parameters for identification and delineation of ACCT.

RESPONSE ACTIONS

If ACCT are discovered, how should they be evaluated and what sort of response actions would be in order?

First, these tiles are indeed friable, and therefore, the inspector should evaluate the degree and severity of the present damage and seek to assess the potential for future damage. The regulatory guidelines defined by AHERA are quite sufficient for ACCT.

Response actions are dictated by selecting from those actions that protect human health and the environment, and are the least burdensome to the Local Educational Agency (LEA). Discovering asbestos in student-occupied areas will often cause school officials to opt for immediate removal,

When damaged, the friability is markedly increased and, when moved, fibers of both glass and asbestos are readily released into the ambient environment. In order to remove the tiles, most environmental and labor regulations require the use of full-containment engineering controls.

Even if such controls are not mandatory, full-containment should be the method of choice. The grid system should be well cleaned and/or disposed of. In addition, the grid system and all of the exposed spaces above it should be heavily encapsulated.

As AHERA-derived inspection information becomes available, increasing numbers of ACCT are likely to be discovered. In the long-term, I believe removal of ceiling tiles is the best overall solution because they are easily damaged, often disturbed and the number of fibers released typically increases with time. Additionally, the presence of amosite asbestos can arguably pose a greater hazard than other ACM.³ I emphasize that I am not advocating the use and retention of chrysotile-bearing tiles, but merely arguing that amosite-bearing tiles are much more dangerous and should require immediate abatement action.

Obviously, all tiles and other ACM cannot be removed upon discovery. However, a school district can and should take certain immediate measures, including sealing the damaged areas with encapsulant or paint. The tiles should be restored into the grid system and monitored regularly to ensure proper placement and the repair of any damage. Trades and building occupants should be warned about the asbestos-containing tiles. Furthermore, construction activities that could disturb the ACCT

should be postponed until after removal or, if necessary, be performed using proper environmental safeguards.

ACCT are likely to be present in many schools that underwent construction work in the early 1970s. Homogeneous area construction and subsequent tile interchangeability place constraints on localization. Sampling densities required for surfacing materials are more likely to provide a reasonable basis for the identification of such tiles. Additional sampling and inspection would be necessary to delineate salient/homogeneous areas for materials. The preferred long-term abatement action is removal. The necessary short-term action requires an operations and maintenance plan tailored for the specific tile occurrence and distribution.

It is necessary that AHERA-oriented inspectors, as well as all other asbestos investigators, factor in the necessity of sampling ceiling tiles. This will certainly increase the expense of initial inspections since the bulk of ceiling tiles are likely non-asbestos-containing materials. However, in the absence of definitive building records certifying that the material is non-ACM or field criterion to unequivocally distinguish ACCT from other tiles, sampling and laboratory analysis are mandatory to identify this hazard. ■

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