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This is probably a rather common problem

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CASE STUDY
Drilling of Floor Tile During Residential Insect Control

By:

J.R. Millette and E. Ewing

4915 AUBURN AVENUE, SUITE 303, BETHESDA, MD 20814

301-961-4999 (phone) 301-961-3094(fax) eiacom@aol.com (email)

CASE STUDY
Drilling of Floor Tile During Residential Insect Control

By J.R. Millette and E. Ewing

ABSTRACT

This report describes a project involving a problem with a residential insect control company employee drilling into asbestos-containing floor tile without precautions. The Occupational Safety and Health Administration (OSHA) rules now extend to many job situations, including this one, which were not traditionally considered asbestos related. A study of fiber release during drilling of the tile was conducted. Based on the guidance from OSHA, the Environmental Protection Agency (EPA) and the experimental evidence of asbestos fiver release, it it clear that drilling asbestos-containing floor tile should be done by trained individuals with proper engineering and work practice controls to minimize exposure.

INTRODUCTION

Although regulations to minimize asbestos fiber release during abatement and remodeling have been in existence for a number of years, not every company that disturbs asbestos-containing material (ACM) recognizes their responsibility. The EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) describe how ACMs such as floor tile, generally considered to be non-friable, can become friable when cut or drilled. The new OSHA rules now apply to many occupations not generally thought to be directly dealing with asbestos fiber exposure. In this particular case study the authors were made aware of a situation where a commercial pest control company had treated a residential dwelling for termites by drilling holes into the floor tile in a finished basement. The termite treatment person drilled the holes in the floor without regard for the fact that the tiles contained asbestos. The drilling was done in a dry manner and the resulting dust and debris was left for the homeowners to clean up. The cleaning was done with a normal household vacuum cleaner and normal dusting procedures. The fact that the floor tile contained asbestos came to light only after a contractor was called in to replace some of the floor tiles damaged during the drilling. The issue then became what the pest control company personnel should have done so that his activities would not have released asbestos fibers.

POLICY AND GUIDANCE RESEARCH

A search of government regulations and guidance was conducted to determine the proper cautions that should be considered in this situation.

Under NESHAP asbestos-containing floor tile is considered a resilient floor covering which is considered a Category I non-friable ACM. Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading is considered regulated asbestos-containing material (RACM). As defined under NESHAP, grinding means to reduce to powder or small fragments and includes mechanical chipping or drilling (1).

Under the Asbestos Hazard Emergency Response Act (AHERA) definition, floor tile is considered a damaged friable miscellaneous material if it is separated into layers; if it is flaking, blistering, or crumbling; or if there are signs of physical damage (2). An EPA Policy Clarification for the AHERA issued by the Chicago (Region 5) office states that removal of vinyl asbestos tile (VAT) which involves sanding, grinding, mechanical chipping, drilling, cutting, or abrading the material has a high probability of rendering the ACM friable and capable of releasing asbestos fibers (3).

Based on the above information, after drilling, an asbestos-containing floor tile is considered by EPA to be a damaged friable miscellaneous material, as well as a RACM.

OSHA regulates asbestos exposure in all work including construction, alteration, repair, maintenance or renovations of structures, substrates, or portions thereof, that contain asbestos. OSHA's approach is to trigger protective provisions based on the kind of

operation undertaken, rather than basing their approach on measured exposure levels (4). Under OSHA, the disturbance of an asbestos-containing material during maintenance operations is considered Class III asbestos work. Drilling of asbestos-containing floor tile should therefore conform to the work practices and engineering controls for Class III asbestos work. The work must be conducted by trained personnel using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees. The work is performed using wet methods and, to the extent feasible, using local exhaust ventilation. Also under OSHA, where an employer does not produce a "negative exposure assessment" (evidence that the asbestos fiber concentration does not exceed the permissible exposure limit while a particular task is done) for a Class III job, the employer must contain the area using a controlling system (5).

Based on the information from OSHA, it is clear that drilling asbestos-containing floor tile should be done with proper engineering and work practice controls to minimize exposure. Employees performing such work should have asbestos training and, in some cases, consider using personal protective equipment.

DEMONSTRATION OF FIBER RELEASE

To determine whether asbestos fibers were released into the air during the drilling of the tile by the pest control company employee, a small experiment was performed in which a piece of the tile from the home was drilled under controlled conditions. A plastic enclosure (glove box) was constructed around a Delta 8" drill press, Model 11-950, for the testing. The box contained approximately 1 cubic foot of air volume. An air sample (G0407A) was collected for one minute in the vicinity (approximately 6 inches away) of tile sample (G0407) while it was being drilled with a 1/4 inch masonry bit. A second sample (G0407B) was collected while the dust created by the drilling was swept with a brush made of broom bristles and put into a plastic container. Both air samples were collected using a 0.45µm pore size membrane filter in a standard air monitoring cassette assembly attached to a personal air sampling pump drawing air through the cassette at a rate of 2 liters per minute. Makeup air for the enclosure was filtered through 2 air cassettes. The samples were prepared using a direct (AHERA) preparation procedure and analyzed using a JEOL 1200 transmission electron microscope (TEM) equipped with a Noran energy dispersive x-ray analysis unit. The combined sample of residual dust and debris created by the drilling was treated as a bulk sample and analyzed with a polarized light microscope (PLM) and scanning electron microscope (SEM).

TESTING RESULTS

Typical asbestos fibers seen by TEM on the air filter (G0407A) collected while the tile was drilled are shown in Figure 1. Chrysotile asbestos is present both as free fibers and bundles and in matrix with tile filler material. Figure 2 shows an asbestos fiber bundle seen on the air filter (G0407B) collected while dust and debris from the tile was being swept up. Although the air samples did not represent a true exposure assessment and concentrations were not calculated, there were a number of fibers present on the filters. The loading of chrysotile structures on the filters was approximately 440/mm^2 for sample G0407A and approximately 16,000/mm^2 for sample G0407B.

The dust and debris contained approximately 15% chrysotile asbestos. Small pieces of the mastic were intact after the drilling and were analyzed separately. The matic was 1-5% chrysotile asbestos. The particles contained limestone, pigment and organic binder as well as chrysotile asbestos. Some chrysotile was in the form of free bundles; while some was in the form of matrix structures.

DISCUSSION

During the demonstration, the asbestos-containing floor tile (G0407) released chrysotile fibers when drilled with a masonry drill bit. Chrysotile asbestos fibers were made airborne by cleaning (sweeping) activities. The sweeping activity created a higher concentration of fibers in the air than did drilling. The dust created by the drilling contained significant amounts of chrysotile asbestos. Some of the microscopic chrysotile fiber material is in the form of free fibers and bundles and some is connected to floor tile filler material. The matrix structures may release asbestos fibers if disturbed by walking on them or during cleanup activities.

An EPA-US Post Office study (6) concluded that drilling of asbestos-containing flooring without engineering controls can produce airborne concentrations of asbestos over 0.1 f/cc time weighted average as determined by phase contrast microscopy (PCM). In that study, rotary drills fitted with shrouds which acted as local exhaust hoods when attached to HEPA vacuums were shown to be effective in minimizing fiber release from drilling. Another

study has shown that a procedure as simple as applying shaving cream to the floor before drilling can minimize airborne fiber release (7).

Businesses dealing with residential or commercial property should provide training for their employees in the proper handling of asbestos-containing material that they may contact on site. A neglect to do so may be in violation of EPA and OSHA regulations and unnecessarily result in asbestos exposure to employees and building occupants.

REFERENCES

1. USEPA, National Emissions Standards for Asbestos, 40 CFR 61.141 and USEPA, A Guide to Normal Demolition Practices Under the Asbestos NESHAP. EPA-340/1-92-013, September 1992.

2. USEPA, Asbestos-Containing Materials in Schools; Final Rule and Notice, 40 CFR 763.83

3. USEPA, Policy Clarification Asbestos Hazard Emergency Response Act (AHERA), United States Environmental Protection Agency, Region 5, Chicago, April 29, 1993.

4. OSHA preamble, FR p 40968

5. US Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926.1101

6. Brakett, K.A.; Hanna, J.L., Vincent, H.S. and Clark, P.J.; Engineering Control Practices for Reducing Emissions During Drilling of Asbestos-Containing Flooring Materials, EIA Tech. Monograph Series, Vol. 2, 1997

7. Oberta, A.F.; and K.E. Fischer; Negative Exposure Assessments for Special Floor Tile Work Practices; presented at *Advances in Environmental Measurement Methods for Asbestos*, American Society for Testing and Materials, University of Colorado, Boulder, Colorado July 13-17, 1997; scheduled for publication in an ASTM Standard Technical Publication in 1998.

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