

the building than inside where the demolition was occurring. Although no personal samples were taken, areas samples in work activity zones revealed average exposure levels below 0.1 f/cc [Exhibit 288].

Conclusion

OSHA has determined that compliance with the 0.2 f/cc PEL is feasible in most industries most of the time through the use of wet methods, engineering controls, and good housekeeping practices. There are some operations, however, for which compliance through the use of engineering controls and work practices alone does not appear achievable at this time. These situations are usually due to the inability of the operation to use wet methods (e.g., some textile operations, nuclear rip-out, some building repair etc.), or due to space limitations, (e.g., maintenance and major rip-outs on ships) and the volume of dust generated (e.g., cutting coupling operations for A/C pipe and sanding A/C sheet). During these operations, therefore, respiratory protection must also be used to comply with the 0.2 f/cc PEL. Finally, engineering controls are needed even when immediate exposures exceed 0.2 f/cc, however, because they protect workers in neighboring areas from being exposed over the PEL.

Benefits

The inhalation of asbestos fiber has been clearly associated with three clinical conditions: asbestosis, mesothelioma (a cancer of the lining of the chest or abdomen), and lung cancer. Many studies have also observed increased gastrointestinal cancer risk. Risk from cancer at other sites, such as the larynx, pharynx, and kidneys, is also suspected.

Initial exposure limits for asbestos were based on efforts to reduce asbestosis which was known to be associated with asbestos exposure. The reduction in the number of cases of asbestosis, however, resulted in workers living long enough to develop cancers that are now recognized as associated with asbestos exposure. The following discussion of the benefits associated with a reduction in exposures, therefore, focuses on the number of cancer cases avoided within the exposed work force. The results are expressed in terms of deaths avoided because these cancers almost always result in death.

The benefits of a reduction in the PEL depend upon current exposure levels, the number of workers exposed, and the risk associated with each exposure level. The current ambient air levels estimated by OSHA and the estimated

number of workers exposed to asbestos are presented in Tables 22 through 23. Based on the Agency's economic and feasibility analyses, OSHA estimated the new exposure and employment levels that would result from the promulgation of the revised 0.2 f/cc PEL.

These are also presented in Tables 22 and 23. The lifetime risk of three kinds of cancer (lung cancer, mesothelioma, and gastrointestinal cancer) was estimated by OSHA for 1 year of exposure and is presented in Section VI of this preamble.

TABLE 22.—ESTIMATES OF OCCUPATIONAL EXPOSURE TO ASBESTOS IN GENERAL INDUSTRY FOR 1984

Industry segment	Current 2.0 f/cc		Proposed 0.2 f/cc	
	No. of exposed workers	Level of exposure (f/cc)	No. of exposed workers	Level of exposure (f/cc)
Primary manufacturing:				
Asbestos/cement pipe	512	0.12	512	0.02
Asbestos/cement sheet	203	.69	159	.11
Friction materials	5,104	.88	4,801	.11
Textiles	413	.37	405	.03
Floor tile	276	.06	276	.06
Gaskets and packings	315	.37	306	.07
Paper	387	.13	380	.03
Coating and sealants	1,327	.31	1,327	.06
Plastics	324	.28	322	.05
Secondary manufacturing:				
Asbestos/cement sheet	345	.45	345	.07
Friction products	1,504	.27	1,458	.10
Gaskets and packings	9,972	.08	8,741	.02
Textiles	172	.59	170	.05
Plastics	2,450	.10	2,420	.04
Automotive remanufacturing	4,750	.19	4,669	.03
Services:				
Automotive repair	526,998	.06	526,998	.01
Shipbuilding and repair	15,000	.27	15,000	.02

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis. Based on the analysis presented in Appendix G of the RIA.

TABLE 23.—ESTIMATES OF EXPOSURE TO ASBESTOS IN THE CONSTRUCTION INDUSTRY: 1984¹

Industry segment	Current 2.0 f/cc		Proposed 0.2 f/cc	
	No. of full-time equivalent workers	Level of exposure (f/cc) ²	No. of full-time equivalent workers	Level of exposure (f/cc)
New construction:				
Asbestos/cement pipe	1,415	0.035	1,415	0.035
Asbestos/cement sheet	1,225	.130	1,225	.10
Built-up roofing installation	1,375	.220	1,375	.022
Asbestos abatement:				
Asbestos removal	3,820	.140	3,820	.021
Asbestos encapsulation	453	.220	453	.022
Demolition	3,163	.061	3,163	.001
General building renovation:				
Drywall demolition	51,300	.340	51,300	.003
Built-up roofing	10,990	.120	10,990	.012
Routine maintenance in commercial and residential buildings:				
Repair/replace ceiling tiles	895	.450	895	.045
Repair/adjust ventilation/lighting	2,688	.310	2,688	.006
Other work above drop ceiling	385	.310	385	.006
Repair plumbing/boiler	2,854	.180	2,854	.018
Repair roofing	3,073	.120	3,073	.012
Repair drywall	4,618	.750	4,618	.075
Repair flooring	18,430	.020	18,430	.020
Routine maintenance in general industry:				
Gasket removal and installation	768	.090	768	.080
Removal of pipe and boiler insulation	653	.123	653	.025
Miscellaneous activities	612	.294	612	.029

¹ Based on the determination that there is a large group of construction workers who are exposed to asbestos infrequently throughout the year. This analysis converts the number of workers to the full-time equivalents (i.e., the number of workers that would be exposed for the full 1-year period).

² These exposure levels were estimated based on the assumption that the least costly respirator will be used. If supplied-air respirators are used, as is assumed in the cost analysis, then the exposures will be lower.

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis. Based on the analysis presented in Appendix G of the RIA.

Based on these risk assessments, OSHA estimated the deaths resulting from these three types of cancer, given

current exposures.² These estimates are

² Given the nature of the construction industry, many workers are exposed intermittently throughout year. In order to estimate the cancer deaths, full-time equivalents were used—that is, two workers exposed for one-half year each would total one full-time equivalent.