API, 448 U.S. at 655]. Because OSHA has found the 0.2 f/cc level technologically feasible the Agency designated the lower proposed limit as the new PEL.

The next point made by proponents of a 0.5 f/cc PEL is that a sizeable portion of the excess risk of asbestos-related disease is caused by smoking and should be deducted from the projected asbestos risk. Accordingly, it is stated, a 0.5 level will more than adequately protect employees from the resulting *pure* asbestos excess risk (Ex. 328, p. I-26). OSHA does not agree. As stated more fully in the section on significant of risk (Section VI), the available evidence shows no causal relationship between mesothelioma and gastrointestinal cancer and smoking. The evidence on the relationship between asbestosis and smoking is limited. Lung cancer risk is influenced by smoking, but both non-smoking and smoking asbestos workers have the same *relative* lung cancer risk, compared to non asbestos-exposed workers. OSHA also believes that the Agency's mandate under the Act requires that OSHA protect the smoking worker as well as the non-smoking worker. Therefore OSHA believes that its risk estimates, which included excess risk for smoking workers properly are the basis for OSHA's determinations of when excess asbestos-related risk is no longer significant.

Other participants urged OSHA to choose a PEL less than 0.2 f/cc. They based their recommendations mainly on what levels are technologically feasible. For example, the AFL-CIO urged that OSHA choose 0.1 f/cc as the PEL because it is the lowest level feasible to achieve. However, as discussed in the section on technological feasibility, OSHA projected that if a 0.1 f/cc level were chosen, in a large number of operations most workers would have to wear respirators to be in compliance (See Section VII).

Although OSHA expects that a modest level of technological development for asbestos control and an improvement in the application of the effectiveness of currently available best controls will occur, OSHA does not find, on this record, evidence of a possible technological breakthrough which would render the 0.1 f/cc level technologically feasible in most operations.

Further, this rulemaking has again pointed out the inherent limitations of reliance on respirators to meet the PEL, particularly for full shift use. OSHA believes that where, as here, the marginal reduction in exposure levels would be quite small, i.e. 0.2 f/cc vs. 0.1 f/cc, employee protection will be more reliable if employer resources and efforts are concentrated on perfecting the more reliable engineering and work practice controls to control down to the PEL rather than deflecting such efforts by requiring widespread respirator use. OSHA also notes that the requirement that some protective activities be instituted below the 0.2 f/cc level at the action level of 0.1 f/cc, is expected to result in reductions in exposure for employees exposed between 0.1 and 0.2 f/cc.

Another issue discussed in the proposal was the need to promulgate different PEL's for different types of asbestos fibers. As discussed in Section IV (Health Effects), epidemiologic data suggest that exposure to amphiboles, particularly crocidolite, is associated with a higher risk of mortality from mesothelioma than is exposure to chrysotile. The United Kingdom and the Province of Ontario have both promulgated lower PEL's for crocidolite than for other types of asbestos minerals, based on these data (Exs. 84-379, 84-223).

Comments that OSHA received on this issue recommended against the promulgation of different PEL's for the different forms of asbestos. For example, NIOSH (Tr. 6/21), ORC (Ex. 123-A), and AIA/NA (Ex. 328) did not believe that the scientific evidence warranted this approach. OSHA agrees with this assessment of the evidence. Although a differential risk by fiber type for mesothelioma is suggested by the human studies, no differential risk is evident for lung cancer. In addition, animal inhalation and injection studies suggest that chrysotile, and not the amphiboles, pose the greatest hazard. As discussed in Section IV, a number of mechanisms have been proposed to explain these human and animal results. OSHA has found that these results and the scientific community's current level of understanding of the mechanisms leading to asbestos-related disease are insufficient to justify the establishment of different PEL's for the different asbestos minerals. Accordingly, in the revised rule, the Agency has retained the concept of the existing asbestos standard that one PEL be established for all types of asbestos minerals.

An additional reason to set a single PEL for all fiber types is OSHA's finding that it would be highly impractical to require employers to distinguish among fiber types in their measurement programs. Most exposures in working with new asbestos materials are to chrysotile, although crocidolite may also be present in smaller quantities (Tr. 7/9, p. 259-260). Removal, repair and abatement activities often involve mixed fiber exposures (Tr. 6/19, p. I-144). These employers, therefore, would be required not only to measure total asbestos fiber levels, but also to measure and analyze by fiber type. The difficulties in making these distinctions in a timely manner as well as the uncertain capability of the reference sampling and analytic method to reliably distinguish fiber types would make fiber type differentials infeasible to comply with for many industries (Tr. 6/21, p. 84; Exs. 90-173, 90-181).

As stated above, the health evidence concerning fiber differential, suggests, but does not compel setting a lower PEL for crocidolite exposures. However, OSHA believes the difficulties of routinely distinguishing by fiber type, the fact that the dominant exposure potential is expected to be to chrysotile and the weakness of the evidence concerning fiber type, all support OSHA's decision to set a single PEL based primarily on feasibility considerations for all fiber types.

Ceiling Limit

This final standard does not designate a ceiling limit for exposure to asbestos. This differs from the April proposal which would have retained the previous requirement in the standard of a ceiling limit of 10 f/cc to be met through engineering and work practice controls (49 FR 14123). Although the existing standard's ceiling limit of 10 f/cc did not include a time period, OSHA had administratively interpreted this provision as prescribing 10 f/cc over a 15 minute period.

OSHA's decision not to designate a ceiling limit in the regulatory text is based on several considerations. First it is noted that the sizeable reduction in the time weighted average PEL affected by this revision i.e., from 2.0 f/cc to 0.2 f/cc, effectively reduces the *de facto* ceiling limit from the 10 f/cc level to 6.4 f/cc. This figure results from multiplying the new PEL of 0.2 f/cc by 32, the number of 15 minute periods in a workday. Therefore should an employer expose an employee above 6.4 f/cc for over 15 minutes, he will be violating the 0.2 f/cc TWA PEL, even if that employee has *no* asbestos exposure for the remainder of that day.

Similarly a 15 minute excursion over 3.2 f/cc would constitute a time weighted average exposure over the action level of 0.1 f/cc and would require the employer to institute monitoring, medical surveillance and training programs. OSHA believes therefore, that even without designating a specific ceiling level this standard effectively protects employees against short term very high exposures.