

Based on the EEH study, OSHA has determined that these exposures can be controlled to levels under 0.1 f/cc through the use of shrouded or doty tools. Thus, the Agency has determined that it is feasible to comply with the 0.2 f/cc PEL during the installation of A/C pipe.

A/C Sheet. In new construction activities, the installation of A/C sheet may require sawing, drilling, or sanding operations. Much of this activity, however, is performed by primary and secondary manufacturers, thereby reducing the need for additional fabrication in the field.

For on-site fabrication that does occur, the use of tools fitted with local exhaust shrouds connected to a HEPA vacuum have been demonstrated to reduce concentrations significantly [Exhibits 312-A and 298]. TWA exposures during the installation of A/C sheet have been reported to be below 0.2 f/cc, even for drilling and cutting [Exhibit 84-474, Appendix A]. In fact, some studies reported only from 40 percent to 50 percent of the measurements above concentrations of 0.1 f/cc [Exhibits 308 and 333, Section R]. Thus, OSHA has determined that it is feasible to meet a PEL of 0.2 f/cc through the use of engineering controls during the installation of A/C sheet.

Vinyl/Asbestos Floor Tile. In four studies [Exhibit 84-474, p. 314] performed for the Resilient Floor Covering Institute, personal breathing zone samples were collected to evaluate worker exposures during various installation and removal operations for both sheet vinyl floor covering and vinyl-asbestos floor tile. The results indicated that TWA airborne fiber concentrations ranged from below detectable (less than 0.01 f/cc) to 0.10 f/cc during the installation of sheet vinyl, and from below detectable to 0.03 f/cc during the installation of vinyl-asbestos floor tile. In another study, Dunnigan and Lebel [Exhibit 84-474, p. 3.14] reported TWA concentrations below detectable levels for the installation of vinyl-asbestos floor tile.

When installing a new floor, it is often necessary to first remove the old tile or sheet vinyl floor covering. The data obtained [Exhibit 84-474, p. 314] indicate that when the recommendations of the Resilient Floor Covering Institute (e.g., wet sweeping and handling, and prohibiting powersanding and blowing asbestos dust) were followed, average TWA airborne fiber concentrations were below the 0.2 f/cc PEL during the removal of the old floor. Thus, OSHA determined that it is feasible to comply with the 0.2 f/cc PEL during the removal

and installation of vinyl/asbestos flooring.

Asphalt Roofing Felts and Coatings. Asbestos roofing felts are composed of approximately 85 percent chrysotile asbestos, saturated with tar or asphalt. During installation, the roofing felts are cut to length with knives and are attached to the roof with nails. Asphalt is then applied over the felts. The removal of roofing felts generally requires chopping (with an axe) or sawing (with a circular mounting on wheels) the existing roof membrane into pieces that can be pried or scraped from the deck. Because the asbestos fibers are encapsulated with tar or asphalt during the production of the felt, the fiber release during installation and removal is expected to be relatively low.

In written testimony, Eric Wormser of Gibson-Homans emphasized that during the "tear-off" of an old roof, "there still is no asbestos exposure since asbestos fibers in any old coating or cement are encapsulated in the product" [Exhibit 91-16, Section K, p. 8]. Nevertheless, as the condition of the roof deteriorates due to age and exposure to the elements, the quantity of asbestos fibers released will increase. This is clearly shown in studies conducted by Johns-Manville, and reported by GCA Corporation [Exhibit 84-474, p. 3.17]. Personal breathing zone and area samples were collected at 11 separate construction sites to evaluate worker exposure to asbestos during the removal and subsequent replacement of old roofing. The results indicated TWA airborne fiber concentrations as high as 0.60 f/cc during the installation of roofing felts, with a mean concentration of 0.22 f/cc. Thus, engineering controls and work practices may not reduce exposures below the 0.2 f/cc PEL in all cases and respirators will be required during some roofing projects.

Asbestos Abatement. Because of the concerns about potential health hazards, many building owners and managers, as well as industrial firms, are performing asbestos abatement projects to prevent or reduce the potential for fiber release. Generally, these involve either removal (with or without replacement using a non-asbestos substitute), encapsulation with a polymeric coating, or enclosure. In recent years, many contracting firms have been formed that specialize in asbestos abatement.

In general, asbestos removal involves one of two categories of products: (1) Spray-on or trowel-applied fireproofing or acoustical plasters; and (2) insulation of pipes, boilers, or process equipment. In removing asbestos, a widely used practice is to wet the material to be

removed, usually with water having a surfactant added to enhance penetration [Exhibit 84-474, p. 3.22]. The use of vacuums equipped with HEPA filters, or wet mopping are the preferred methods of clean up.

In written testimony, Suzanne Kossan of the International Brotherhood of Teamsters gave evidence to support the effectiveness of wet methods, when she stated the following:

Of over 7,000 air samples gathered [in 1983] at Maryland construction sites, approximately one-half of the samples showed asbestos exposure levels less than 0.1 f/cc, 8-hour TWA. [Exhibit 223, p. 3].

The data by T. Joel Loving of the University of Virginia [Exhibit 84-474, p. 3.23] show that although wet methods are effective in reducing exposures to below the current PEL of 2.0 f/cc during asbestos removal, 47 percent of the observations exceeded 0.5 f/cc, and a total of 59 percent exceeded the 0.2 f/cc PEL. The Loving report also summarized similar data from other investigators.

The data from Clayton Environmental Consultants, Inc. [Exhibit 84-474, p. 3.27] for the removal of fireproofing and acoustical plastics using both wet methods and a HEPA vacuum, for example, show eight short-term exposures ranging from below detectable to 170 f/cc. In fact, of 255 personal samples collected, 79 percent exceeded the 0.2 f/cc PEL. Joseph Durst, Jr., of United Brotherhood of Carpenters and Joiners of America, acknowledged the difficulty of reducing exposure levels during abatement projects and stated as follows:

Although exposures could be brought down to the level of 500,000 to one million fibers/m³ [through the use of wet methods and engineering controls], exposures below 100,000 fibers/m³ may be difficult to achieve in some cases. In those cases personal protective equipment will be necessary and would be the only feasible way to reduce exposures to below safe levels. [Exhibit 143, p. 4.]

Thus, on the basis of these data, OSHA has determined that engineering controls cannot routinely reduce exposures below the 0.2 f/cc PEL during major asbestos removal projects and that the supplemental use of respirators may be required.

For minor removal projects, where small amounts of asbestos are removed, OSHA has determined that the 0.2 f/cc PEL is feasible. For example, data supplied by Clayton Environmental Consultants, Inc., indicate that 8-hour TWA exposures during the removal of preformed pipe insulation from process pipe at petroleum refineries using wet methods, range from less than 0.01 f/cc