Asbestos

"Second wind" brings contaminant back into public eye

By Jeffery C. Camplin

SH&E PROFESSIONALS MAY BE OPERATING with a false sense of security on asbestos issues. Once a topic every SH&E professional feared, asbestos has been pushed to the back burner in recent years by emerging issues such as mold, terrorism and emergency preparedness. What many SH&E professionals do not realize is that asbestos has been quietly reemerging as a front-burner issue.

Asbestos can still be a concern even if building inspections state that none is present. These inspections are typically plagued by a series of flaws—ranging from improper inspection scope, lack of inspector and lab qualifications, new regulatory requirements and plain old errors. Ten of these flaws are discussed in this article.

Asbestos can also reappear if all asbestos has reportedly been removed from a building. Even new buildings can have asbestos since asbestos products are still being produced, imported and sold throughout the U.S. The U.S. Geological Survey estimated that more than 13,000 metric tons of asbestos were imported into the U.S. in 2001 (Buckingham and Yates). Common products such as flooring materials, roofing materials, friction materials (such as vehicle brake pads) and cement products still contain asbestos.

At this time, all buildings are subject to contamination. Asbestos is naturally occurring and has contaminated communities and products during its mining. Damaged and disturbed asbestos in buildings has also caused contamination. Improper building demolitions and unforeseen building collapses (such as the World Trade Center) have also released large amounts of asbestos into the environment. Yet, testing for contamination remains controversial. SH&E professionals must be aware of these controversies so sound decisions can be made regarding potential asbestos contamination in buildings and products.

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Asbestos Issues: What Every SH&E Professional Should Know

Asbestos became a regulatory issue in the early 1970s when exposure to it was linked to adverse worker health effects. Massive numbers of individual and class-action lawsuits followed in the 1980s, creating a legal crisis. In response, Senator Orrin Hatch (R-UT) proposed the Fairness in Asbestos Injury Resolution in the U.S. Senate in May 2003. Intended to streamline asbestos lawsuits and relieve the court systems, the bill would create a $108 billion trust fund to efficiently compensate those with asbestos diseases while capping the liability of businesses and curbing the number of bankruptcies.

A huge industry was created in the mid 1980s to inspect, test, analyze and abate asbestos found in buildings. By the early 1990s, the lawsuits and the asbestos industry began a steady decline as new issues garnered attention. Recent developments indicate a reemergence of asbestos-related legal actions, including many claims without any demonstrable disease (General Cologne Re 2). The largest single factor in the rise of tort costs in 2001 was a $6 billion increase in liabilities tied to asbestos claims over 2000 levels (Tillinghast & Towers Perrin 1). The Fairness in Asbestos Injury Resolution was designed to address this rise in claims. Furthermore, regulatory updates and revisions can suddenly change materials previously tested as non-asbestos-containing into regulated asbestos upon retesting. Finally, asbestos contamination caused by releases and in building and consumer products is a growing fear. Failure to address these evolving issues could put asbestos right back in the spotlight.

Issue #1: Asbestos in New Construction Materials

Asbestos Use in Many Products Banned in U.S.

Asbestos is predominantly an airborne hazard that has been linked to lung cancer, mesothelioma and asbestosis. EPA responded to health hazard concerns by banning the production of the most hazardous forms of asbestos in the early 1970s through the early 1990s under authority of the Clean Air Act. The hazardous or friable (crumbles or reduces to powder by hand pressure when dry) materials that were banned are thermal systems insulation including wet-applied and pre-formed asbestos pipe covering (1975); pre-formed asbestos block insulation on boilers and hot water tanks (1975); spray-applied fireproofing/insulation (1973); and spray-applied materials for decorative purposes (1978). In late 1990, spray-applied materials containing more than one percent asbestos were prohibited from use

unless they were encapsulated with a bituminous or resinous binder.

In 1989, under the authority of the Toxic Substance Control Act (TSCA), EPA banned most remaining asbestos materials. Materials still subject to that ban include corrugated paper, roll board, commercial paper, specialty paper, flooring felt and new uses of asbestos (EPA "EPA Asbestos Material Ban" 1-4). These products were no longer being produced in the U.S. at the time of the ban. So, if all of these uses were banned over the last 30 years, where is the asbestos coming from?

Current U.S. Production & Importation of Asbestos Products

In 1991, the U.S. Court of Appeals for the Fifth Circuit vacated the 1989 EPA ban (EPA "EPA Asbestos Material Ban" 3). Thus, materials containing asbestos that were being produced in the U.S. at the time of the ban are still legal to produce, import and use; these include corrugated and flat cement sheeting, clothing, pipeline wrap, roofing felt, vinyl floor tile, cement shingle, millboard, cement pipe, automatic transmission components, clutch facings, friction materials, disc brake pads, drum brake linings, brake blocks, gaskets, nonroofing coatings and roof coatings. (The sidebar on pg. 38 lists suspected asbestos-containing materials.)

Senator Patty Murray (D-WA) recently proposed The Ban Asbestos in America Act of 2003, which closely resembles EPA's 1989 ban. EPA sponsored a "blue-ribbon panel" focus group organized through the Global Environmental Technology Foundation (GETF) to develop asbestos policies. EPA released the GETF report in May 2003; it recommended several aspects of the Murray bill, and called on Congress to pass legislation.

Seeking Additional Information

EPA does not track the manufacture, processing or distribution in commerce of asbestos-containing products. The most prominent uses of asbestos in 2001 included roofing, flooring, gaskets and friction products (Buckingham and Yates 4). Since EPA has no existing ban on many products, the agency recommends that a prudent consumer inquire about the presence of asbestos in a particular product. According to the agency, possible information sources include inquiries to dealers/suppliers/manufacturers, MSDS or tests by a qualified laboratory (EPA "EPA Asbestos Material Ban" 4). In the author's experience, the first two recommendations typically lead to unreliable information, while testing suspect materials prior to installation often will produce documentation that the material does not contain asbestos. Therefore, inspection, testing and analytical methods must be carefully selected to determine whether a material truly does not contain asbestos.

Issue #2: Evaluation of Inspections & Non-Asbestos-Containing Materials

The term "asbestos-containing material" is a regulatory term usually defined as a material that contains more than one percent asbestos. The scope of an asbestos building inspection should address those regulations that affect the facility or the project in question. A quick review of federal regulations is necessary to determine how comprehensive the asbestos inspection should be.

In 1986, President Reagan signed the Asbestos Hazard Emergency Response Act (AHERA) into law. This regulation requires the use of accredited inspectors to conduct inspections and mandates that accredited response action contractors conduct friable asbestos abatement activities in public and private schools (grades K-12).

EPA also enforces the National Emissions Standards for Hazardous Air Pollutants (NESHAP), which is commonly called the demolition and renovation regulation. This regulation requires building owners to inspect at least those portions of a structure that are to be renovated or demolished for regulated asbestos and to have it removed prior to beginning the demolition or renovation process. Regulated materials are all friable materials and any non-friable materials that could release visible emissions due to these activities.

In addition, OSHA regulates worker exposure to airborne asbestos. Its construction and general industry asbestos standards require employers to determine whether their employees are coming into contact and are disturbing asbestos during work activities. If so, the employer must determine the employees' exposure. Identification of the presence, quantity and location of asbestos is a main responsibility of building owners and employers under OSHA.

Don't Rely on Previous Asbestos Inspections & Testing

Many building owners have conducted asbestos studies of their buildings in order to manage any materials that are in place and to determine what removal is required before demolition and renovation activities. However, the buyer-beware principle applies. Asbestos inspections can be inherently flawed due to limited scope, inspector error, improper sampling, lab error, hidden materials and new/revised regulations.

10 Potential Flaws in an Existing Asbestos Building Inspection

1) Lack of properly accredited (and in most states licensed) asbestos building inspectors.

2) Scope limited to interior spaces.

3) Failure to use accredited laboratories for sample analysis.

4) Failure to perform point-counting on "trace" amounts of asbestos in friable materials.

5) Failure to independently reanalyze multilayered materials by layer.

6) Failure of non-school buildings to presume materials contain asbestos or apply the AHERA inspection and sampling protocol to rebut this presumption.

7) Failure to perform a thorough due diligence inspection.

8) Failure to consider use of recommended analytical methods on flooring materials.

9) Failure of inspectors to identify, locate and quantify all suspected asbestos-containing materials.

10) Failure of accredited laboratories to accurately identify or quantify asbestos in materials.

Friable vs. Non-Friable: When Do Asbestos-Containing Materials Become Regulated?

Friable asbestos is a material that can be crumbled, pulverized or reduced to powder by hand pressure when dry. It easily releases asbestos fibers into the air where they can pollute and/or become inhaled or ingested by humans, causing potential health problems. Non-friable materials do not readily release asbestos fibers unless forces or mechanical actions cause fibers in a material to be released.

EPA defines regulated asbestos as any friable asbestos. Non-friable materials can become regulated under conditions that cause the material to release asbestos fibers. Category I non-friable materials include flooring, roofing, valve packings and gaskets; they are not regulated unless they become friable or are subject to sanding, grinding, cutting or abrading. These materials can generally remain in a building that will be demolished.

Category II non-friable materials include galbestos (asbestos-coated sheet metal) and cement products. These materials become regulated when there is a high probability that the materials will become crumbled, pulverized or reduced to powder by the forces expected to act on them. These non-friable materials must be removed from a building prior to demolition. Regulated asbestos must be removed prior to demolition and renovation activities. The materials must not have any visible emissions and remain adequately wetted at all times. The regulated asbestos must be properly containerized, labeled, manifested and sent to a landfill that can accept asbestos waste. Non-regulated materials are not subject to these requirements. Visit www.epa.gov for more information.

State-of-the-Art School Building Asbestos Inspection Procedures Limited

K-12 public and private schools are the only group of buildings that must comply with AHERA. This regulation mandates what to inspect for, where to inspect, how to sample and analyze, and how to document suspected asbestos-containing materials. Accredited personnel must perform inspections, develop management plans and perform abatement activities. Most states use this accredited training as a prerequisite for issuing asbestos licenses. In 1992, the accreditation requirements were extended to public and commercial buildings, including residential structures featuring 10 or more units (TSCA, Section 206 Revisions ASHARA). *The first flaw in a typical inspection is the lack of properly accredited (and in most states licensed) asbestos building inspectors.*

The AHERA school regulations address friable asbestos and non-friable materials that if disturbed could release airborne asbestos which could subsequently be inhaled by building occupants. EPA estimates that more than 3,000 commercial products contain asbestos (EPA "Asbestos Building Inspection" 2). Friable forms fall into two categories: 1) thermal systems insulation used to inhibit heat transfer or for condensation control on heating, ventilating and air conditioning systems (HVAC); and 2) surfacing materials sprayed or troweled on for acoustical, decorative and fireproofing purposes. As noted, these materials are hazardous and have been banned.

However, other materials that do not fall into these categories—such as ceiling tiles, flooring materials, cement boards (transite) and drywall systems—may also contain asbestos. These friable and non-friable materials fall into a third category: "miscellaneous materials." AHERA regulations require identification of these three categories of suspected asbestos materials found on the inside of a school building; however, this protocol does not require identification of most materials found on the outside of a building. It also requires that a minimum number of samples be taken for all suspect materials and analyzed by an accredited laboratory using a polarized light microscope (PLM). This requirement applies to non-school buildings as well under OSHA standards (which are described later). *The second and third flaws of most asbestos inspections is that the scope is limited to interior spaces and the failure to use accredited laboratories for sample analysis.*

Non-School Buildings Also Regulated

NESHAP is triggered when demolition or renovation activities occur in commercial and public buildings, including residential buildings with more than four units. The regulation does not specify who must conduct the inspection, what materials require testing or how many samples must be taken. It does, however, require identification of all asbestos-containing building materials inside and outside a building. NESHAP also has a special analytical protocol that applies to friable materials. It requires that samples initially found to have asbestos detected in quantities up to 10 percent be subjected to a more exact quantification method. EPA believes this measurement is necessary to confirm whether the material is more than one percent asbestos and, therefore, regulated.

Previously tested materials found to be a non-asbestos-containing material must be subjected to this additional analytical method before demolition and renovation activities commence as well. Called point-counting (see sidebar pg. 35), this procedure requires requantification of the percent of asbestos found in materials initially quantified at one percent or less (non-asbestos-containing). To a building owner, this means that a prior asbestos inspection could identify a material as non-regulated because it was analyzed and found to be one percent asbestos or less and, therefore, is documented in the inspection report as a non-asbestos-containing material; however, when the material is disturbed during renovation or demolition, it must treated as a regulated asbestos-containing material until point-counting confirms that it contains one percent or less asbestos. *The fourth flaw in an asbestos inspection is failure to perform point-counting on "trace" amounts of asbestos detected in friable materials.*

Another analytical requirement under NESHAP deals with multilayered materials such as plasters and stuccos (EPA "Asbestos Bulk Sampling Bulletin" 3). If plaster and stucco walls or ceiling systems are layered, and the layers can be distinguished, then each layer must be analyzed separately. Again, this affects building owners who have had these elements analyzed as a composite and identified as non-asbestos-containing material. Once these layers are analyzed separately, one or more layer may exceed the one percent asbestos criteria, making the material regulated during demolition and renovation activities. *The fifth flaw in an asbestos inspection is*

the failure to consider and reanalyze previously tested plasters and stucco materials that may contain multiple layers.

Building Owners, Employers Must Communicate the Presence of Asbestos

OSHA's general industry asbestos standards (29 CFR 1910.1001) and construction industry standard (29 CFR 1926.1101) require building owners and employers to identify the presence of asbestos and communicate this information to employees, tenants and outside contractors who occupy their buildings or jobsites. OSHA would accept an AHERA inspection as long as it also addresses potential asbestos exposures on the outside of a building. However, OSHA does not require inspections. If a building owner does not have an asbestos inspection performed, then certain material must be presumed to contain asbestos.

It's Asbestos Until Proven Otherwise

OSHA's primary concern is employees disturbing and breathing asbestos. Friable asbestos materials allow asbestos fibers to become easily airborne. As noted, the largest groups of these materials are thermal system insulations and surfacing materials, which are banned. To protect employees from airborne exposure to these materials, OSHA requires building owners to presume that all thermal systems and surfacing materials installed no later than 1980 contain asbestos and treat them as such until testing is performed. OSHA has also identified resilient flooring materials including floor tiles, related adhesives and mastics, and sheet goods as suspect and requires them to be treated as asbestos-containing materials until testing proves otherwise.

OSHA has adopted the AHERA school regulation testing protocol (use of accredited inspectors, minimum numbers of samples taken for each material, use of recognized analytical protocol and accredited laboratories) to rebut the presumption that a material contains asbestos. Without proper testing, the owner must continue to treat these materials as if they contain asbestos and must comply with all relevant OSHA requirements. *The sixth flaw in asbestos building inspections is failure to presume that materials in non-school buildings are asbestos or to apply the AHERA sampling protocol to suspect materials to rebut this presumption.*

OSHA specifically addresses two of the three categories of asbestos materials. For the "miscellaneous materials" such as transite, cement boards, roofing materials, ceiling tiles, drywall and myriad other suspected asbestos-containing commercial products identified by EPA, OSHA has a three-pronged attack to protect workers from asbestos exposure.

1) As noted, building owners must presume certain materials contain asbestos.

2) Building owners must address those materials known to contain asbestos. If testing or manufacturer labeling indicates the presence of asbestos, then the building owner must treat it as such.

3) The third requirement is a catchall. Building owners must identify those materials that should have been found through the exercise of due diligence. Although OSHA does not define due diligence, a building owner can be found in violation if a worker is unknowingly exposed to asbestos. If a worker is exposed to asbestos, then OSHA can challenge the due diligence component of the inspection. *The seventh flaw of an asbestos building inspection is the failure to perform a thorough due diligence inspection.*

Scrutinize Resilient Flooring Materials

The final OSHA-specific issue relates to analytical methods. The agency allows the use of the AHERA school inspection testing and analytical protocol to prove that a presumed material does not contain asbestos—with the exception of resilient flooring materials. For these materials, OSHA requires building owners to consult an industrial hygienist in order to determine an appropriate analytical method.

This is based on a 1994 EPA bulletin which stated that the AHERA analytical method was not adequate for identifying materials that contain small, thin asbestos fibers (EPA "Asbestos Bulk Sampling Bulletin" 2). EPA found that fibers such as those found in floor tiles were too small and thin to be identified at the resolution of a PLM, so it recommended that floor tiles found to be non-asbestos-containing be retested using a transmission electron microscope (TEM). TEM analysis has found that

Asbestos Material Testing: A Summary of Analytical Methods

Polarized Light Microscopy

Polarized light microscopy (PLM) method for analyzing asbestos is the most common technique for determining the presence and quantity of asbestos in a material. The method is limited in that it can't identify small, thin fibers (<0.3 microns in diameter) or fibers hidden by binders or coatings. This procedure is not recommended for analyzing flooring products that may contain small, thin fibers. Another limitation is the visual quantification accuracy down to a level of only three percent. Percentages below this have been found to be grossly overestimated by the analyst. Typical costs for PLM range from $5 to $35.

Point-Counting

Point-counting is an analytical method required by EPA for requantifying "friable" asbestos found in demolition and renovation projects. Those friable materials found to contain greater than zero and less than 10 percent asbestos must either have the quantity reconfirmed by point-counting or be treated as regulated. Point-counting is considered to be a less-biased method for quantifying the percentage of asbestos in a material. Typical costs range from $20 to $50.

Transmission Electron Microscopy

Transmission electron microscopy (TEM) analysis is recommended for flooring products and other materials suspected of having small, thin asbestos fibers. TEM can detect asbestos fibers as small as 0.5 microns in length. The Chatfield TEM method detects the asbestos, then weighs the asbestos to determine an accurate percentage of asbestos by weight. Typical costs range from $35 to $100.

Gravimetric

The gravimetric analytical method uses a PLM to identify asbestos, then weighs the asbestos content. The material is weighed. All non-asbestos portions of the sample are then removed by burning in a small furnace or by using chemicals to dissolve them. The remaining asbestos is then reweighed and the asbestos percentage is provided by weight. This method can be time-consuming and expensive. Gravimetric analysis is used on materials with heavy binders or matrices such as roofing materials. Typical costs range from $75 to several hundred dollars.

many presumed non-asbestos flooring products actually contain more than 20 percent asbestos. However, since this method is not required, many building owners choose not to have it performed. The OSHA statement infers the use of the TEM method on flooring. *The eighth flaw in an asbestos building inspection is not considering whether floor tiles contain small, thin fibers and, therefore, not reanalyzing the materials with a TEM.*

Issue #3: Errors By Inspectors & Labs

The AHERA school inspection format is considered to be the state-of-the-art method for determining the presence of asbestos. However, in addition to the limitations already described, errors made by inspectors and laboratories are a concern.

All K-12 schools had to conduct AHERA inspections in the late 1980s. EPA later evaluated these inspections for thoroughness, accuracy and compliance, and found significant problems, including missed suspected asbestos-containing materials, underestimated material quantities and inaccurate documentation of location of materials identified. EPA also reviewed the quality control testing results performed on accredited laboratories and again found errors. Labs were found to have misidentified asbestos-containing materials and inaccurately quantified the asbestos percentages in materials (Harvey, et al 2).

What Materials Are Suspect & Where Are They Found?

According to EPA, thousands of products contain asbestos, yet most asbestos inspectors are only aware of a small fraction of these materials (EPA "Asbestos Building Inspection"). In 1991, EPA evaluated the thoroughness of AHERA school asbestos inspections and found that 38 percent were deficient or seriously deficient (EPA "Asbestos in Schools" 2). Primary deficiencies included failure to identify all suspected asbestos materials; failure to clearly record their location; and failure to quantify them within acceptable standards of accuracy. As noted, OSHA requires building owners to communicate the presence, location and quantity of asbestos; inaccurate inspections will not provide a strong due diligence defense.

According to EPA, 82 percent of the AHERA school asbestos inspections had at least one unidentified material. The materials missed most frequently were fire doors, sheet flooring, drywall and vibration-dampening cloth in air ducts. Other typical inspector errors include misidentifying additional materials, such as the presence of floor tiles under carpeting or other layers of tile; original ceilings above dropped ceilings; roof and sanitary drains; transite panels; and materials in concealed areas such as attic spaces and pipe tunnels. Remember, also, that these inspections exclude most materials on a building's exterior—such as siding, fascia board, wall panels, eaves and roofing. Despite these findings, the inspections are still considered by many building owners, consultants and regulatory agencies to be state-of-the-art. *The ninth flaw in an asbestos building inspection is failure of inspectors to identify, locate and quantify all suspected asbestos required by the scope of work.*

Asbestos Lab Work Is Not an Exact Science

The most common analytical method used by accredited laboratories to identify the presence of asbestos in materials is PLM using the dispersion staining technique. This method has limitations in that it cannot identify small, thin fibers (<0.3 microns in diameter) such as those in flooring products. Another limitation is its inability to identify asbestos in materials that have heavy binders (such as those found in cement products and roofing materials without special treatment).

Once asbestos is identified, its quantification is limited in that the method can accurately estimate the percent of asbestos to a lower limit of only three percent. The visual estimates of asbestos quantities at or below one percent have been found to be significantly overestimated by laboratories (Perkins, et al 5). In fact, overestimation can be as high as 1,000 percent by the PLM method, which can result in non-asbestos containing materials being identified as over one percent and, therefore, subject to regulation. *The tenth flaw of an asbestos building inspection is failure of accredited laboratories to accurately identify and quantify the asbestos in materials.*

Issue #4: Asbestos-Contaminated Products & Building Materials

What Isn't Contaminated With Asbestos?

The fact that asbestos is present in the environment as a naturally occurring mineral, in consumer products and building materials creates many potential contamination issues. For example, many automobile brake pads still contain asbestos and can release contamination each time a driver applies the brakes. The state of California has issued guidelines and regulations to reduce airborne levels of naturally occurring asbestos used to surface unpaved roads, parking lots, playgrounds and other open areas. Asbestos contamination has also occurred in communities and in materials during the mining of other minerals such as vermiculite.

Contamination also exists in areas where friable asbestos or damaged asbestos materials have released fibers over time, resulting in asbestos in settled dust. Ceiling tiles and filters on ventilation systems have become contaminated by disturbance and air movement near spray-on fireproofing applied to structural steel in buildings. Improper demolition and the unplanned collapse of building structures can also contaminate large areas. The identification, quantification and response to these potential asbestos contaminations are controversial.

What Is Contamination?

Asbestos contamination can exist for many reasons. The most common contamination issue occurs during abatement activities. Asbestos must be disturbed during removal, resulting in contamination of the work area. Special negative-pressure contain-

ments are often designed to prevent the spread of contamination. Special cleaning and work practices remove visible and microscopic contamination.

Once work is complete, a clearance air test can be performed to document a clean area prior to releasing the asbestos contractor from the jobsite. Under federal regulations, schools must have clearance air testing performed, but no federal requirements mandate such tests in non-school buildings. Clearance air testing does not require an asbestos-free work area. Millions of asbestos fibers can remain in the air and on surfaces of work areas while still achieving clearance. If contamination can exist after an asbestos abatement project, how should building owners and employers address other forms of contamination?

Surface Dust Testing Is Controversial

No federal regulation requires surface dust to be tested for asbestos. More importantly, no federal clearance or safe levels have been determined for asbestos in surface dust. Yet, many building owners routinely test surfaces to determine whether asbestos contamination exists—without challenging how samples are taken or what the results mean.

ASTM has developed several methods for general testing for asbestos on building surfaces such as ceiling tiles, shelving, electrical components and ductwork. Even ASTM acknowledges that these methods are controversial (ASTM International STP 1342). The methods define how to obtain and analyze a sample, yet provide no guidance on where or how often to test. The methods discuss how to express measured results, but provide no clearance or clean surface measurements against which results can be compared. Each ASTM method states that it does not describe procedures or techniques required for the evaluation of the safety or habitability of buildings with asbestos-containing materials, or compliance with federal, state or local regulations or statutes. ASTM further states that it is the user's responsibility to make these determinations (ASTM D5755-95).

Therefore, before conducting any dust sampling for asbestos contamination, building owners and employers should carefully review how the evaluation will be performed, and must scrutinize testing methods, the number of sample sites, analytical measurements, and inspector and laboratory credentials. Furthermore, measurement levels that require a response should be agreed upon before testing commences.

Asbestos-Contaminated Products

Consumer Product Safety Commission (CPSC) has investigated and identified several consumer products and building materials that have been inadvertently contaminated with asbestos. These products include play sand, talc, gravel and vermiculite products. Zonolite, a vermiculite insulation used in attics and wall cavities in residential homes, was contaminated with Tremolite asbestos during its mining. (See sidebar on pg. 39.) It was used in 15 to 35 million homes, causing concerns to millions of homeowners (EPA "Asbestos in Vermiculite" 1).

Asbestos Quiz

Question 1: What year did the EPA ban the use of asbestos products?

a) 1973
b) 1975
c) 1978
d) 1989
e) 1990
f) all of the above
g) none of the above

Both f) and g). Friable asbestos was banned from 1973 through 1978. Some non-friable asbestos materials were banned in 1989 and 1990. However, many non-friable asbestos products are not subject to the asbestos ban.

Question 2: True or false: All forms of asbestos materials are hazardous to your health.

False. Non-friable asbestos that is not subject to external forces causing it to release asbestos fibers does not pose a health threat.

Question 3: True or false: Buildings built after 1980 are asbestos-free and not subject to federal regulations.

False. OSHA requires surfacing and thermal systems insulations (friable forms of asbestos) installed in buildings no later than 1980 to be presumed to be asbestos-containing. However, asbestos products are still manufactured and used in current building construction.

Question 4: True or false: Asbestos-containing flooring products such as floor tiles, mastics and sheet goods are not regulated by federal OSHA or EPA asbestos regulations.

False. If flooring materials remain "intact" and "non-friable," they are subject to reduced OSHA regulations and are considered nonregulated by EPA. If these products are mechanically disturbed and subject to sanding, grinding or abrading, then more comprehensive regulations apply.

Question 5: How many asbestos fibers are allowed by the EPA in a liter of drinking water?

a) None
b) 1
c) 100
d) 7 million
e) unlimited

D). Asbestos minerals are naturally occurring in many areas of the U.S. and can be found in background levels of drinking water. There are more than 200,000 miles of asbestos cement water lines carrying drinking water to U.S. homes. These two sources account for the EPA's allowance for asbestos in drinking water.

Question 6: Which federal agencies require air clearance testing on non-school asbestos abatement (removal) projects?

a) EPA
b) OSHA
c) NIOSH
d) all of the above
e) none of the above

E). Only the AHERA asbestos in schools rule requires air clearances after asbestos is removed. However, many state and local regulatory agencies require such testing, and asbestos abatement specifications also define air clearance testing that owners may require.

NIOSH and EPA have not provided specific information on asbestos-contaminated vermiculite due to challenges from The Vermiculite Assn. (TVA) (Chatfield). TVA cites errors in the analytical methods employed by EPA on vermiculite-contaminated gardening products in a 2000 study (EPA "Sampling and Analysis"). Its review found that the asbestos identified may not have been fibrous or even an asbestos mineral (Chatfield 21).

Suspect Asbestos Materials

Due diligence may require sampling of the following list of suspect asbestos materials.

Paper Products
- Acoustical ceiling tile
- Lamp sockets
- Burner mats for gas stoves
- Roofing felt (outer layer)
- Pipe and boiler covering
- Vinyl sheet flooring backing
- Radiator top insulation
- Appliance heating shielding (paper)
- Paper sheets for heat insulation
- Millboard
- Soldering and welding blocks
- Iron rests
- Appliance heat shielding
- Fireproof wallboard
- Metal-clad fire doors and partitions
- Tent garments
- Stove pipe rings

Cloth & Woven Products
- Appliance wiring
- Awnings
- Candlesticks
- Catalytic heater mantles
- Cigarette lighter wicks
- Cord
- Seals for high temperature gaskets
- Valve steam packing
- Insulation for glass handling tools
- Reinforcing for braided wall stem hose
- Theater curtains
- Felt
- Reinforcements in plastics
- Gaskets
- Reinforcements in tapes
- Secondary insulation in high-temperature wire/cable
- Asphalt-impregnated high-temperature wire/cable
- Asphalt-impregnated roofing felts
- Piano and organ felts
- Flexible air conductors for heating, cooking and ventilation equipment
- Heating pads (element insulation)
- Ironing board pads and covers
- Lamp and lantern mantles
- Pipe and boiler covering
- Pot holders and oven mitts
- Flame-resistant garments
- Stoves—coal and wood-burning
- Tape for pipe insulation
- Braid and rope for pecking
- Motion picture screens
- Tent grommets

Cement Products
- Water, sewer and septic drain field pipe
- Air duct pipe
- Sheet products
- Roofing clapboard
- Siding
- Shingles
- Interior walls
- Boiler and furnace baffles
- Bulk sheeting
- Welding shields
- Baking sheets
- Blackboards
- Laboratory table tops
- Linings for vault, safes, humidifiers and filing cabinets

Various Matrix Products
- Adhesives (glues and epoxies)
- Air duct cement
- Buffing and polishing compounds
- Caulks and putties
- Floor tile cement and mastic
- Auto body filler
- Flashing cement
- Furnace cement
- Glazing compound
- Pipe and boiler coverings
- Roof and driveway coatings
- Stains and varnishes
- Automotive undercoating
- Refrigerant cements
- Automotive muffler repair compounds

Inadvertent Asbestos Contamination
- Driveway gravel
- Fertilizer and lawncare products
- Potting materials (vermiculite)
- Play sand
- Talcs

Miscellaneous Products
- Acoustical and thermal insulation material sprayed
- Ammunition shell wadding
- Automotive mufflers
- Barbecue fire bed
- Boat hull repair kits
- Flower pots
- Friction materials
- Clutch plates
- Brake linings
- Potter's kilns
- Reinforcement in molded plastic and rubber
- Automotive radiator sealant
- Pottery clay
- Powder (asbestos)
- Bulk fiber
- Vinyl asbestos floor tiles
- Abrasive wheels
- Aerial distress flares
- Molded plastics and phenolic laminates
- Paints
- Textured paint
- Cement, drywall and plaster patching compounds
- Artificial gas fireplace emberizing material
- Phonograph records

Consumer Products Possibly Containing Asbestos

Appliances
- Air conditioners
- Dishwashers
- Handheld mixers
- Portable electric heaters
- Popcorn poppers
- Refrigerators
- Vacuum cleaners
- Waffle makers

Miscellaneous Products
- Carpet padding
- Fireplaces
- Instant paper mache
- Light fixtures on railroad passenger cars
- Welding masks
- File cabinets

Source: CPSC

Nevertheless, building owners are calling asbestos professionals and laboratories for testing. Again, however, inspectors can bias sample results. Contamination on vermiculite attic insulation is generally heavier than on the lightweight expanded vermiculite. The contamination may have settled in an attic or wall cavity over several decades; if the inspector takes the sample from the top of the pile, the contamination may appear lower than is actually present.

Analytical methods employed to determine asbestos contamination in surface dust continue to be controversial. Therefore, before considering surface dust tests, building owners and employers should note that EPA uses air sampling to determine contamination in residences and businesses affected by the collapse of the World Trade Center (EPA WTC 1). Before testing for asbestos contamination, one should ask "What isn't contaminated?"

Conclusion

Asbestos lawsuits are again on the rise. The SH&E community can no longer assume asbestos is on the back burner. While many recognize that asbestos is present in their facilities and address issues as they arise, others operate under a false sense of security by relying on previous asbestos inspections that may not pass the inspection flaw test. Newer buildings may also contain asbestos without anyone's knowledge. Due diligence requirements to identify asbestos can certainly raise the bar for most SH&E professionals—with or without existing asbestos inspections.

Asbestos is naturally occurring and can be found in background levels throughout the world. Contamination can occur naturally or by disturbance of asbestos-containing materials. SH&E professionals should proceed cautiously when asbestos contamination becomes a concern. Many of the current analyti-

cal methods are inadequate and controversial, particularly those involving product and surface dust asbestos contamination. Fortunately, EPA has developed excellent guidance for testing, cleaning and clearing asbestos-contaminated buildings.

Those who believe asbestos is no longer being produced are ignoring the facts. Some 13,100 metric tons of asbestos were imported into the U.S. in 2001, and worldwide mining of asbestos was estimated at 2,050,000 metric tons in 2001(Buckingham and Yates 3). Asbestos is not just hanging around; it's getting a second wind. ■

Zonolite: Cause for Concern

In Libby, MT, near the Canadian border, ore from a vermiculite mine was contaminated with an asbestos fiber that has been linked to illness and possibly death among miners and their families. The Libby mine was responsible for producing more than 70 percent of the world's vermiculite before it was closed in 1990. This mine has been found to be contaminated with Tremolite asbestos. EPA reports that most vermiculite likely contains small traces of asbestos contamination.

Vermiculite is mined, heated and expanded into a light, fluffy product that is fire-resistant, chemically inert, absorbent and odorless. Its absorbent properties make it useful in lawn and garden, agricultural and horticultural products. Other common uses include thermal and sound insulation, construction material, and in lightweight packing materials.

Another product of concern is an insulating material called Zonolite, which was used in residential structures as loose-fill insulation for attics and wall cavities; it was manufactured and sold from approximately 1925 to 1985. No one knows how many homes contain Zonolite, but the government estimates as many as 15 to 35 million homes may be affected.

The scientific community is studying what this contamination means to homeowners who find this product in their homes. Until more information is available, EPA recommends that affected homeowners take several precautions:

- If possible, leave the insulation undisturbed. Asbestos particles will not become airborne if the insulation is contained in walls or attic spaces. If it is sealed behind wallboards and floorboards or is isolated in an attic that is vented outside, the best approach is to keep it in place.
- If planning to remodel or replace vermiculite insulation, it should be tested first by a trained and accredited professional. Many states maintain lists of licensed asbestos professionals. Use of a negative-pressure enclosure will prevent asbestos fibers and dust from escaping into the rest of the home. According to EPA, homeowners should not attempt to remove the insulation by themselves because improper removal methods could result in the release of asbestos fibers throughout the home.
- After vermiculite insulation is removed, homeowners should consider air testing to ensure that the concentration of asbestos in the home is low or undetected.

For current information on asbestos and its health effects, call EPA's hotline at at (202) 554-1404. Information is also available at www.epa.gov/asbestos.

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