Not designating a ceiling level also corresponds to OSHA's use of cumulative dose models in deriving lung cancer risk and the model used to derive mesothelioma risk. Neither model attributes additional risk to peak ceiling exposures (see discussion in Section V, Quantitative Risk Assessment, and Tr. 6/19, p. I-109).

Although some experts have attributed elevated risk of disease to short "very high" level asbestos exposures, OSHA believes the level of peak exposures involved in the situations referred to far exceeded 6.0 f/cc, the practical ceiling imposed by this standard. Thus, at the rulemaking hearing, Dr. William Nicholson, based his assessment that "much of the hazardous exposures come from peaks" on evidence from

> "two industries [where] the predominate exposure has been from air concentrations that have occurred that were very high, but for short duration. Insulation work is one for example. Repair work is the other. And as a consequence particularly in insulation work much of the exposures, much of the disease of today has been from these intermittent high peaks, . . . which we have averaged over time for the purpose of a risk assessment [Tr. 6/19, p. I-140-147].

For one of the groups, insulation work, time-weighted average exposures have been estimated as approximately 50 f/cc (Tr. 7/12, 295). At such a high TWA exposure a 15 minute ceiling exposure would necessarily be vastly higher than the levels allowed by this final standard. Therefore OSHA believes this record provides no evidence indicating that peaks permitted by this standard independently elevate risk above the cumulative dose permitted by the time-weighted average PEL. Other participants also pointed out the scarcity of toxicological and dose-response data concerning an appropriate ceiling level and the resultant difficulties of recommending a specific change to the 10 f/cc limit (see e.g., Ex. 90-236).

The April proposal specifically asked participants for recommendations for specific ceiling levels. In response, some participants recommended a 5 f/cc ceiling limit [Exs. 92-045, 90-180]; a ceiling limit equivalent to 10 times the PEL [Ex. 127] and the AFL-CIO recommended that OSHA should lower the ceiling level for the asbestos standard proportionally to the reduction in the permissible exposure limit which would be 0.5 f/cc, based on the AFL-CIO recommended 0.1 f/cc time-weighted average PEL [Ex. 335, p. 46]. The only scientific evidence cited by the AFL-CIO was the statement of Dr. Nicholson, discussed above, and Dr. Selikoff's testimony that mesotheliomas have appeared in a few workers with very short exposures and in household contact with peak exposures from laundering asbestos contaminated clothing. However the evidence relating dose to these diseases is limited, and OSHA believes it is as compatible with a cumulative dose model as with a peak exposure model. In addition, practical considerations rule out ceiling levels as low as AFL-CIO recommends. The NIOSH panel testified that using the reference method of sampling and analysis, the shortest period of time one could measure 0.5 f/cc would be 25 minutes [Tr. 6/21, p. III-139].

As to the other levels suggested by participants, OSHA believes there is little biological evidence in the record that supports a dose rate response model utilizing peak or ceiling exposures on which to base any specific ceiling limit. As explained above, OSHA believes that practical limitations are imposed on short-term exposures by the time-weighted PEL and by the provisions under housekeeping which would require immediate clean-up of any unexpected release of asbestos fibers such as spills and containers and bags breaking.

Further, the provisions on monitoring require that sampling be conducted during the periods when the highest exposures occur, which would include periods of peak exposures.

Because protective requirements are triggered by the action level of 0.1 f/cc any exposure for 15 minutes above 3 f/cc will have regulatory significance. OSHA believes that its treatment of the issue of a ceiling level reflects the evidence on this record and will protect employees against the as of yet unproven possibility that in fact very high short term exposures have independent significance in increasing risk.

4. *Paragraph (d). Exposure Monitoring.*

Section 6(b)(7) of the Act [29 U.S.C. 665] mandates that any standard promulgated under section 6(b) shall, where appropriate, "provide for monitoring or measuring of employee exposures at such locations and intervals, and in such a manner as may be necessary for the protection of employees." The primary purpose of monitoring is to determine the extent of employee exposures to asbestos.

Exposure monitoring informs the employer whether the employer meets the obligation to keep employee exposures below the 8-hour TWA exposure limit. Exposure monitoring also permits the employer to evaluate the effectiveness of engineering and work practice controls and informs the employer whether additional controls need to be installed. Furthermore, exposure monitoring is necessary in order to determine whether respiratory protection is required at all, and if so, which respirator is to be selected. In addition, Section 8(c)(3) of the Act [29 U.S.C. 657(c)(3)] requires employers to notify promptly any employee who has been or is being exposed to toxic materials or harmful physical agents at levels that exceed those prescribed by an applicable occupational safety or health standard. Finally, the results of exposure monitoring are part of the information that must be supplied to the physician, and these results may contribute information on the causes and prevention of occupational illness.

Paragraph (d) of the final rule contains the standard's requirements related to the monitoring of employee exposure. The final rule contains an 8-hour TWA permissible exposure limit and an action level that acts to alert employers of cases where existing exposures are approaching the PEL. There are two possible exposure situations that will determine the frequency of monitoring required. The table below lists these two exposure situations, along with the monitoring frequency for each.

Exposure scenario	Required monitoring activity
Below the action level	No monitoring required.
At or above the action level	Monitor exposure at least every 6 months.

As is shown by the table above, the action level trigger determines whether employers must monitor employee exposure to asbestos; where the action level is reached or exceeded, the employer must monitor employee exposures. This is changed from the existing standard, which requires periodic monitoring when exposures are above the permissible exposure limits. It is OSHA's belief that this new requirement of monitoring when levels are at or above the action level is needed to properly assess worker exposure so as to ensure the proper operation of available controls and that respirators with the appropriate protection factors are used in each regulated area. Periodic measurement is appropriate when employee exposures are at or above the action level, because relatively minor changes in the process, materials or environmental conditions might increase the airborne concentration of asbestos to levels above the standard's PEL.

Paragraph (d)(2)(i) requires that each employer shall perform initial

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