The primary reason for adopting an action level is that OSHA believes, based on its experience, that it is appropriate to begin some protective actions prior to exceeding the permissible exposure limit to help drive exposure levels downward and to optimize the possibilities that the PEL can be met. Also, in the case of asbestos, significant health risks exist from exposures to 0.1 f/cc. Consequently, supplemental protective measures are clearly warranted, especially when they are feasibly instituted. The 0.1 f/cc action level also is consistent with OSHA's enforcement of the medical surveillance provision of the current asbestos standard, which requires examinations at *any* level, but which OSHA has interpreted to be 0.1 f/cc.

Another purpose of the action level is to provide an appropriate cut-off point for many of the required compliance activities under the standard. The standard applies to some employers whose employees are exposed to airborne asbestos levels that are below the permissible exposure limits but which are significantly above ambient levels. Such employers are required to perform initial monitoring to determine the extent of their employees' exposures to asbestos. If, on the basis of the results of the initial determination, exposure is below the action level, the employer may be excused from monitoring and most other protective measures for that employee, even though it would be feasible to continue them for all exposed employees. The action level concept thus provides an objective test for OSHA and employers to permit the discontinuance of certain activities, such as medical surveillance, training and periodic monitoring when exposures are low.

A statistical explanation of the need for an action level has been discussed in connection with other OSHA health standards. (See, for example, inorganic arsenic, 43 FR 19584; vinyl chloride, 39 FR 35890; and acrylonitrile, 43 FR 45762). In brief, although all employee exposure measurements on a given day may be below the PEL, it is possible that on days when no measurements are taken, an employee's actual exposure may unknowingly exceed the PEL. As discussed in detail in the section on technological feasibility, some industry representatives expressed concern that they may be unable to assure that levels are less than the PEL every day and stated that measurements showing 0.2 f/cc levels on any given day did not mean that levels on unmeasured days would not be higher. OSHA believes that setting an action level will help to alleviate these concerns because requiring periodic employee exposure measurement to begin at the action level will provide the employer with an increased degree of confidence that employees are not inadvertently overexposed on unmeasured days.

The level that should be designated as the action level was an issue during the rulemaking. OSHA had proposed 0.2 f/cc based on the possibility that 0.5 f/cc would be the PEL and because of the uncertainty about the lower limit of reliable measurement. The Asbestos Information Association/North America (AIA/NA) stated that an action level of 0.2 f/cc for monitoring and training is inappropriate based on interday variability and measurement uncertainty for asbestos workplaces [Ex. 328]. As discussed in the section on sampling and analysis, NIOSH has developed modifications to the existing phase contrast method for asbestos determination. By employing the critical aspects of the method (NIOSH Method 7400) and by adopting other procedures that reduce the analytical variability, OSHA believes, based on the record evidence, that reliable measurement can be made at 0.1 f/cc.

It is noted here, however, that even if the employer has controlled exposures to below the action level, paragraph (d)(5) of the final rule requires reinstitution of exposure monitoring "when there has been a change in the production process, control equipment, personnel or work practices that may result in new or additional exposures to asbestos or when the employer has any reason to suspect that a change may result in new or additional exposures."

Fiber

The current definition for "asbestos fibers" is somewhat circular because it begins, " 'Asbestos fibers' means asbestos fibers. . . ." OSHA has deleted the word "asbestos" and the amended definition now begins. " 'Fiber' means a particulate form of asbestos, tremolite, anthophyllite, or actinolite. . . ."

The current definition specifies only the minimum fiber length (5 micrometers) and does not specify any other dimensions. As methods have been developed to count these fibers, other criteria, for example, the aspect ratio (the ratio of length to diameter) have been used in order to standardize counting methods. When criteria of length, diameter, or aspect ratio differ from one method to another, the result could be widely differing counts on the same asbestos sample.

In the April proposal, OSHA raised the issue of adding an aspect ratio (a ratio of length to diameter) to the definition. The aspect ratio most commonly used throughout the world is 3 to 1 or greater. In 1975, both the American Industrial Hygiene Association and the U.S. Public Health Service were recommending the use of the 3 to 1 aspect ratio (40 FR 47658). This convention is currently in use in the NIOSH recommended method #P&CAM 239 (Ex. 84-062), and NIOSH method 7400 (counting rules A) specifies that only fibers with a length to width ratio equal to or greater than 3 to 1 are to be counted (Ex. 84-444). The NIOSH recommended definition for asbestos (Ex. 117A) and the definition for asbestos fiber recommended by the Building and Construction Trades Dept., also AFL-CIO (Ex. 330) specify an aspect ratio of 3 to 1 or greater. Although the current definition for asbestos fiber does not contain an aspect ratio, OSHA has been using the 3 to 1 or greater aspect ratio in its laboratory determinations. This practice agrees with the recommendation made by NIOSH in its revised criteria document (H-033B, Ex. 5).

The experimental evidence in the record indicates that a number of durable fibers, including asbestos, are carcinogenic (Exs. 84-93, 84-131, 84-195). Fibers meeting certain criteria of length and diameter appear to be closely correlated to the incidence of sarcomas in experimental animals. Using implantation studies, Stanton and coworkers (Ex. 84-195) examined the relationship between the carcinogenicity of durable fibers and fiber length and diameter. They demonstrated that in female Osbourne-Mendel rats, the probability of pleural sarcomas correlated best with the number of fibers that measured 0.25 micrometer or less in diameter (and more than 8 micrometers in length). Relatively high correlations were noted with fibers having diameters up to 1.5 micrometers (and length greater than 4 micrometers).

Although these investigators were able to demonstrate that fibers of a certain size were associated with a higher incidence of sarcomas, their work did not show a size threshold for carcinogenicity. In addition, these implantation studies demonstrate the carcinogenicity of fibers that have been implanted in the lung and do not address the likelihood that inhaled fibers will actually reach the alveolar spaces.

Bertrand and Pezerat (Ex. 84-114) showed that the aspect ratio was related to the carcinogenicity of the fiber. They reanalyzed Stanton's early data using other variables and concluded that