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U.S. Department of Labor

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Occupational Exposure to Asbestos - 59:40964-41162

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DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910, 1915, and 1926

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Occupational Exposure to Asbestos

AGENCY: Occupational Safety and Health Administration, Department of Labor.

ACTION: Final rule.

SUMMARY: These final standards amend the Occupational Safety and Health Administration's (OSHA's) standards issued June 17, 1986 (51 FR 22612, 29 CFR 1910.1001, June 20, 1986) for occupational exposure to asbestos in general industry, and the construction industry, 29 CFR 1926.1101 (previously 1926.58). In addition, they include a separate standard covering occupational exposure to asbestos in the shipyard industry, (29 CFR 1915.1001). Major revisions in these standards include a reduced time-weighted-average permissible exposure limit (PEL) of 0.1 fiber per cubic centimeter (f/cc) for all asbestos work in all industries, a new classification scheme for asbestos construction and shipyard industry work which ties



mandatory work practices to work classification, a presumptive asbestos identification requirement for "high hazard" asbestos containing building materials, limited notification requirements for employers who use unlisted compliance methods in high risk asbestos abatement work, and mandatory methods of control for brake and clutch repair.

Most of the revisions in these amended standards are the final response to an order of the Court of Appeals for the District of Columbia Circuit, Building and Construction Trades Department v. Brock, 838 F. 2d 1258, (D.C. Cir 1988), which had upheld the 1986 standards in major respects, but which had remanded certain issues for reconsideration. OSHA had made earlier changes in response to the court order on December 14, 1989 (54 FR 52024, December 20, 1989), and on February 5, 1990 (55 FR 3724).

OSHA believes that these final standards fully address all of the concerns of the participants in this rulemaking and are responsive to all issues remanded by the court for reconsideration.

DATES: The effective date of these amendments is October 11, 1994. Various start-up dates are specified in the standards.

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I. Regulatory History

OSHA has regulated asbestos several times as more information has become available. Asbestos rulemakings marked the early years of the Agency. A 12 f/cc permissible exposure limit (PEL) for asbestos was included in the initial promulgation on May 29, 1971 (36 FR 10466) of OSHA standards pursuant to Section 6(a) of the Act. In response to a petition by the Industrial Union Department of the AFL-CIO, OSHA issued an Emergency Temporary Standard (ETS) on asbestos on December 7, 1971, which established a PEL of 5 f/cc as an 8-hour time-weighted average (TWA) and a peak exposure level of 10 f/cc.

In June 1972, OSHA promulgated a new final standard that established an 8-hour TWA PEL of 5 f/cc and a ceiling limit of 10 f/cc. These limits were intended primarily to protect employees against asbestosis, and it was hoped that they would provide some incidental degree of protection against asbestos induced forms of cancer. Effective July 1976, OSHA's 8-hour TWA limit was reduced to 2 f/cc and this limit remained in effect up to the effective date of the

revised 1986 standards.

In October 1975, OSHA published a notice of proposed rulemaking (40 FR 47652) to revise the asbestos standard because the Agency believed that "sufficient medical and scientific evidence has been accumulated to warrant the designation of asbestos as a human carcinogen" and that advances in monitoring and protective technology made re-examination of the standard "desirable." This proposal would have reduced the 8-hour TWA to 0.5 f/cc and imposed a ceiling limit of 5 f/cc for 15 minutes. The 1975 proposal would have applied to all industries except construction.

At that time no separate proposal applicable to the construction industry was developed by the Agency.

On May 24, 1983 OSHA consulted with the Advisory Committee for Construction Safety and Health ("ACCSH") concerning the applicability of any new asbestos standard to the construction industry. ACCSH endorsed OSHA's position that any new PEL adopted for general industry should also apply to the construction industry (Ex. 84-424).

On November 4, 1983 OSHA published an ETS for asbestos (48 FR 51096). The ETS marked a new regulatory initiative, related to, but not part of the 1975 proceeding. The ETS was held invalid by the U.S. Circuit Court of Appeals for the Fifth Circuit on March 7, 1984.

Subsequently, OSHA published a notice of proposed rulemaking (49 FR 1416, April 10, 1984) for a standard covering occupational exposure to asbestos in all work places subject to the Act. Pursuant to Section 6(c) of the Act, the ETS also served as a proposed rule. On June 17, 1986, OSHA issued two revised standards, one governing occupational exposure to asbestos in general industry workplaces, the other applicable to construction workplaces (51 FR 22612 et seq., June 20, 1986). Effective July 21, 1986, the revised standards amended OSHA's previous asbestos standard issued in 1972. The 1986 standards explicitly applied to occupational exposure to non-asbestiform tremolite, anthophyllite and actinolite. After a subsequent and separate rulemaking proceeding OSHA has deleted these minerals from the scope of the asbestos standards. (57 FR 24310, June 8, 1992).

The separate comprehensive asbestos standards for general industry and construction which were issued in 1986 shared the same permissible exposure limit (PEL) and most ancillary requirements. Both standards reduced the 8-hour time weighted average (TWA) PEL tenfold to 0.2 f/cc from the previous 2 f/cc limit. Specific provisions were added in the construction standard to cover unique hazards relating to asbestos abatement and demolition jobs.

Several major participants in the rulemaking proceeding including the AFL-CIO, the Building and Construction Trades Department (BCTD) of the AFL-CIO, and the Asbestos Information Association (AIA), challenged various provisions of the revised standards. On February 2, 1988, the U.S. Court of Appeals for the District of Columbia issued its decision upholding most major challenged provisions, but remanding certain issues to OSHA for reconsideration (BCTD, AFL-CIO v. Brock, 838 F.2d 1258). The Court determined that OSHA had not adequately explained why it was not adopting certain recommended provisions in light of evidence suggesting that those provisions would be feasible to implement and would provide more than

a de minimis benefit for worker health. The Court also ordered OSHA to clarify the regulatory text for two provisions and found one provision, a ban of spraying asbestos-containing products, unsupported by the record. In addition, OSHA's failure to adopt a short-term exposure limit (STEL) was ordered to be reconsidered within 60 days of the Court's mandate. In partial response, OSHA issued a STEL of 1 f/cc measured over a 30-minute sampling period, on September 14, 1988 (53 FR 35610).

In response to additional petitions by BCTD and the AFL-CIO, the Court, in an October 30, 1989 order, divided the remand issues into three categories as follows. With respect to three issues, the Court ordered OSHA to take action by December 14, 1989. These issues were:

Issue 1. formally delete the ban on the spraying of asbestos-containing materials;

Issue 2. clarify that periodic monitoring in the construction industry must be resumed after conditions change; and

Issue 3. Clarify the exemption for "small-scale, short duration operations" from the negative-pressure enclosure requirements of the construction standard to limit the exemption to work operations where it is impractical to construct an enclosure because of the configuration of the work environment.

OSHA issued its response on these issues on December 14, 1989 (54 FR 52024, December 20, 1989). In that document OSHA (1) removed the ban on the spraying of asbestos-containing materials; (2) changed the regulatory text to clarify that construction employers must resume periodic monitoring whenever there has been a change in process, control equipment, personnel or work practices that may result in new or additional asbestos exposure; and (3) explained why OSHA was not amending the regulatory text to clarify the limited exemption for "small-scale, short-duration operations" in the construction industry standard, but instead would institute rulemaking on this issue.

With respect to the second group of issues, the Court ordered OSHA to complete its response on the existing record by January 28, 1990. These issues are:

Issue 4. The possibility of further regulations governing employee smoking controls;

Issue 5. The effectiveness levels of various respirators and OSHA's policy of requiring respirators to protect workers at only PEL level; and

Issue 6. The possibility of bi-lingual warnings and labels for employers with a significant number of non-English-speaking employees.

The Court stated that if OSHA determines that these issues could not be resolved on the existing record, OSHA may explain why and commence new rulemaking instead.

On January 28, 1990, OSHA issued its response on these issues (55 FR 3724, February 5, 1990). In that document, OSHA: (1) prohibited workplace smoking in areas where occupational exposure to asbestos takes place; expanded training requirements to include information

about available smoking cessation programs; required the distribution of self-help smoking cessation material; and, required a written opinion by the physician stating that the employee has been advised of the combined dangers of smoking and working with asbestos; (2) explained how and why the 1986 respiratory protection standards will reduce employee risk below that remaining solely as a result of the PEL, and that the effectiveness levels of respirators are under review; and (3) required employers to ensure that employees working in or near regulated areas understand warning signs, and required training programs to specifically instruct employees as to the content and presence of signs and labels.

Finally, as to the third group of three remaining remand issues, the Court ordered OSHA to resolve these issues after rulemaking. These issues are:

Issue 7. The establishment of operation-specific permissible exposure limits;

Issue 8. The extension of reporting and information transfer requirements; and

Issue 9. The expansion of the competent person requirement to all employers engaged in any kind of construction work.

In addition, the Court granted OSHA's unopposed request to publish the Notice of Proposed Rulemaking on this group of issues on April 13, 1990, to allow sufficient time to consult with the Advisory Committee on Construction Safety and Health (ACCSH). Under the Construction Safety Act (40 USC 333) and regulations in 29 CFR 1911.10 and 29 CFR 1912.3, OSHA was required to consult with that committee in the formulation of regulatory proposals which would apply to employment in construction. OSHA presented the proposed regulatory text and pertinent explanatory materials to the ACCSH and consulted with them on March 14, 1990. The Committee submitted comments and suggestions which were discussed in the proposal. The Court, on May 2, 1990 granted OSHA's further motion and extended the time to issue the proposal until July 12, 1990, in order to allow coordination of the proposal with other regulatory agencies, in particular EPA.

The proposed revisions were published July 20, 1990 (55 FR 29712). The date for close of the public comment period in the NPRM was September 25, 1990 with the public hearing scheduled to commence October 23, 1990. However, several interested parties requested additional time for comment on the NPRM due to the breadth of issues it presented. OSHA felt the objective of developing a complete rulemaking record would be served and extended the period for submission of public comments and for notices to appear at the informal hearing until December 3, 1990. The Agency also rescheduled the informal hearing to begin January 23, 1991. In the notice extending the time periods, OSHA also explained more clearly that the ACCSH report referenced in the NPRM was submitted by the labor representatives on that committee and not by the committee as a whole (55 FR p. 38703, September 20, 1990).

The informal hearing was held for 13 days from January 23 to February 8, 1991. At the close of the hearing Administrative Law Judge Sheldon Lipson set April 12, 1991 as the close of the post-hearing comment period and June 12, 1991 as the close of the post-hearing briefing period. Subsequently on request, Judge Lipson extended these periods to April 26 and June 26 respectively. BCTD requested OSHA extend the post-hearing briefing period 4 weeks to

allow additional time to fully address all issues of concern due to the extent and complexity of the records. OSHA granted this request and notified participants that the post-hearing briefing period was extended to July 24, 1991.

On November 3, 1992, by **Federal Register** notice, OSHA re-opened the comment period to allow supplementary public comment on options to protect workers from inadvertent exposure to asbestos in buildings (57 FR 49697). This issue, not part of the Court's remand order, was broached by the Agency in the preamble to the proposal, and had been the subject of litigation brought by Service Employees International Union (SEIU) against EPA. In 1988 the Service Employees International Union, AFL-CIO petitioned the Environmental Protection Agency for regulation of asbestos in public and commercial buildings and subsequently sued the Agency. This resulted in the convening of a series of "Policy Dialogue" meetings established by EPA in an attempt to reach agreement on issues concerning asbestos in public and commercial buildings. As discussed in the NPRM of July 20, 1990, OSHA and a variety of other interested parties participated in the meetings which took place between May 1989 and May 1990. These groups included realty interests, lenders and insurance interests, unions, asbestos manufacturers, public interest groups, asbestos consultants and contractors and states. The group failed to agree on all issues, but did generally agree that the presence of asbestos should be known to building service workers. The major area of disagreement in the group dealt with the characterization of risk to general building occupants and office workers. The group also did not agree on the need for specific federal asbestos inspection requirements.

SEIU and other unions also participated in this rulemaking and urged OSHA to issue a building inspection rule. After discussions with EPA and review of the record concerning how best to protect employees against unknowing exposure the Agency published a request for comment on a regulatory approach to protect building service workers. The approach would require certain high-risk materials in accessible building/facility areas be designated presumptive asbestos containing materials and thus be treated as if they contained asbestos, until or unless the presumption was rebutted through sampling or specific information in the owner's possession relation to construction specifications. The notice also asked for comments on the Health Effects Institute (HEI) report which had been submitted to the record after the close of the post-hearing briefing periods. The notice resulted in submission of an additional 60 sets of comments, and the comment period closed on January 4, 1993.

The record of this rulemaking consists of over 55,000 pages. OSHA has worked closely with EPA so that the regulations of both agencies are compatible to the extent OSHA's mandate allows.

II. Pertinent Legal Authority

Authority for issuance of this standard is found primarily in sections 6(b), 8(c), and 8(g)(2) of the Occupational Safety and Health Act of 1970 (the Act), 29 U.S.C. 655(b), 657(c), and 657(g)(2) and in the Construction Safety Act, 40 U.S.C. 333. Section 6(b)(5) governs the issuance of occupational safety and health standards dealing with toxic materials or harmful physical agents. Section 3(8) of the Act defines an occupational safety and health standard as:

* * * A standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment.

The Supreme Court has said that section 3(8) applies to all permanent standards promulgated under the Act and requires the Secretary, before issuing any standard, to determine that it is reasonably necessary and appropriate to remedy a significant risk of material health impairment. *Industrial Union Department v. American Petroleum Institute*, 448 U.S. 607 (1980).

The "significant risk" determination constitutes a finding that, absent the change in practices mandated by the standard, the workplaces in question would be "unsafe" in the sense that workers would be threatened with a significant risk of harm. *Id.* at 642. A significant risk finding, however, does not require mathematical precision or anything approaching scientific certainty if the "best available evidence" does not warrant that degree of proof. *Id.* at 655-656; 29 U.S. 655 (b)(5). Rather, the Agency may base its finding largely on policy considerations and has considerable leeway with the kinds of assumptions it applies in interpreting the data supporting it, *Id.* 655-656; 29 U.S. 655(b)(5). The Court's opinion indicates that risk assessments, which may involve mathematical estimates with some inherent uncertainties, are a means of demonstrating the existence of significant risk.

The court further stated:

It is the Agency's responsibility to determine in the first instance what it considers to be a "significant" risk. Some risks are plainly acceptable and others are plainly unacceptable. If, for example, the odds are one in a billion that a person will die from cancer by taking a drink of chlorinated water, the risk clearly could not be considered significant. On the other hand, if the odds are one in a thousand that regular inhalation of gasoline vapors that are 2% benzene will be fatal a reasonable person might well consider the risk significant and take the appropriate steps to decrease or eliminate it. (*I.U.D. v A.P.I.*, 448 U.S. et 655).

OSHA has always considered that a working lifetime risk of death of over 1 per 1000 from occupational causes is significant. This has been consistently upheld by the courts. See the recent discussion in the cadmium preamble 57 FR 42102, 42204 and the earlier asbestos preambles.

OSHA believes that compliance with these final amendments to reduce the PEL to 0.1 f/cc as a time-weighted average measured over 8 hours will further reduce a significant health risk which existed after imposing a 0.2 f/cc PEL. OSHA's risk assessment accompanying the 1986 standard, showed that lowering the TWA PEL from 2 f/cc to 0.2 f/cc reduces the asbestos cancer mortality risk from lifetime exposure from 64 deaths per 1,000 workers to 7 deaths per 1,000 workers. OSHA estimated that the incidence of asbestosis would be 5 cases per 1,000 workers exposed for a working lifetime under the TWA PEL of 0.2 f/cc. Counterpart risk figures for 20 years of exposure are excess cancer risks of 4.5 per 1,000 workers and an estimated asbestosis incidence of 2 cases per 1,000 workers.

OSHA's risk assessment also showed that reducing exposures to 0.1 f/cc would reduce excess cancer risk to 3.4 per 1,000 workers and a 20 year exposure risk to 2.3 per 1,000 workers.

OSHA concludes therefore that reducing the exposure limit to 0.1 f/cc will further reduce significant risk.

OSHA's current estimates of employee exposure in the various operations covered by these standards are referenced in the Regulatory Impact Analysis found later in this document. Additional exposure estimates, based on record evidence are referenced throughout this document in the relevant preamble discussion concerning each operation.

In the Court of Appeals litigation, AIA challenged OSHA's use of the PEL to calculate the residual risk remaining after the standard is implemented. AIA contended that workers would actually be exposed to average levels significantly below the PEL because employers would be required to engineer down to levels well below the PEL to assure that random fluctuations would not result in an OSHA compliance officer measuring an exposure level over the PEL during a routine inspection. Therefore, AIA contended, in calculating residual risk, OSHA should assume that employees will be exposed to average levels that are between one-half and one-quarter of the PEL. The Court implied that such an argument might have merit if factually supported and suggested that OSHA should make its own calculations of the relation between permissible exposure limit and the actual exposures such a limit would produce. (838 F.2d at 1266) Having carefully considered the issue, OSHA concludes it would be unrealistic to base its risk assessment on the assumption that employers will engineer to levels significantly below the PEL. First, as discussed below, the PEL of 0.1 f/cc is at the limit of feasibility for those workplaces in which asbestos levels are most difficult to control, and an assumption that average exposures will be substantially below the PEL will clearly be unrealistic for such workplaces. Second, OSHA found in issuing the 1986 standard that AIA's argument about uncontrollable fluctuations was exaggerated because such fluctuations could be minimized through proper inspection and maintenance of engineering controls and through proper training and supervision of employees whose work practices affected exposure levels. (51 FR at 22653). Third, OSHA's enforcement policy gives employers the opportunity to show that a compliance officer's measurement over the PEL is unrepresentatively high and does not justify a citation, thus alleviating any concern employers might have that they will be cited on the basis of a single measurement that results from uncontrollable fluctuations. Fourth, even if some employers are sufficiently risk-averse to engineer down to well below the PEL to avoid a slight risk of citation, OSHA cannot base a realistic risk assessment on the assumption that most employers will do so.

The 0.1 f/cc level leaves a remaining significant risk. However as discussed below, and in earlier documents, OSHA believes this is the practical lower limit of feasibility for measuring asbestos levels reliably. However the work practices and engineering controls specified below for specific operations and required respirator use will in OSHA's view further reduce the risk. As discussed below, OSHA has carefully reviewed all the public suggestions to further reduce significant risk and has adopted those which have merit.

After OSHA has determined that a significant risk exists and that such risk can be reduced or eliminated by the proposed standard, it must set the standard "which most adequately assures, to the extent feasible on the basis of the best available evidence, that no employee will suffer material impairment of health* * *," Section 6(b)(5) of the Act. The Supreme Court has interpreted this section to mean that OSHA must enact the most protective standard

necessary to eliminate a significant risk of material health impairment, subject to the constraints of technological and economic feasibility. *American Textile Manufacturers Institute, Inc. v. Donovan*, 452 U.S. 490(1981). The Court held that "cost-benefit analysis is not required by the statute because feasibility analysis is." *Id.* at 509.

Authority to issue this standard is also found in section 8(c) of the Act. In general, this section gives the Secretary authority to require employers to make, keep, and preserve records regarding activities related to the Act. In particular, section 8(c)(3) gives the Secretary authority to require employers to "maintain accurate records of employee exposures to potentially toxic materials or harmful physical agents which are required to be monitored or measured under section 6." Provisions of OSHA standards which require the making and maintenance of records of medical examinations, exposure monitoring, and the like are issued pursuant to section 8(c) of the Act.

Because the revisions to the asbestos standards are reasonably related to these statutory goals, the Secretary finds that these standards are necessary and appropriate to carry out its responsibilities under the Act.

"Response to recommendations of public to further reduce risk": As noted above, this rulemaking proceeding is a response to a remand order of the Court of Appeals for the D.C. Circuit. The Court determined that in the earlier 1986 rulemaking, OSHA had not sufficiently explained its decisions not to adopt certain regulatory provisions recommended by participants in that rulemaking. In particular, the Court of Appeals held that it is OSHA's "duty to keep adding measures so long as they afford benefit and are feasible, up to the point where (it) no longer finds significant risk," and that it is OSHA's duty to consider the reasonableness of adopting them. 838 F.2d at 1269. The Court noted that OSHA need not justify its failure to adopt all suggested provisions: rather, the Agency must defend not adopting only those provisions demonstrated by their advocates, "to be feasible to implement and will provide more than a de minimis benefit for worker health." The Court further explained, "(n)aturally the force of the evidence and argument that OSHA must offer to defend its choice will vary with the force of the proponent's evidence and argument." *Id.* at 1271.

In this final rule, based upon the record evidence, OSHA is adopting certain regulatory recommendations made in the earlier rulemaking, is rejecting other recommendations, and is issuing other provisions which are based on, but are altered versions of yet other recommendations in the earlier rulemaking. In addition, new, different and expanded provisions also have been urged for adoption by participants in this rulemaking. These participants represent labor, public interest and industry interests. The Agency is adopting, rejecting and changing these recommendations as well.

A large portion of this preamble is devoted to the Agency's explanations of these regulatory decisions. OSHA believes that its reasons when it has adopted or has not adopted recommended provisions are well supported by the evidence and that the reasons for its choices are stronger than the contrary arguments. In general, OSHA believes that the extent of its burden to refute claims of benefit for a recommended provision depends on the extent of the supporting data. If the data are valid and extensive, OSHA's burden is greater. If however, the claim of benefit is based on opinion, refutation by OSHA need not be grounded in data, but

may be based on OSHA's well reasoned and expert contrary opinion.

In sum, OSHA's decision not to adopt recommended provisions to reduce asbestos related risk reflects the Agency's expert judgment, often where available data creates considerable uncertainty, that the provisions would not offer more than de minimis benefit in reducing a still significant risk. Many recommendations were unsupported by data showing benefit. For example, it was recommended to prohibit high speed burnishing of asbestos-containing floor tile. However, the data do not show a measurable reduction of airborne asbestos fiber levels, based on actual fiber counts using such practices. Other recommended provisions simply do not reduce a still significant risk. For example, requiring very low clearance samples (analyzed by transmission electron microscopy) to deregulate all "regulated areas" to assure that EPA/AHERA level of 0.01 f/cc is met does not appear to be necessary to reduce a significant risk to employees. There is an extremely low (although speculative) risk of asbestos related disease estimated at such clearance levels, and, there is evidence that immediate clearance sampling does not predict later concentration levels.

OSHA discusses the recommendations made by participants in the preamble sections which cover the recommended provisions. The following is a list of the major recommendations made by public which are discussed later:

1. Recommendations for a mandatory building inspection program:

Recommended by BCTD (Ex. 143, Att. A); Gobbell Hays Partners, Inc. (7- 149), Service Employees International Union (SEIU) (Ex. 144); American Federation of State, County and Municipal Employees, (AFSCME, Ex. 141); ORC, or assume it is asbestos (Ex. 145), SBA; limited to employers whose work duties involve contact with ACM shall assure that all ACM in workplace is identified, need not inspect building areas constructed since 1980.

2. Mandatory notification to OSHA by employers of all removal, renovation, and abatement work: Recommended by BCTD, (Ex. 143, Att. A at 3), The Courdith-Roberts Group, (L7-185); Gobbell Hays Partners, Inc. (7-149).

3. Mandatory use of negative pressure enclosures in regulated areas, except for small-scale, short-duration operations and other limited circumstances: Recommended by BCTD, (Ex. 143 Att A at 5).

4. Mandatory procedures for deregulating regulated areas including mandatory clearance sampling. Recommended by BCTD, (Ex. 143, Att. A at 6); AFSCME (Ex. 141).

5. OSHA accreditation of training and OSHA designated detailed training curricula.

Recommended by BCTD (Ex. 143 Att. A at 8) 6. Reduction of PEL below 0.1 f/c. Recommended by Gobbell Hays Partners, Inc. (Ex. 7-149).

7. Require that required protective clothing be impervious. Recommended by Melco, Inc. (L7-187), J.Loften, Asbestos Workers Local Union #16 (Ex. 137).

8. Specific training for maintenance and custodial workers in buildings that contain

asbestos-containing material. Recommended by SEIU. (Ex. 144 at 14).

9. Requirement that building owner respond to knowledge of asbestos in building by establishing O&M plan. Recommended by SEIU (Ex. 144 at 17); AFSCME, (Ex. 141).

10. Change in medical surveillance requirements for maintenance and custodial workers in ACM buildings -- they exceed the 30 day limit. Recommended by AFSCME, (Ex. 141).

11. Reduce action level to 0.05 f/cc. Recommended by BCTD. (Ex. 143).

12. Reduce STEL to 0.5 f/cc over 30 minutes. Recommended by BCTD. (Ex.143), also by SESAC and NIOSH (Ex. 7-77, 125).

13. Require most effective respirators feasible in all asbestos work. Recommended by BCTD. (Ex. 143).

14. Require more specific and protective brake repair procedures. Recommended by Clayton Associates, Inc. (Ex. 148).

15. Regulate activities involving "friable" asbestos-containing material differently from those involving "non-friable" asbestos. Recommended by Edison Electric Institute, (Ex. 7-145, at e.g., 8 for quantity cut-offs for SSSD activities.) 16. A clearance fiber level of 0.04 f/cc was recommended by SESAC who stated that such a requirement was needed to "ensure that the asbestos work area is safe to enter by unprotected personnel after the asbestos work operation is completed." (Ex. 7-77).

Relationship to Indoor Air Quality Proposed Rule

On April 5, 1994 at 59 FR 15968, OSHA proposed a new standard for indoor air quality. The proposed regulation included a clause making brief reference to asbestos. See Paragraph (d)(8) at page 16036. That reference was unintended as OSHA, intends to cover all asbestos issues in the final asbestos rule where full consideration has been given to them. OSHA will not create new requirements in a final Indoor Air Quality Standard that are specifically designed to control asbestos exposures, and will announce that it is withdrawing the asbestos clause in paragraph (d)(8) at the commencement of the indoor air hearing.

Accordingly there is no need for parties to submit asbestos-related materials into the Indoor Air record.

III. Summary and Explanation of Revised Standards

These final standards constitute OSHA's response to the remaining issues raised for the Agency's reconsideration by the United States Court of Appeals for the D.C. Circuit. The specific issues raised by the Court are: the establishment of operation-specific permissible exposure limits; the extension of reporting and information transfer requirements; the expansion of the competent person requirement to all employers engaged in any kind of construction work; and, the clarification of the small scale, short duration operation exemption from the requirement to establish a negative-pressure enclosure. For convenience OSHA is summarizing

here its response to each of these issues. They are discussed in depth below. Also discussed below are the other changes OSHA has made which are not in direct response to the remand.

Issue 7. "Establishment of Operation Specific Exposure Limits": The court remand causes OSHA to consider establishing operation-specific permissible exposure limits to the extent feasible, as needed to eliminate significant risk of illnesses caused by asbestos exposure. OSHA proposed to decrease the PEL to a uniform 0.1 f/cc. OSHA believes that this limit is feasible for most industry sectors to reach most of the time (55 FR 29720). However, OSHA explained that PELs lower than 0.1 f/cc are difficult to reliably measure. However OSHA has followed a more effective approach to lowering exposures for those sections and operations where lower exposures can be achieved. This approach is triggering protective provisions based on the kind of operation undertaken, rather than measured exposure levels. This approach is consistent with some other health standards (e.g., lead, coke ovens).

A major reason for this approach for construction and shipyards is that measured levels of exposure often fail to define risk and are often not received before the work is completed. This was partly explained in the proposal. There OSHA noted that for removal jobs, highly variable amounts of asbestos are generated, "reducing the predictability of exposure levels from one monitoring event to the next. Moreover, measured asbestos levels often cannot be used to determine the need for (specific controls) . . . because of the time required by the laboratory to complete the test and report the results." (55 FR at 29715-16). Thus, it would be unproductive to leave employees unprotected while initial monitoring results are being analyzed; and in many cases, even prompt reporting of exposure levels during the setting up of the controls would not predict exposures during the actual removal.

A significant risk remains at the PEL of 0.1 f/cc, and it is feasible to attain lower levels for some workers exposed to asbestos. OSHA has therefore considered whether to establish different PELs for different operations based on the lowest exposure limits that can feasibly be achieved in those operations and that are needed to eliminate significant risk. OSHA has decided not to do so because the operation-specific work practices mandated in the standard will be a most cost-effective means of assuring that significant risk is eliminated to the extent feasible.

Asbestos has been the subject of extensive rulemaking by OSHA and other agencies, and the operations that expose employees to asbestos are well known and thoroughly studied. Moreover, given the shift away from asbestos products wherever substitutes are available, it appears unlikely that major new uses will be found for asbestos in the future. OSHA has therefore been able to focus its rulemaking effort on evaluating the work practices that will best reduce asbestos exposures in the specific operations that expose workers to asbestos. The result is a standard that relies heavily on mandated work practices that will, in most situations, result in employee exposure well below the PEL. In effect, the mandated work practices will assure that each asbestos worker is exposed to the lowest feasible level for the operation in which that worker is engaged. This approach was taken in the 1986 construction standard. There, OSHA "tiered" its construction standard "to apply increasingly stringent requirements to those work operations associated with the highest exposures." (51 FR at 23706). Rather than two classifications as in 1986 (small-scale and abatement work), OSHA now divides construction work into four classes and has made additional limited distinctions

based on measurable variables such as amount of material disturbed.

Since OSHA's approach assures that each employee is exposed to the lowest feasible level of asbestos, no additional protection would be gained by establishing a series of different PELs for different operations. Such an approach would add cost and complexity to employers' compliance duties and to OSHA's enforcement duties without benefiting worker health. PELs lower than 0.1 f/cc would be particularly unsuitable as compliance criteria because it is difficult to reliably measure lower levels. Because such measurements are unreliable, if lower PELs were established, measurements taken by employers and by OSHA would provide an uncertain basis for determining whether employers have fulfilled their compliance duties. However, both employers and OSHA can easily determine whether the work practices prescribed in the standard are being followed. The mandated work practices thus assure that employees are better protected than a series of different PELs while reducing compliance burdens on employers and easing the agency's enforcement burden. Therefore, rather than set operation-specific permissible exposure limits, OSHA proposed to further reduce risk by requiring certain additional work practices. The operations for which mandatory work practices are required would otherwise result in employee exposure that is significant. OSHA believes that these controls are feasible, reasonable, and necessary.

OSHA also proposed, in the general industry standard, to link the dates when engineering controls would be required to reach the new lower PEL with the EPA Ban and Phase-out Rule. This linkage is no longer an option since the Fifth Circuit Court of Appeals recently vacated the ban and it is not yet clear which asbestos-containing products will no longer remain in commerce, and staged phase-outs of asbestos containing products are not required.

Issue 3. "Small Scale Short Duration Definition": The Court asked that OSHA clarify the exemption for "small scale, short duration operations" from the negative-pressure enclosure (NPE) requirements of the construction standard. The negative pressure enclosure requirements are a substantial set of requirements. They include creating a system of regulated areas with a sealed work area under negative pressure, decontamination facilities and procedures, clean room facilities and procedures and shower facilities, and other practices to reduce worker exposure and spread of contamination outside the work area. In that standard, NPEs were required for all removal, demolition and renovation work except for small scale short duration operations.

The Court suggested, based on its view of the Agency's earlier intent, that OSHA limit the exemption to work operations where it is impractical to construct an enclosure because of the configuration of the work environment. In an earlier response to the remand order, published in the **Federal Register** (54 FR 52024, December 20, 1989), OSHA declined to amend the regulatory text on the small-scale, short duration issue, without conducting supplemental notice and comment rulemaking. The Agency explained "that explicitly limiting the exemption to situations where negative pressure enclosures are impractical might not reduce employee risk from asbestos exposure." (54 FR at 52026). OSHA stated that in the supplemental rulemaking, it intended "to discuss the effectiveness and drawbacks of negative-pressure enclosure, glove bags, and alternative control systems; and to specify more clearly under what circumstances various control systems may be used." (54 FR at 5207). OSHA also noted that the small-scale, short duration issue is related to the scope of the "competent person" requirement, which the

1986 standard lifted for operations which conformed to the exception, and thus combined consideration of both issues would be appropriate.

Accordingly, in July 1990, OSHA proposed related changes in both provisions "small scale, short duration" operations would be redefined in terms of general criteria, as well as the 1986 approach of listing specific examples. However, the underlying premise remained the same as in the 1986 standard: i.e. exemptions to the negative-pressure enclosure requirement for removal, renovation and demolition projects and limited to jobs which conformed to specified criteria. "Competent" persons, according to the 1990 proposal, were to be required as supervisors on all asbestos-related construction worksites, instead of as in the 1986 standard, that required competent persons only for non "small-scale, short term jobs." Required training for competent persons, would vary, however, depending on the kind of asbestos-related job needing supervision.

The final provisions resolving these issues, are different from the proposal. Four classes of increasingly hazardous types of construction activity are matched with increasingly stringent control requirements. Class I asbestos work means activities involving the removal of asbestos containing material (ACM) and presumed asbestos containing material (PACM) which is "high risk." Class II asbestos work means activities involving the removal of ACM and PACM which is not "high risk." Class III asbestos work means activities involving repair and maintenance where ACM and PACM is disturbed. Class IV asbestos work means maintenance and custodial activities during which employees contact ACM and PACM and activities to clean up waste and debris containing ACM and PACM. Each class includes work with similar exposure levels and with similar exposure risks. Each has a prescribed set of controls and work practices. Basically only Class I work, high-risk activities, require negative-pressure enclosures. The standard allows other designated proven control systems in limited circumstances and provides for yet-to-be-developed systems if certain backstop provisions are met. As indicated in its earlier responses to the Court, and its public notices of proposed rulemaking, OSHA has evaluated available control technologies and has concluded that the use of negative-pressure control enclosures should be regulated in terms of when they are required rather than when they are not.

In a major departure from the language of both the 1986 standard and the proposal, OSHA is deleting the term "small scale, short duration" from the regulatory text. Instead, the agency is distinguishing high- from lower-risk operations through the use of the classification system described above. Work that was exempted from the negative pressure enclosure requirements in the existing standard because it was of "small-scale, short-duration" are considered to be Class II and Class III work in this amendment. The agency finds that the term "small-scale, short term" is too limiting, is confusing, and cannot be defined with sufficient precision to serve the purpose of distinguishing high risk asbestos-disturbing activity from activity of reduced risk.

The term is limiting because it focuses on a fraction of the circumstances and criteria which define lower risk work with asbestos-containing material. For example, removing asbestos-containing products like transite panels, likely will not result in significant exposure, even if conducted for more than one day, if there is use of a few simple controls. As much as the scope and duration of the job, the materials themselves, their condition and the

work-practices used define hazard potential. OSHA had tried to include these concepts under the "small-term, short-duration" exception in the current standard, by reference to examples. However, the breadth of the examples led the court to observe that "the exception as now worded seems to erase the rule." (838 F. 2d at 1279).

In the 1990 proposal OSHA tried to identify the conditions and operations which separated higher risk work with ACM from lower risk work in its small-scale, short-term definition. Still anchoring the distinction however, was OSHA's belief that the time a job took, and the amount of material involved, primarily determined risk. Based on the record of this proceeding, OSHA now finds that these are relevant, but not exclusive, factors.

OSHA finds also that use of the term is confusing. In 1986, in its list of activities considered "small-scale, short-term," OSHA listed some which are neither small-scale or short-term, but were regarded as lower risk, such as roofing work. To cure this confusion, OSHA proposed, in 1990 to limit the "small-scale, short duration" exemption to a subset of renovation, removal and demolition operations which took less time, and/or involved small areas. Even for these activities a temporal or volume cutoff was difficult to define, and the proposed definition contained numerical criteria, which varied depending on which activity was defined. In addition, it proposed to exempt other activities, such as roofing, regardless of the size of the project, from the negative-pressure enclosure requirement. EPA uses the term "small-scale, short-duration" to describe cut-offs which are much higher than those proposed by OSHA for its reporting requirements for asbestos renovation, demolition and removal work under NESHAPS. And under EPA's worker protection rule which applied to state and local government workers in OSHA non-state plan states, reporting requirements for asbestos "abatement" projects, do not apply to projects involving "less than 3 linear feet or 3 square feet of friable asbestos material." (40 CFR 763.124).

Many objections to the proposed definition were received by the Agency. After reviewing this record, and in light of the variety of interpretations of the term "small-scale, short-duration," OSHA determined that it is inappropriate to use that term as the equivalent of lower risk activities. Once OSHA decided to include other control methods in the "preferred category" for high risk asbestos work, neither a "small-scale, short-duration" definition nor an exemption from negative-pressure enclosure requirement was central to OSHA's regulatory scheme. As explained more fully below, although OSHA no longer uses the term "small -- scale, short-term" to exempt activities from universal requirements, OSHA uses the related terms "small-scale" and "reduced exposure potential" as part of a larger classification scheme.

Issue 8. "The extension of reporting and information and transfer requirements":

A. Notification to OSHA

OSHA had proposed expanded notification and reporting provisions in response to the Court's remand order concerning two issues. The first is whether OSHA should require employers to give the Agency advance notification of asbestos-related jobs. BCTD, in the 1984 rulemaking had suggested that OSHA should require all construction industry employers to file reports concerning any building demolition, renovation or removal project involving asbestos prior to beginning such a project. Two health enhancing benefits of a notice requirement were

advanced by BCTD. One, is the help such information would provide the Agency in targeting inspections. The other is a claimed reduction in risk because of the consciousness-raising and self-education provided by the notice process.

The Court noted that the BCTD proposal would "arguably generate better information for selecting targets for inspection and that it was based on "uncontradicted (and unanalyzed) evidence of non-de minimis benefits." (relating to compliance enhancement). (838 F.2d at 1278). It remanded the issue to the Agency for further explanation or rebuttal.

OSHA responded in 1990, by proposing a new provision to require employers to notify OSHA in writing prior to engaging in demolition, renovation, and removal operations which are not small-scale, short-term operations. OSHA's proposed notice requirement shared many core elements with EPA's then current and proposed notification requirements under NESHAPS. OSHA noted that "(t)he proposed notification is modeled after the notification requirement concerning asbestos abatement projects that occur in conjunction with building demolition and renovation operations. OSHA noted further that "(e)mloyers can satisfy the OSHA (proposed) notification requirement simply by forwarding a copy of the EPA form to the OSHA area office when complying with EPA's asbestos NESHAP." (55 FR at 29731). Both EPA's and OSHA's proposed, notification requirements would exempt less extensive operations. In OSHA's case, the exemption would have applied to small-scale, short-duration operations as otherwise defined in the standard. EPA's cutoffs are annual amounts: 260 linear feet on pipes and 160 square feet on other facility components. OSHA noted that many asbestos jobs would meet the notification requirements of both agencies, however there would be an indeterminate, yet significant number for which EPA notification would not be called for, but OSHA's proposed requirement would apply.

Most public comment opposed the requirement. The major objection was the burden on the employer from completing and mailing the notification form. Further, some commenters questioned the overall usefulness of the notification requirement in promoting compliance (See comments of Shipbuilder's Council of America Ex. 7-2.) BCTD continued to argue for extensive reporting requirements for the reasons stated above. A few other commenters supported its position. (Ex. 7-5, 7-6, 7-34, 7-64, 7-95, 7-118, 7-132, 7-149, 141, 144).

OSHA has carefully reviewed all the comments. Based on the review and subsequent developments, the final regulation scales down OSHA's proposed notice requirements. OSHA is now requiring advance notification of Class I (mainly large-scale removals) only when the employer intends to utilize controls other than a negative pressure enclosure which meets the requirements of paragraph (g) of this standard, and in some circumstances, where modifications of glove bag systems, glove box systems and other control systems described in paragraph (g) are made.

There are a number of reasons for OSHA's decisions. OSHA believes that the potential benefits in direct risk reduction from a separate OSHA reporting requirement are unlikely. There are already extensive EPA and state reporting requirements which OSHA requirements would partly duplicate. The EPA and state requirements already create any incentive to comply that such reports could create. Similar OSHA reports would not increase this benefit. Information which may be useful to OSHA in targeting inspections can be retrieved by information-sharing

with the EPA while avoiding overlapping reports. OSHA notes that the Paperwork Reduction Act requires that federal agencies avoid clearly duplicative reporting requirements. Various comments challenge the value of duplicative requirements (e.g., Ex. 7-17, 7-20, 7-22, 7-28, 7-39, 7-46, 7-47, 7-50, 7-54, 7-72, 7-74, 7-76, 7-77, 7-78, 7-79, 7-81, 7-86, 7-87, 7-88, 7-89, 7-102, 7-103, 7-108, 7-112, 7-125, 7-133, 142, 147). Thus, although OSHA's and EPA's reporting requirements are only partially duplicative, these considerations have influenced OSHA's decision not to require extensive pre-job reporting. OSHA is concerned that in reviewing the volume of reports which may be spawned by a separate OSHA requirement which exceeded the EPA requirements would strain OSHA area offices enforcement resources and drain such resources from other enforcement efforts. However, OSHA finds that advance reporting is appropriate where information is related to new or modified control methods for Class I work. In such cases, heightened attention to the data supporting their use will result from the requirement to send them to OSHA.

BCTD's contrary view that compliance would be enhanced was based in part on its contractor's report, submitted after the 1984 hearing. The report estimated that an advance reporting requirement would reduce "the number of workers with TWA exposures over 0.1 f/cc" up to 30% in drywall removal and demolition, and lesser amounts in other construction work. These estimates were based on the opinions of a seven person "focus group" which included three representatives of member unions of BCTD. No methodology was presented for deriving these quantitative estimates, and no supporting data has been submitted in either rulemaking (see brief Ex. 143 at 198). The Court referred to the report in its decision as uncontradicted, but that was because it was submitted late in the rulemaking procedures.

The Agency believes based on its experience that these estimates of specific quantifiable benefits are speculative. But more importantly, the now-existing EPA and state reporting requirements and OSHA's use of that data for targeting inspections will achieve those benefits without duplicative reporting requirements. Further, OSHA made various changes to the final standard which will also achieve some of these benefits. These include the expanded provisions on hazard communication, which will alert employees in all asbestos renovation, removal and maintenance work that presumed asbestos containing material is present; that require competent persons to evaluate the work site before work is begun, by informing employers that OSHA is setting up information sharing systems with EPA to access employer notices sent to that Agency, and that require employers who use new and modified control systems to notify OSHA.

Help for OSHA in targeting inspections from the submission of advance reports is the other claimed benefit from a reporting requirement. Some participants claimed that because pre-job reporting was helpful to EPA in targeting its inspections for compliance with NESHAP requirements, an OSHA pre-job reporting would similarly benefit this Agency. EPA did not testify at the hearing, but available information shows that its reporting system provides useful information to that Agency's enforcement program. NESHAPS reporting is made mostly to 45 state agencies, delegated by EPA to implement the asbestos NESHAP. Reporting in EPA Region II, is directly to the Regional Office. These reports are the source of two data bases: the National Asbestos Registry System (NARS), which develops a historical record of asbestos contractors, updated quarterly; and the ACTS system, which is a local data base on the compliance history of each contractor. OSHA is informed that ACTS is a tool that delegated

agencies may use for day-to-day tracking of asbestos activities. EPA's evaluation of the reports submitted to it and other information used in its NESHAP enforcement effort constitute a valuable resource for OSHA.

In 1991 both agencies signed a Memorandum of Understanding (MOU) to share information which will aid their enforcement efforts. Pursuant to that MOU, OSHA is developing with EPA an information sharing system based on the reports submitted both to EPA and to various states upon delegation from EPA to access that information to help OSHA target asbestos removal jobs. OSHA also believes that at this time some EPA delegated states, and OSHA state plan states have worked out ways to share notifications. OSHA believes that utilizing the EPA data to assist in targeting inspections will be more effective than duplicative reporting requirements.

The Agency believes, based on its own enforcement experience that a limited notification requirement may enhance compliance in specified circumstances. Employers who choose to use new or modified control technology to reduce exposures in Class I asbestos work, must notify OSHA in advance, using EPA's NESHAP reporting form. Such information about new and/or modified asbestos control technology submitted to OSHA by employers who wish to use it will provide accessible information for the Agency to use to evaluate such technologies. OSHA believes that requiring employers to routinely submit to the Agency their data in support of claims of the effectiveness of new technology will help OSHA, employers and employees and their representatives to evaluate its effectiveness promptly.

Shipyard Employment Standard

One area of the proposed standard to which SESAC raised objection was the requirement that OSHA be notified 10 days prior to initiating work on large scale asbestos operations. In addition to reiterating many of the objections to the provision raised by others, they pointed out that often they must immediately work on ships which enter their shipyards and turn them around quickly and that the delay caused by the notification would be overly burdensome. As OSHA explained above, notification of OSHA is required only when Class I operations are undertaken and alternate methods of control, other than the negative-pressure enclosure methodology, is to be employed. This provision applies both in the construction and shipyard employment standards.

B. Notification of Other Employers and Subsequent Owners

The Court remanded the issue of whether OSHA should, as recommended by BCTD, require employers contracting asbestos-related work to establish, maintain and transfer to building owners written records of the presence and locations of asbestos or asbestos products, in order to facilitate identification and prevention of asbestos hazards. As noted in the 1990 remand proposal, the Court remanded this issue so that the Agency may reach "its own judgment on the issue" of whether it was legally empowered to adopt such a requirement (See BCTD v. Brock, supra at 1278). OSHA concludes that BCTD has made a persuasive case for the need to expand the notification provisions to other employer and building owners and from them to subsequent employers with exposed employees. This is a necessary way to informing subsequent employers that their employees are at risk of asbestos exposure and of the need to take appropriate precautions. Requiring building owners to maintain and provide

this information is by far the most effective way of notifying employers of exposed employees who are doing work many years after the asbestos was identified.

OSHA has developed an information transfer scheme concerning the presence of asbestos in buildings and structures which may present a hazard to employees which is more comprehensive than the recommendation of BCTD. The approach places the primary compliance burden on the building and/or facility owner, even though the employees at risk may not be the owner's direct employees. Thus, this final standard confirms OSHA's tentative view in the proposal, that it has authority to require building owners who are statutory employers to take necessary and appropriate remedial action such as notifying other employers, to protect employees other than their own (see 55 FR at 29729).

The proposed hazard communication provision limited the building owner's communication obligations to "available" information concerning the presence and location of asbestos. Now, in the final standard, the building owner must communicate his knowledge of the presence and location of ACM, based on "available" information, and, new to the final standard, of the presence and location of certain high risk materials, which are presumed to contain asbestos (PACM), unless the building was constructed or renovated after 1979 or is rebutted using laboratory analysis. Further details of this provision are spelled out later in this preamble.

Issue 9. "Competent Person". The Court remanded to OSHA to determine whether employers engaged in any kind of asbestos related construction work should be required to designate "competent persons" to oversee safety measures, or whether, as in the 1986 standard, employers should only be required to designate trained "competent persons" for asbestos removal, demolition, and renovations operations that are not small-scale, short duration. The court requested that OSHA either expand the "competent person" requirement or provide a more persuasive explanation of its refusal to do so.

OSHA proposed in 1990 to expand the requirement. Under the proposal, supervision of all asbestos construction worksites by a "competent person" would be required; the training of a competent person would be keyed to the kind of asbestos operation. However, the proposal left undecided whether onsite, continuous supervision of all asbestos-related work would be required for all asbestos work. The final standard resolves these issues. A "competent" person, as defined in the general construction standards, must supervise all work under the asbestos construction standard. That person must be "capable of identifying existing asbestos * * * hazards in the workplace, and has the authority to take prompt corrective measures to eliminate them * * *" 29 CFR 1926.58[b].

OSHA reiterates its statement in the proposal that "all construction site employees would benefit from the presence of a competent person to oversee asbestos-related work" (55 FR at 29726). However, the need for on-site supervision varies with the hazard potential of the work undertaken. All workers performing Class I construction work must have continuous access to an on-site supervisor, who meets the training requirements for designation as a "competent person" under this standard. Supervision for Class II and III work does not always require a continuous on-site "competent person," therefore the standard requires inspections at "sufficient" intervals and at employee request. Supervision of installation of asbestos containing construction materials and Class IV work must also be accomplished by

complying with the "generic" requirement for "frequent and regular" inspection [Paragraph (0)(2)].

Training for "competent persons" can be accomplished in a number of ways and meet the standard's performance requirements. For Class I, II and III work, the "competent person" must take a course such as a course under the EPA Model Accreditation Plan for accredited contractor/supervisor, project designer or management planner course, or their equivalent in content, duration, and criteria for success. Class IV work may be part of larger construction projects, in which case the competent person trained to supervise the project should supervise the on-site cleanup activities which constitute the Class IV work.

Explanation of Provisions of the Final Standards

The following is a provision-by-provision discussion of the revised asbestos standards. Thus all the provisions in all three standards: general industry, construction and shipyard employment, relating to a topic will be discussed under the heading for that topic. For example, under the scope heading, the scope of the general industry standard will be first discussed, then the scope of the construction standard, and finally the scope of the shipyard employment standard. Similarly, under the methods of compliance heading, the provisions in each standard relating to that topic will be discussed. Where a discussion applies to all three or to two of the separate standards it will be so noted and will not be repeated for each standard. OSHA believes that this format will help the public understand where and why the various standards contain different provisions relating to the same subject matter. Further, it will avoid repetition in explanations where a common policy rationale applies to more than one asbestos standard.

(1) Scope and Application

Paragraph (a). General Industry Standard. 29 CFR 1910.1001. The general industry standard covers all activities (except agriculture), covered by the Act which are not otherwise covered by the construction asbestos standard, 29 CFR 1926.1101, and the new shipyard employment standard, 29 CFR 1915.1001. Consequently, marine terminals and longshoring would be covered by the general industry standard if asbestos were being loaded, unloaded or stored. The asbestos construction standard, in existence since 1986, lists activities which it covers. This includes construction activities though they may take place at a factory or agricultural premises. The new shipyard employment standard, likewise lists its covered activities.

Formerly, the general industry standard had been considered the generic asbestos standard. However, because of dramatic changes in the market for asbestos containing products, the standard now covers only four industry segments, three of which are distinct from each other, and all are diminishing in volume and employee population. Brake and clutch repair is the activity engaged in by the largest group of asbestos exposed workers, although most of them are exposed sporadically and at low levels. Next largest is custodial workers who do not perform their duties as part of construction activities, but clean surfaces, sweep, buff and vacuum floors and wash walls and windows in manufacturing plants and a wide variety of public and commercial buildings. Although in the preamble to the proposal and throughout this proceeding OSHA and most commenters had treated these workers as part of the construction work force, OSHA concludes that pure custodial work is not a construction activity, and should

be regulated under the general industry standard. However, to avoid misinterpretation or for purposes of clarity of duties to affected parties, OSHA also is including provisions protecting custodial workers who may unknowingly contact asbestos-containing material in the construction and shipyard employment standards. In this way, there will be no advantage to interpreting coverage under any one of the asbestos standards, rather than another.

The primary and secondary manufacture of asbestos containing products, completes the roster of identifiable general industry sectors. Once, along with installers of asbestos-containing products, the core of the asbestos-exposed work force, asbestos-containing product manufacturing employees are rapidly dwindling in number. OSHA expands on this theme its on economic analysis later in this document. At the time of the proposal, EPA had prohibited, at three stated intervals from August 1990 to August 1996, the future manufacture, importation, processing and distribution in commerce of asbestos in almost all products (54 FR at 29460, July 12, 1989). Subsequently the ban was overturned by the United States Court of Appeals for the Fifth Circuit. EPA has interpreted the decision as invalidating only those portions of the ban for products that were manufactured or imported at the time of the decision. Despite the remaining legitimacy of manufacture and use of asbestos-containing products, the industries which make and maintain them and the employees who are employed in those industries are declining rapidly and dramatically.

Paragraph (a) Construction Standard. 29 CFR 1926.1101. The construction standard covers (but is not limited to) the following activities involving asbestos: demolition, removal, alteration, repair, maintenance, installation, clean-up, transportation, disposal, and storage. It has been redesignated 29 CFR 1926.1101 to reflect the reorganization of health standards covering construction made June 30, 1993 (58 FR 35076). The scope and application remain generally unchanged from the proposal and earlier standard. However, 3 issues arose. First, new language, proposed in 1990 is retained in the final. " * * * coverage under this standard shall be based on the nature of the work operation involving asbestos exposure, not on the primary activity of the employer." This point was made clearly in the preamble to the 1986 standards; however, it was not specifically stated in the regulatory text and subsequently some confusion arose among the regulated community. Therefore, it is included as a clarification of the intended application of the standards. Asbestos work which involves removal, repair, maintenance or demolition is therefore explicitly regulated by the construction standard even if such work is performed within a facility otherwise regulated under the general industry standard.

Certain commenters stated that maintenance and custodial work should not be regulated by the construction standard, because they are not construction operations. OSHA notes that it has made a distinction between maintenance and custodial work, that maintenance work is covered in the construction and shipyard employment standards, and that custodial work is covered in all three standards, when it is incidental to work otherwise covered by a standard.

"Naturally Occurring Asbestos in Soil": Prior to the publication of the 1990 asbestos proposal, OSHA received submissions describing asbestos deposits which occur as natural formations in the U.S. and that when disturbed, for example during earthmoving projects or during mining operations, drilling, blasting or sawing operations, the asbestos in the deposit can become airborne and expose workers to significant levels of asbestos fibers (Ex. 3-10, 3-11). The

Agency proposed to clarify that such activities were covered under its asbestos construction standard and that methods of control were to be employed to avoid worker exposure during disturbances of naturally occurring asbestos deposits. OSHA sought additional information regarding any additional provisions it would adopt to protect workers engaged in these activities. In the proposal, the Agency also requested any information on appropriate methods to use to determine the presence of asbestos in soils, the effectiveness of wet and/or other methods to control worker exposures and information on effective decontamination methods for exposed workers.

There were relatively few comments received on this issue. Some felt that asbestos in soil resulted in negligible exposures and that wetting to prevent fugitive emissions during earth moving would be sufficient control (e.g., Ex. 7-6). Another participant said there was a lack of control technology and called for further study to determine the extent and location of problems (Ex. 7-63). The industrial hygienists who had raised the issue of worker exposure to naturally occurring asbestos, described the occurrence of asbestos in the soil of Fairfax County, Virginia (Ex. 7-143). They reported that water misting during disturbance of asbestos-containing soils was effective in controlling exposures. They recommended the use of negative pressure air purifying respirators, protective clothing and showers to control exposures.

OSHA finds that the record indicates that certain construction sites in mostly well-defined areas contain deposits of naturally occurring asbestos. In such areas, airborne asbestos during earthmoving activities may result in significant exposures. In such cases, wetting of the excavation site, often required by local authorities, should be sufficient to suppress measurable airborne asbestos concentrations. Information regarding the presence of asbestos in the vicinity of construction sites may be available from state environmental agencies, the United States Geological Survey, and the Bureau of Mines.

In the absence of information which is readily available showing asbestos contamination of soil in the immediate vicinity of a construction site, the employer is not required to take any action under this standard.

Paragraph (a) Shipyard Employment Asbestos Standard. 29 CFR 1915.1001.:

Workers engaged in shipyard industry activities, i.e. shipbuilding, ship repair, and other work in shipyards, who are exposed to asbestos have been protected by inclusion in 1986 general industry and construction standards published in 1986. Like in other non-construction industries, OSHA intended employees working in shipyards to be protected by the general industry standard, except for those operations which were specifically listed as covered by the construction standard, i.e. renovation, removal, demolition and repair.

In 1988, OSHA convened the Shipyard Employment Standards Advisory Committee (SESAC), comprised of members from labor, private industry, state and federal government, and professional and trade associations. The Committee's charter directed it "to develop a single set of comprehensive health and safety standards for Shipyards."

In the 1990 NPRM, OSHA sought information and comment on how best to provide equivalent

protection to workers engaged in shipyard activities. The Agency noted that although it had considered these operations to be regulated under the general industry standard in the 1986 rulemaking, subsequent considerations led OSHA to observe that many shipyard industry activities are construction-like in nature.

In response, SESAC drafted alternative regulatory text which it submitted to this rulemaking docket with the recommendation that it be adopted as a vertical asbestos standard for shipyards (29 CFR 1915, Ex. 7-77). The Committee stated: "Maritime is neither general industry nor construction -- it is maritime. "This committee was formed by the Secretary of Labor with the objective in its charter to "recommend * * * one comprehensive set of standards* * *for the shipbuilding, ship repair and shipbreaking industries* * *" (Advisory Committee Charter).

Additional comment and testimony on this issue was submitted during the rulemaking. For example, Charles Sledge, Jr. of the Norfolk Naval Shipyard in his testimony stated that he did not feel that shipyard industry work meets the definition of construction work defined in 29 CFR 1910.12 (Ex. 28). Although he preferred keeping shipyard industry operations under the general industry asbestos standard, he recommended that OSHA apply the SESAC-recommended standard to shipyard activities rather than the construction asbestos standard. He pointed out that most asbestos work in shipyards takes place in fixed locations and does not have the transient nature of true construction work. Mr. Sledge also felt that shipyards have developed ways to stay below the PEL and that any change would result in requiring expensive alterations of facilities, and a need for additional training.

Several commentators including F. Losey of the Shipbuilders Council of America (Ex. 7-2), D. Knecht of Litton Ingalls Shipbuilding (Ex. 7-22), and C. Klein of Newport News Shipbuilding (Ex. 7-71) encouraged OSHA to adopt the SESAC-recommended regulatory text for shipyards (Ex. 7-2).

J. Collins of Naval Operations objected to OSHA's proposal to apply the construction asbestos standard to shipyard industry because he considered some of the provisions infeasible on vessels (Ex. 7-52). In his opinion the construction standard requires showers be located at the entrance to the regulated area and that this was not reasonable on small ships like submarines. Other comments, (apparently by others) in this submission expressed the view that shipyard industry activities should be regulated under the construction standard since they are often identical to construction work. To the same effect see Ex. 7-52.

BCTD stated in its testimony that:

* * * [It] agrees with OSHA that, because the manner in which maritime employees work with and are exposed to asbestos is similar to the experience of construction employees, the provisions of the construction standard should apply in that industry. In particular, whenever the likelihood exists that asbestos-containing materials will be disturbed in ship repair and renovation, that activity should be conducted under a negative air apparatus. [Ex. 34, p.2]

The rulemaking process revealed that there was confusion in the shipyard industry sector as to which of the standards applied to the various activities within the shipyard. In his

testimony, the Chairman of the Shipyard Employment Standards Committee said: "In the case of asbestos, both 1910 and 1926 are both applied in various shipyard operations. This is confusing to the shipyard work force who are required to follow one set of rules one day and another set the next day." (Tr. 337) In the current revision of the asbestos standards, OSHA has determined that a separate vertical standard for shipyards is appropriate. OSHA understands that many spokespeople for the shipyard industry believe that compliance with OSHA's asbestos standards will be facilitated in shipyards if only one standard applies to those workplaces. Because OSHA wishes to promote compliance, and because the Agency acknowledges that some shipyard conditions are unique, OSHA is issuing a standard that will apply only to shipyard industries. It is neither less nor more rigorous than the general industry and construction standards. How it differs from the two other asbestos standards will be discussed under the topic heading for each substantive provision, in the preamble text which follows. The recommendations will be discussed more fully, following a summary of the relatively small number of comments received by the Agency.

Most provisions in the final shipyard standard include some relevant provisions similar to the revised construction standard. In addition OSHA has incorporated some of the specific recommendations made by the Shipyards Employment Standards Advisory Committee discussed below.

Relatedly, the Great Lakes Carriers Associates, representing fleets on the Great Lakes, wanted assurance that asbestos exposures of seamen aboard vessels will continue to be regulated by the Coast Guard under an existing Memorandum of Understanding between the Coast Guard and OSHA (Ex. 7-8). OSHA does not intend to alter the agreement it has with the Coast Guard. Rather, the maritime standard under discussion concerns shipbuilding, ship repair and ship-breaking activities (29 CFR part 1915, Shipyards).

(2) Definitions

Paragraph (b) General Industry, Construction and Shipyard Employment. OSHA has deleted some definitions which appear in the 1986 standards, and has added others. Alphabetically, the changes are as follows:

The 1986 standards contained an "action level" of 0.1 f/cc, one half the PEL of 0.2 f/cc. The action level provides a "trigger" for certain duties, such as monitoring, medical surveillance and training. The Court of Appeals for the District of Columbia Circuit instructed OSHA to consider reducing the action level to 0.05 f/cc should the PEL be reduced to 0.1 f/cc. In most single-substance air contaminant standards it has issued, OSHA has set an action level equal to half the PEL. The action level triggers duties of monitoring, medical surveillance, and training, and assures that workers who are not exposed at or above the PEL but who may nevertheless be exposed to levels that present a risk to their health receive a degree of protection. The action level thus helps to reduce residual risk that may remain at the PEL.

In these standards, OSHA has taken a different approach to protecting workers exposed to levels of asbestos below the PEL. Instead of a numerical action level, employer duties involving training and medical surveillance are triggered by exposure to ACM or PACM or by the type of work being done. Additionally, work practices also are required regardless of measured

exposure levels. OSHA considers this approach to better protect employees than an action level, which triggers training and medical surveillance duties based on monitoring results. OSHA's approach is particularly appropriate for asbestos because in many cases, asbestos levels below the PEL cannot be reliably measured, and duties tied to an action level might therefore be triggered by measurements of dubious accuracy.

In the 1990 proposal, OSHA did not propose an action level based on its tentative conclusion that workplace asbestos concentrations below the PEL could not be reliably and reproducibly measured (55 FR 29722). The Agency asked for comment on the advisability of setting an action level of 0.05 f/cc, and specifically asked whether the methodology for measuring airborne asbestos levels had advanced sufficiently to allow reliable and reproducible measurements at that level. Evidence subsequently submitted to the rulemaking record indicated that levels as low as 0.05 f/cc could not be consistently measured reliably. The rulemaking reinforces OSHA's tentative conclusion that workplace asbestos levels of 0.05 f/cc cannot be measured reliably (see NIOSH Tr. 215, SESAC Tr. 345). Because employers cannot obtain reliable and reproducible measurements of airborne asbestos levels at concentrations of 0.05 f/cc, it would be infeasible to base training and medical surveillance requirements on worker exposure to asbestos at such a level. OSHA therefore declines to establish an action level of 0.05 f/cc. OSHA recognizes in some circumstances the general advantages of an action level, and if future monitoring technology is developed which would allow reliable, consistent determinations at lower fiber levels, OSHA will reconsider whether an action level would be appropriate for the asbestos standard and whether action under section (6)(b)(7) of the Occupational Safety and Health Act which directs OSHA to "make appropriate modification in the * * * requirements relating to * * * monitoring or measuring * * * as may be warranted by experience, information, or medical or technological developments acquired subsequent to the promulgation of the relevant standard" is appropriate.

The agency has, however, included provisions that require training and medical surveillance of employees exposed below the PEL. Thus, like standards that contain an action level, these standards use training and medical surveillance to reduce the residual significant risk that remains at the PEL. The general industry standard requires that all employees who work in areas where ACM or PACM is present be given a prescribed level of awareness training. The construction and shipyard standards require training of all workers who install asbestos-containing products and all workers who perform Class I, Class II, Class III, and Class IV work. These training requirements assure that all employees who are potentially exposed to more than de minimis concentrations of asbestos can recognize conditions and activities that can lead to asbestos exposure, know of the hazards associated with asbestos exposure, and are trained to utilize the means prescribed by the standard to minimize their exposure.

With respect to medical surveillance, the construction and shipyard standards require medical surveillance of all workers who, for a combined total of 30 days per year or more, engage in Class I, II, or III work, or who are exposed above the PEL or excursion limit. Additionally employees who wear negative pressure respirators are provided with medical surveillance. The general industry standard requires medical surveillance of all workers exposed above the PEL or excursion level, with no 30-day per year limitation. In crafting these provisions, OSHA has attempted to assure that those workers for whom medical surveillance will provide

relevant information and benefit are entitled to it. In construction and shipyard work, employees who do not engage in Class I, II, or III work are unlikely to be exposed above 0.05 f/cc (the potential "action level") because the work practices mandated in the standard should result in negligible asbestos exposure to workers who do not specifically engage in asbestos-related work. Employees who engage in only Class IV work also should not be exposed above 0.05 f/cc because of the lower asbestos exposures associated with such work. OSHA therefore believes that the construction and shipyard provisions target medical surveillance where it is needed.

In general industry, the vast majority of workers who are exposed below the PEL will also be exposed below 0.05 f/cc. The work practices mandated for brake and clutch repair, by far the largest general industry segment subject to the standard, should result in virtually all such workers being exposed below 0.05 f/cc. Another large general industry segment, custodial workers, will also be generally exposed below 0.05 f/cc. While some small number of workers in both categories as well as in the manufacturing of asbestos products may be exposed between 0.05 f/cc and 0.10 f/cc on some days, the difficulty of obtaining reliable and reproducible measurements at those levels makes it difficult to identify those workers accurately. Therefore, if medical surveillance were triggered by exposure above 0.05 f/cc, the employees subject to such surveillance would likely be chosen on the basis of the vagaries of the monitoring process rather than on any realistic assessment of the risk that they face. OSHA therefore concludes that it would be infeasible, and would not reduce significant risk, to require medical surveillance for workers in general industry exposed below the PEL or excursion limit.

David Kirby of the Oak Ridge National Laboratory stated his belief that:

I'm not sure if the analytical methodology will be able to support this due to the level of accuracy that's normally associated with trying to take samples under the normal procedures at that level." (Tr. 105)

NIOSH too testified that "[i]n NIOSH's judgment, the establishment of a PEL or an action level below 0.1 fiber per cc for most industrial or construction work sites would be difficult at this period of time" (Tr. 215). Additional doubt was voiced by the chairman of the Shipyard Employment Standards Advisory Committee, "* * * an action level, that is 0.05 fibers per cc, is not appropriate or reasonable due to inconsistencies and non-reproducibility with the sampling and analytical methodology" and noted concern that shipyard environments were especially likely to have high levels of background dust which could overload sampling devices, making determinations at that level more difficult (Tr. 345). Other commenters supported the proposed deletion of an action level (Ex. 7-2, 7-39, 7-99, 7-104, 7-120, 7-146).

Asbestos

In 1992 OSHA amended the definition of "asbestos" from the 1986 standards. The non-asbestiform varieties of the minerals actinolite, tremolite and anthophyllite are no longer included in the definition of asbestos. In 1986 OSHA determined that although tremolite, actinolite and anthophyllite exist in different forms, all forms of these minerals would continue to be regulated. Following promulgation of the rule, several parties requested an

administrative stay of the standard claiming that OSHA improperly included non-asbestiform minerals. A temporary stay insofar as the standards apply to the non-asbestos forms of tremolite, actinolite and anthophyllite was granted and the Agency initiated rulemaking, proposing to remove these forms from the scope of the asbestos standards. Following a public comment period and public hearing, OSHA issued its final decision to delete non-asbestiform tremolite, anthophyllite and actinolite from the scope of the asbestos standards (57 FR 24310, June 8, 1992). The Agency, in evaluating the record, found that "evidence is lacking to conclude that non-asbestiform tremolite, anthophyllite and actinolite present the same type or magnitude of health effect as asbestos," and that the failure to regulate them as asbestos does not present a significant risk to employees.

Classification of Asbestos Work (Classes I-IV)

In the Construction and Shipyard Employment Standards, OSHA is adding definitions for four classes of activities which trigger different provisions in the standard. Those activities presenting the greatest risk are designated Class I work, with decreasing risk potential attaching to each successive class. The Construction and Shipyard Employment Standards regulate Class I, II and III work; all three standards regulate Class IV work.

"Class I" work is defined as activities involving the removal of thermal system insulation and sprayed-on or troweled-on or otherwise applied surfacing ACM (asbestos-containing material) and PACM (presumed asbestos-containing material); "Class II asbestos work" is defined as removal of ACM or PACM which is not TSI or surfacing ACM or PACM; "Class III asbestos work" is defined as repair and maintenance operations which are likely to disturb ACM, or PACM; Class IV operations are custodial and housekeeping operations where minimal contact with ACM and/or PACM may occur.

Class I asbestos work involves removal of surfacing materials sprayed or troweled or otherwise applied to surfaces, and removal of thermal system insulation. Surfacing materials include, for example, decorative plaster on ceilings or acoustical ACM on decking or fireproofing on structural members. Thermal system insulation includes, for example, ACM applied to pipes, boilers, tanks and ducts. Based on the record, OSHA has determined that the prevalence of these materials and their likelihood of significant fiber release when disturbed, requires rigorous control methods which OSHA has set out in the standards.

Class II asbestos work involves removal of any other asbestos-

containing material -- which is not TSI or surfacing ACM. Examples of Class II work are removal of floor or ceiling tiles, siding, roofing, transite panels. EPA refers to these materials as "miscellaneous ACM" in the "Green Book." (Ex. 1-183) Work practices and other control measures to be employed in removing these materials are discussed later in this preamble under the methods of compliance section.

Class III asbestos work are defined as repair and maintenance activities involving intentional disturbance of ACM/PACM. Class III is limited to incidental cutting away of small amounts (less than a single standard waste bag) of ACM/PACM, for example, to access an electrical box for repair.

The first three classes of asbestos work are intended to cover the kinds of asbestos work which under the 1986 construction standard were designated "asbestos removal, demolition, and renovation operations," including "small-scale, short-duration operations, such as pipe repair, valve replacement, installing electrical conduits, installing or removing drywall, roofing, and other general building maintenance or renovation."

The classes are exclusive. For example, the stripping of 50 linear feet of thermal system insulation, which has not been positively identified as non-asbestos containing material is Class I, for it is the removal of PACM. Repair of a valve covered by ACM is Class III, since "removal" is not taking place. Removal of roofing material containing ACM is Class II, since roofing material is not high-risk ACM. OSHA believes dividing activities by "Classes" will be clearer than the prior system in the 1986 standard which prescribed different precautions for "small scale, short duration work," which it then defined by example. As noted in several places in this document this was confusing to employers, to the Court and to OSHA itself. A more extensive discussion of the "Class" system of designating work with asbestos-containing materials is contained in the discussion on "Methods of Compliance" provisions later in this preamble.

Class IV work is defined as maintenance and custodial activities during which employees contact ACM and PACM and activities to clean up waste and debris containing ACM and PACM. This includes dusting surfaces, vacuuming carpets, mopping floors, cleaning up ACM or PACM materials from thermal system insulation or surfacing ACM/PACM. Workers may contact ACM or PACM when performing a wide variety of routine jobs that result in incidental disturbance, such as changing a battery in a smoke detector attached to a ceiling containing ACM or PACM, polishing floors containing asbestos, and changing a light bulb in a fixture attached to an asbestos containing ceiling.

For custodial work, the Class IV characterization applies to situations where there is an indication that surfaces are contaminated with ACM or PACM. One indication would be identification of the ACM or PACM sources of the debris or dust; such as visibly damaged, or degraded, ACM or PACM in the vicinity. Visibly damaged, degraded, or friable ACM or PACM are indications that surface dust could contain asbestos, and Class IV protection applies. OSHA requires in (g)(9) that such dust or debris be assumed to be ACM or PACM. Another indication could be an analytical test to determine whether the surface dust itself contains asbestos. Since dust of carpets may not be visible, visible dust on other surfaces along with the presence of ACM/PACM nearby would indicate that cleaning the carpet is Class IV work.

The general industry standard also includes requirements for maintenance and custodial operations which mirror Class IV requirements in the construction standard. These would apply to activities which are not traditionally viewed as construction activities, and which, as contended by certain participants in this proceeding, may not be covered by the Construction Safety Act (40 U.S.C. 333). As further discussed in the preamble discussion relating to paragraph (a), Scope and Application, examples of these activities are clean-up in areas where asbestos-containing dust or debris is present and removing light fixtures located near "high risk" surfacing material.

Some Class IV work was covered by the earlier standards, yet the coverage was incomplete.

The general industry standard regulated housekeeping activities, and housekeeping activities were also included in the construction standard to be covered if they were part of a construction job. Precautionary maintenance guidelines to avoid disturbing ACM were addressed in Appendix G of the construction standard. OSHA believes that the switch from the regulated "housekeeping" activities to the Class IV definition is clearer and reduces loopholes. The custodial activities covered in either event can clearly create asbestos dust and expose custodial employees to that dust. Data in the record show that custodial activities can produce not insignificant asbestos exposure levels. Therefore, the work practices required to reduce that dust are clearly necessary to reduce significant risk to custodial workers.

By establishing a Class IV, OSHA is rejecting various recommendations that some activities, potentially involving asbestos disturbance, would result in de minimis risk, and as such should not be regulated (See further discussion concerning Methods of Compliance). The new definition of Class IV work, the removal of the non-mandatory appendix, and coverage of these activities both under general industry standard and the construction standard and shipyard employment standards clarify the standards' application to such work.

OSHA requested comments on setting a cut-off for asbestos-containing material with minimal asbestos content. There was overwhelming support for a 1% cutoff for ACM which would be consistent with EPA rules. The Hazard Communication Standard labeling and training provisions require labeling of materials which contain more than 0.1% asbestos. EPA defines asbestos containing material as: "Any material containing more than one percent asbestos." (NESHAP and Green Book p. 30). OSHA has no information to indicate what proportion of building materials fall into the category of containing more than 0.1% and less than 1.0% asbestos. EPA has listed building materials by their asbestos content and among those included on the list, only surfacing ACM ranged down to 1% (and up to 95%) (EPA "Purple Book," Ex. 1-282). Some participants, including NIOSH have expressed concern that even 1% may be below the accuracy level for optical microscopic methods. (Ex. 7-145, 162-39). Among those who dealt with the issue, most supported the 1.0% cutoff, most citing its consistency with EPA (Ex. 7-5, 7-6, 7-21, 7-43, 7-51, 7-74, 7-76, 7-99, 7-106, 7-111, 7-120, 7-137, 151, 162-59, 162-29). OSHA agrees that a cutoff of 1.0% asbestos is appropriate for asbestos containing building materials and has included this value in its definitions of ACM.

Closely Resemble

Included in the construction and shipyard employment standards is a definition for the term "closely resemble," which is the term used in the regulatory text to limit the use of historic exposure data to predict exposures. It is defined as circumstances where "the major workplace conditions which have contributed to the levels of historic asbestos exposure are no more protective than in the current workplace." OSHA's intent is to allow data reflecting past exposures to be used to predict current exposures only when the conditions of the earlier job were not more protective, i.e., employees were not better trained, work practices were not used more consistently, and no more supervision was present.

Competent Person

OSHA has amended the definition of "competent person" in the construction standard and

included it in the Shipyard Employment Standard as a "qualified person." The definition is based on the definition of "competent person" in the general construction standard, 29 CFR 1926.32(f), i.e. "one who is capable of identifying existing asbestos hazards in the workplace and who has the authority to take prompt corrective measures to eliminate them," but adds a specific training qualification. The training provisions require a competent person take a course which meets the requirements of EPA's Model Accreditation Plan (40 CFR 763, Subpart E). OSHA believes that specific training is needed so a "competent person" will have adequate knowledge to perform the competent person's responsibilities for Class I and II work. A Class II and Class IV "competent person" must undergo "Operations and Maintenance" (O&M) training as developed by EPA. Further discussion of these issues is found later in this document.

The revised definition deletes from the definition a list of duties to be performed by the competent person. Duties are more appropriately set out in other regulatory paragraphs which are prescriptive, rather than in the "definition" section. In response to the court's remand, OSHA has also expanded the scope of the competent persons's duties so that a competent person must supervise all asbestos activities under the construction standard. As noted, these requirements are set forth in other regulatory paragraphs which govern conditions of work in covered activities.

The shipyard employment standard does not use the term "competent person," because that term has a unique definition under Part 1915. OSHA has accepted SECSAC's recommendation that the term "qualified person" should be used to designate a person with the same duties under the shipyard employment standard.

Critical Barriers

OSHA is adding a definition for the term "critical barriers" whose use is required in certain asbestos operations. These are defined as plastic sheeting or equivalent material placed over openings to the work area. These barriers are effective when they seal all openings into a work area. Critical barriers can be other physical barriers sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

Disturbance

OSHA has added a definition for "disturbance" to all three standards to distinguish it from removal. In this definition disturbance means any contact with ACM/PACM which releases fibers or which alters its position or arrangement. It also includes operations which disrupt the matrix or render it friable or which generate visible debris from it. A quantitative cutoff of disturbance is given -- the amount of ACM/PACM so disturbed may not exceed the amount that can be contained within one standard sized glove bag or waste bag. OSHA believes that certain jobs, e.g., repairing leaking valves, often require asbestos to be cut away to gain access to a component. If the amount of asbestos so "disturbed" is contained in one bag, Class I precautions are not necessary.

Glove Bag

The term "glove bag" is also defined in the standards as a plastic bag-like enclosure affixed around ACM with glove-like appendages through which material and tools may be handled.

Homogeneous Area

The presumption that a material contains asbestos may be rebutted by sampling a "homogeneous" area of the presumed ACM to determine its asbestos content. OSHA has defined "homogeneous area" in much the same way it is defined by EPA as an area of surfacing material or thermal system insulation that is uniform in color and texture.

Industrial Hygienist

A definition for "Industrial Hygienist" is included in the standards as a professional person qualified by education, training, and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards.

Initial Exposure Assessment

"Initial Exposure Assessment," including "Negative Initial Exposure Assessment" are terms used in the construction and in the shipyard standards. It means a required assessment by a "competent person" concerning the exposure potential of a specific asbestos job, or series of similar asbestos jobs. A "Negative Initial Exposure Assessment" is such an assessment in which it is concluded that employee exposures during the job are likely to be consistently below the PELs. Assessments must be based on information and data which are allowed pursuant to criteria in paragraph (f). The results of "Initial monitoring," no longer required for each job, should be considered, but do not necessarily constitute an adequate "assessment" if they would not represent all worst-case employee exposures during the entire job.

Modification

Alternatives or modifications to listed control methods are allowed when the employer demonstrates that such a "modification" still provides equivalent worker protection. OSHA does not intend that changes in a control method which decrease the safety margin of a material or omitting a procedure be permitted by calling it a "modification." A "modification" means a changed or altered procedure, material which replaces a procedure, material or component of a required system. For example, a new test proven successful in detecting leaks might be substituted for required "smoke tests." Omission of a procedure or component, or a reduction in the stringency or strength of a material or component is not considered a "modification" under this section.

Presumed Asbestos-Containing Material (PACM)

In all three standards, "presumed asbestos containing material," "PACM"

means thermal system insulation and sprayed on and/or troweled or otherwise applied surfacing material in buildings constructed no later than 1980. OSHA has found that these materials are "high risk" if asbestos-containing. OSHA bases this on the record, including the

HEI Report which states that "thermal system insulation and surface treatments (fireproofing, acoustical and decorative finishes) stand out in importance for their potential for fiber release and subsequent exposure to [building] occupants" (Ex. 1-344, p. 4-5). Although these materials may have been installed in small quantities after 1980, OSHA finds that their installation is unlikely after that date.

Project Designer

OSHA has adopted a definition like that of EPA for a "Project Designer"

-- a person who has successfully completed the training requirements for an abatement project designer established by 40 USC 763.90(g).

Removal

"Removal" means all operations where ACM and/or PACM is removed from a building component, regardless of the reason for the removal. It includes those maintenance, repair, renovation and demolition activities where ACM and/or PACM removal is incidental to the primary reason for the project, as well as where removal of ACM and/or PACM is the primary reason for the project. Removal should be distinguished from "disturbance" which includes "cutting away" a small amount of ACM or PACM.

Regulated Area

"Regulated area" is included in all three standards. All three, like the 1986 standards, require the establishment of such an area where the employer believes that the PEL will be exceeded. Now, the construction and shipyard employment standards add that such area must be established also where Class I, II and III activities will take place, regardless of exposure levels. Also, the specific actions required of the employer to demarcate a regulated area are deleted from the definition, and are placed in the appropriate prescriptive paragraph, in this case paragraph (e)(6).

(3) Permissible Exposure Limits

Paragraph (c) General Industry, Construction and Shipyard Standards. In all three standards, the eight hour time-weighted average permissible exposure limit is changed from an eight hour time weighted average (TWA) of 0.2 f/cc to a TWA of 0.1 f/cc in the revised final rules. As noted in the 1990 proposal and in the preamble discussion above, OSHA's decision to reduce the PEL across the board responds to the Court's directive to consider whether to establish operation-specific exposure limits, since the Court noted that on the record of the 1986 standards, it appeared feasible to reduce the PEL to 0.1 f/cc limit in many industry sectors. OSHA has rejected "operation-specific" PELs for the wide variety of operations that expose employees to asbestos. OSHA proposed and these final standards adopt required operation-specific work practices, in addition to an across-the-board PEL reduction to 0.1 f/cc. OSHA expects that the risk reduction accomplished by this two-pronged approach will be at least as great as would operation-specific PELs. First, the required controls are found to be capable of achieving maximum exposure reduction on an operation-by-operation basis.

Second, since OSHA has found that specific work practices are feasible, the Agency expects a higher compliance rate and thus, greater risk reduction than if practices were not specified. Third, in operations where particular controls are specified, the PEL is a backstop; alerting employers where additional controls are needed or closer surveillance is required; in all operations the PEL is a measurable and comparable value, which cannot be exceeded without further action by the employer to reduce exposures.

At the time of the proposal in 1990, the question of whether the proposed PEL reduction would reduce a still significant risk had already been given a tentative answer by the Court. The D.C. Circuit Court of Appeals, in remanding the issue of lowering the PEL to the Agency, noted that based on the 1984 risk assessment, the excess risk stemming from average exposures of 0.1 f/cc "could well be found significant." *BCTD v. Brock*, 838 F.2d at 1266." (55 FR at 29714).

In the proposal, OSHA stated that it believes "that compliance with proposed amendments to reduce the PEL to 0.1 f/cc as a time-weighted average measured over 8 hours would further reduce a significant health risk which exists after imposing a 0.2 f/cc PEL" (55 FR 29714, July 20, 1990). OSHA's 1984 risk assessment showed that lowering the TWA PEL from 2 f/cc to 0.2 f/cc reduced the asbestos cancer mortality risk from lifetime exposure from 64 to 6.7 deaths per 1,000 workers. OSHA estimated that the incidence of asbestosis would be 5 cases per 1,000 workers exposed for a working lifetime under the TWA PEL of 0.2 f/cc. Counterpart risk figures for 20 years of exposure are excess cancer risks of 4.5 per 1,000 workers and an estimated asbestosis incidence of 2 cases per 1,000 workers.

OSHA's risk assessment also showed that reducing exposure to 0.1 f/cc would further reduce, but not eliminate, significant risk. The excess cancer risk at that level would be reduced to a lifetime risk of 3.4 per 1,000 workers and a 20 year exposure risk of 2.3 per 1,000 workers. Consequently significant risk would be reduced substantially. However, OSHA concluded therefore that continued exposure to asbestos at the TWA permitted level and action level would still present residual risks to employees which are significant.

The Court did not ask and OSHA did not undertake to review its earlier risk assessment in the proposal. At the hearing in January, 1991, Mr. Martonik, spokesperson for OSHA was asked by Mr. Hardy, representing the Safe Building Alliance (SBA), if OSHA was planning to update the earlier risk assessment as part of this proceeding. Mr. Hardy stated that "a number of parties have suggested to OSHA that its risk assessment from 1984, as relied on in the 1986 final rule, is outdated" (Tr. 30). Mr. Martonik responded that "we will have to consider all information we receive and determine relevance in this rulemaking after the record is closed. (Ibid).

Other parties questioned OSHA's continuing reliance on the 1984 risk assessment. The Asbestos Information Association (AIANA) testified that "OSHA's 1984 risk assessment fails to take into account the scientific community's consensus that chrysotile exposures hold lower risk than the Agency estimates * * * we do not believe that the risk assessment that is six years old relies on the best available evidence." AIANA requested OSHA to convene experts, as part of this hearing process "to revise its asbestos risk assessment." (Tr. 530), this was the major objection to OSHA's earlier risk assessment. Some participants voiced similar objections.

(Ex. 7-88, 7-110, 7-104, 7-120, Ex. 145, 151), while others were of the opinion that chrysotile had the same potency as other forms of asbestos (see Ex. 119 C, 1-136, 125, Att. 6, 143 Att C, 143 Att. D.).

Although as noted above, the issue of the continuing validity of OSHA's earlier risk assessment was not remanded to the Agency for reconsideration, implicit in OSHA's proposal to lower the PEL to 0.1 f/ cc is OSHA's determination based on the 1984 risk assessment, that the lower exposure limit is necessary to reduce a still significant occupational risk.

After a comprehensive review of the evidence submitted concerning the validity of the 1984 risk assessment, OSHA has determined that it will continue to rely on the earlier analysis. The Agency believes that the studies used to derive risk estimates remain valid and reliable, and that OSHA's decision to not separate fiber types for purposes of risk analysis is neither scientifically nor regulatorily incorrect.

There are at least three reasons for OSHA's decision not to separate fiber types. First, OSHA believes that the evidence in the record supports similar potency for chrysotile and amphiboles with regard to lung cancer and asbestosis. The evidence submitted in support of the claim that chrysotile asbestos is less toxic than other asbestos fiber types is related primarily to mesothelioma. This evidence is unpersuasive, and it provides an insufficient basis upon which to regulate that fiber type less stringently.

As OSHA explained in the preamble to the 1986 standards,

*** to summarize the data on risk differential by asbestos fiber type, human epidemiological studies have suggested that occupational exposure to amphiboles is associated with a greater risk of mesothelioma than is exposure to chrysotile *** No clear risk differential for lung cancer or other asbestos-related disease has been demonstrated by epidemiological studies. Animal experiments, however, have indicated that chrysotile is a more potent carcinogen than amphiboles when administered by inhalation or intrapleural injection *** (51 FR at 22628).

OSHA agreed with the testimony of Dr. Davis, who stated that "the evidence cannot answer *** with certainty *** if "one fiber *** of amphibole (is) more dangerous than one fiber *** of chrysotile." (Ibid).

Second, as stated in the 1986 asbestos standard, even if OSHA were to accept the premise (which it does not), that chrysotile may present a lower cancer risk than other asbestos fiber types, occupational exposure to chrysotile asbestos still presents a significant risk of disease at the revised PEL (See 51 FR 22649, 22652). In particular, asbestosis, the disabling and often fatal fibrosis of the deep portions of the lung, is caused by exposure to all types of asbestos. The evidence on this is strong and no new information has been presented to contradict this. As stated above, OSHA estimated asbestosis risks at 0.2 f/cc exposures as an unacceptably high 5 cases per 1000 workers. Thus, asbestosis risks alone justify the regulation for chrysotile.

Lung cancer risks associated with chrysotile exposures are also high -- 6.7 lung cancer deaths

per 1000 workers exposed to 0.2 f/cc for a full working lifetime. OSHA notes that SBA's witness, Dr. K. Crump acknowledged that "(t)here's not a clear difference, * * * even in humans, for lung cancer * * * in terms of distinguishing the potency of amphiboles vs. chrysotile." (Tr. 4220).

Third, the record shows that employees are likely to be exposed to mixed fiber types at most construction and shipyard industry worksites most of the time. Assigning a higher PEL to chrysotile would present the Agency and employers with analytical difficulties in separately monitoring exposures to different fiber types. Thus, regulating different fiber types at differing levels, would require more monitoring all the time and would produce limited benefits (51 FR 22682).

Consequently, OSHA believes that its conclusion to treat all asbestos fibers as having a similar potency in the occupational setting remains valid. Most of the evidence submitted to the remand rulemaking duplicated evidence submitted to the 1986 standards' record, or was cumulative to the earlier body of evidence. For example AIANA appended its 1988 submission to the EPA, consisting of numerous studies and reports. Some of these documents were considered by OSHA in the prior rulemaking. There, OSHA had stated that the 1983 Berry and Newhouse study of friction materials manufacturing workers which found nonsignificant increases in lung cancer mortality, was inconsistent with other studies showing that low level asbestos exposure resulted in excess lung cancer mortality, because of the relatively short follow up period used (51 FR 22618).

Other studies involved lung burden analyses of mesothelioma victims, apparently showing that the pulmonary content of chrysotile was within the range of the general population, whereas amphibole content was significantly elevated compared to the general population (see e.g. Churg, Malignant Mesothelioma in British Columbia in 1982, Cancer, 2/85, 672). OSHA noted in the preamble to the 1986 rule, that there is a difference in tissue retention which would account for the autopsy results and cited a study by Glyseth et al. (Doc. 33-C, Ex. 312) which supported that explanation. OSHA also noted that "the differential lung retention of various fiber types has been demonstrated in animals," citing a study by Wagner which found that animals exposed to chrysotile fibers developed lung cancer even though a smaller amount of chrysotile was retained in the lung compared to similar tests with amphiboles.

Dr. Weill believed that "these differences in tissue persistence may wholly or partially explain the observations [that exposure to amphiboles are associated with a higher prevalence of mesothelioma] in human * * * population * * *. Non-confirmation of fiber type differences in animal experiments may be related to the much shorter life span * * * [of experimental animals, which would not allow] the effects of varying tissue-persistence to be expressed" (Doc. 33-C, Ex. 99, p.18; 51 FR 22628). Therefore OSHA had reviewed and evaluated in the earlier rulemaking a portion of the evidence submitted by proponents of differential regulation of fiber types, and had rejected the claim that chrysotile should be regulated less stringently.

Some new evidence on the issue of differential risks of asbestos fiber types was submitted by both supporters and detractors of that theory.

In support of the position that chrysotile asbestos exposure is equivalent in risk to amphibole

asbestos exposure, BCTD submitted studies which indicated excess mesothelioma cases in workers exposed solely to chrysotile asbestos (see Ex. 119 C, 1-136, 125, Att.6, 143 Att C, 143 Att. D). In support of the opposing claim that chrysotile has reduced carcinogenic potential, AIANA and SBA submitted additional evidence. For example, AIANA submitted the World Health Organization's 1989 working report which recommended that the exposure limit for chrysotile should be reduced to 1 f/cc or below (8 hour TWA), where it was recommended that exposure to crocidolite and amosite asbestos be prohibited (Ex. 21 A, p. 9). In particular, two papers by Mossman, et. al, are cited as the basis for the claim that a scientific "consensus" believes that chrysotile carries a reduced carcinogenic risk (Ex. 1-153, 151). Thus AIANA states that "since OSHA issued its 1984 asbestos risk assessment, the scientific consensus that chrysotile asbestos poses lesser risks has solidified" (Ex. 142 at 3).

However, OSHA notes that various participants in this rulemaking, including NIOSH and Dr. Nicholson, disputed the existence of such a consensus. Dr. Nicholson and others including Dr. Landrigan, in a letter to Science, (Ex. 1-155), dispute various interpretations of data in Mossman et al.'s paper, and challenge the conclusion that chrysotile asbestos carries little cancer risk. Nicholson et al, point out that human studies show excess lung cancer risk that is proportionate to exposure across all fiber types, and that animal tests confirm these relationships. OSHA believes that the scientific community has not achieved "consensus" on these issues.

Among the studies submitted in support of the lowered risk of chrysotile asbestos, are those of Churg, and others showing that the lung burden of mesothelioma victims is predominantly amphibole, even though high chrysotile exposure levels were reported. As noted above, this line of argument was presented in the earlier asbestos rulemaking, and OSHA had concluded that lung burden studies are inconclusive. Additional response to this argument is provided by Dement who notes that "(t)he biological significance of post-mortem lung fiber burden data has yet to be established. These data are not useful as a predictor of disease for several reasons. Chrysotile is known to split longitudinally and partially dissolve in the lung whereas amphiboles remain in the lungs for years without significant dissolution * * *. Measurements of tissue fiber burdens many years after first exposure may bear no relationship to the carcinogenic events which likely have taken place many years before clinical manifestation of cancer." (Ex. 1-273) BCTD pointed out in its post-hearing brief, that "Dr. Landrigan testified, while the observation that chrysotile does not last as long in the lungs as other forms of asbestos is not new knowledge (Tr. 1074), there is recent evidence that chrysotile is "the most effective of the three major fiber types at migrating to the pleura, that it is present in substantial amounts in pleural plaques and mesotheliomas, even in circumstances where it is not present or minimally present in the lungs themselves" (Tr. 1074).

The Agency also notes that the HEI report, in summing up its discussion of its literature search of studies examining the issue of the relative potency of chrysotile in inducing mesothelioma, stated: "(t)he evidence that chrysotile rarely causes pleural mesothelioma is not conclusive * * * and concluded that the absence of mesothelioma in one of the "two cohorts of heavily exposed asbestos workers who worked only with chrysotile * * * seems likely to be due at least in part to chance" (Ex. 1-344 p. 6-23).

HEI concluded that "the mesothelioma risk for chrysotile was an issue of disagreement; some

members of the Literature Review Panel held the view that a lower estimate should be recommended, as it would be more consistent with available data. The crucial issues, neither of which can be resolved unequivocally, are (1) what proportion of the mesotheliomas observed in groups such as the U.K. textile workers and the U.S. insulation workers were caused by their exposure to crocidolite or amosite; and (2) whether the best general estimate of the ratio of mesothelioma to excess lung cancer caused by chrysotile is provided by the Quebec miners and millers (about 1:4 or 1:5), or by the South Carolina textile workers handling Quebec fiber (zero)" (Ex. 1-344 p. 6-32).

Thus, although there is some evidence linking chrysotile to a lower mesothelioma rate than some amphibole fiber types, OSHA believes that there is insufficient evidence to show that chrysotile does not present a significant mesothelioma risk to exposed employees. Furthermore, the major disease linked to asbestos exposure, lung cancer, occurs at the same frequency among employees exposed to equivalent doses of chrysotile or to amphibole asbestos fiber types. Indeed, evaluation of all of the evidence indicates that chrysotile asbestos presents a similar significant risk of lung cancer and asbestosis as other forms of asbestos. Since these adverse health effects constitute the majority of diseases related to asbestos exposure, OSHA is still of the opinion that chrysotile exposure should be treated the same as other forms of asbestos.

In addition to contentions that OSHA's risk assessment had overstated asbestos risks because it treated the risks from all asbestos fiber types equally, other contentions were made that the earlier risk assessment may have understated the risks from asbestos, because it ignored evidence of the incidence of pleural plaques, and other asbestos disease which occurred in workers exposed at low levels, primarily as building custodians. The earlier risk assessment in 1984 focused on whether there was a significant risk of cancer and asbestosis at various levels of cumulative exposure. During this hearing, various labor groups stated their position that the presence of pleural plaques in asbestos exposed employees is not only a marker of asbestos exposure, but also an independent "material impairment" because they are associated with a greater risk of lung function impairment and pleuritic pain. Pleural plaques are focal areas of fibrous thickening of the pleura, the membrane lining the lung. Further, suggestions were made that OSHA should reduce its PELS to correspond to these increased risks of "material impairment" which occurred at lower exposure levels (see e.g., Ex. 143 at 35-37).

Evidence submitted during the rulemaking consisted of testimony and studies which in the view of some participants showed lung function decrement and resulting excess disease among workers exposed at low levels. For example BCTD witness Dr. Christine Oliver described various studies and concluded:

Pleural plaques * * * were a predictor for increased mortality from lung cancer and malignant mesothelioma in subsequent years * * * pleural plaques have also been shown to be associated with decrement in lung function * * * At the very least, pleural plaques are a marker for exposure, sufficient to increase risk for lung cancer and for malignant mesothelioma, and they have also been associated with loss of lung function (Tr. 1035-6).

Dr. Oliver recommended medical surveillance of those exposed to asbestos in their capacity as

custodians in buildings.

The studies considered by Dr. Oliver consisted of one involving 120 Boston public school custodians (Tr. 1026) which she conducted and found pleural plaques in 33% (N = 40) of the group. Further she noted that in 21% (of the 40, or 12 individuals) there was no known exposure to asbestos outside work as school custodian. In 18% of the group and 17 % of those with no outside exposure to asbestos, she observed a restrictive pulmonary defect, significantly associated with duration of employment as school custodian. Other studies described by Dr. Oliver, in the docket include: a study of 666 New York school custodians, reporting only x-ray data (Ex. 47). For all groups of workers, the lung abnormality seen on x-ray was associated with duration of work as custodian: a study of 1,117 insulation workers (likely to have had extensive asbestos exposure) by Dr. Irving Selikoff, in which workers were followed for up to 27 years prospectively, in which pleural plaques were found and which were concluded to be predictive of lung cancer mortality (Tr. 1036 and Ex. 124A): a study, by Balmes (Ex. 124 DD, Tr. 1036, Ex. 1-374) of approximately 900 school district employees in California were determined as likely to have been exposed to asbestos. The authors concluded, "More than 11 percent of workers known to have sustained exposure to ACM in school building, without history of exposure to asbestos prior to school district employment, and with at least 10 years of employment with the district had radiographic evidence of parenchymal asbestosis and/or asbestos-related pleural thickening" (Ex. 1-374, p. 547). After adjusting for smoking and age, the relative risk was 1.3 times greater for those with 10 years or more employment compared with those who had just begun working for the school district.

In addition to the occurrence of pleural plaques which are viewed as presenting an independent material impairment of health due to low level asbestos exposures, Dr. Oliver cited other studies which correlated low level asbestos exposure with mesothelioma. Thus, a study by Dr. H. Anderson (Tr. 1032 and Ex. 124 EE, Ex. 1-374 using information on mesothelioma cases from a Wisconsin Cancer Registry, analyzed 359 deaths from 1959 to 1989. Using death certificate occupational information, the researchers hypothesized 41 as likely to have been exposed to asbestos in buildings. For 10 (34%), no other likely source of asbestos exposure was identified. The paper concluded that "individuals occupationally exposed to in-place ACM are at risk for the subsequent development of mesothelioma" (Ex. 1-374, p. 570).

SBA submitted a critique of these studies which they commissioned by Drs. H. Weill and J. Hughes (Ex. 122). They suggested potential biases in these studies, that Dr. Oliver's study subjects were volunteers, the study had a low participation rate, they had used a non-standard classification system, and did not adequately account for age in relating restriction to lung function. These reviewers concluded that spirometric functional measurements were not related to the presence of plaques and that reduced lung volume could result from other factors. Drs. Weill and Hughes also examined the other studies, and argued that Dr. Selikoff's were "fatally flawed" due to the potential for development of unmeasured changes during the 27 year period of follow-up, and that both the Anderson and Balmes studies failed to adequately adjust for age, smoking and other direct asbestos exposures. Other reports cited by BCTD were dismissed because of potential sources of bias.

Dr. Oliver rebutted these arguments (Ex 143, Attachment F). She argued that she had

adequate controls, adequately accounted for age and demonstrated that pleural plaques were significantly associated with both latency and duration of work as custodian in the total group and in the group with no known other exposure, that lung restriction was significantly associated with duration of work as a custodian, and that pleural plaques mark increased risk for lung cancer mortality.

Dr. Levin also responded to the reviewer's criticism of his studies with Dr. Selikoff (Ex. 143, Attachment G). He pointed out that all x-rays had been read by a single reader, Dr. Selikoff, and that there is no evidence that smoking without asbestos exposure increases appearance of the small irregular opacities in the lung seen on the x-rays in their study. He further noted that in his study only actively working custodians were included and were therefore a "survivor" group and would therefore not be expected to report pulmonary dysfunction frequently. He claimed that relatively unexposed subject groups would not be expected to have more than an upper limit of 3% pleural plaques.

Dr. Anderson also responded to the Weill/Hughes comments (Ex. 143, Attachment H). He asserted that the review fails to explain how biases would significantly increase odds ratios in the study, that misclassification often is random and biases toward not detecting a difference between the study and control groups. He also questioned existence of evidence that smoking without asbestos exposure causes pleural thickening or irregular opacities.

The review of available literature, including the studies mentioned above by the Health Effects Institute, resulted in its the estimation that the prevalence of pleural plaques in the general population to be about 5% (Ex. 1-344, p. A2-9). Although HEI advised caution in interpreting the existing studies due to lack of specificity and sensitivity of methods used and couched its conclusions in cautious terms, they concluded: " * * * there is now persuasive evidence implicating asbestos-related pleural disease as an independent cause or indicator of functional impairment and possibly even disability * * * On the individual level, pleural disease may be the only indication of asbestos exposure, may explain symptoms and function impairment, and may predict future deterioration in lung function" (Ex. 1-344 p. A2-12).

OSHA agrees that health effects such as lung function impairment and pleuritic pain would be considered "material impairment," if substantial evidence supports the link to pleural plaques. OSHA concludes that the scientific data indicate that pleural plaques are primarily associated with asbestos exposure, and that they have occurred and still may at relatively low exposure levels.

However, OSHA does not believe that the data are available to permit OSHA to do a separate risk assessment for these effects which would in a major way add to the present assessment. The risk assessment on which OSHA has based its significant risk determinations for the 1986 and newly revised standards, calculated the incidence of mesothelioma, lung and other cancers and asbestosis, diseases based on a substantial amount of both mortality and exposure data. The data concerning lung function decrement and pleural plaques lack exposure information and would make quantitative risk estimates for these health effects less precise than the data for other forms of asbestos-related disease upon which OSHA is relying.

A separate risk assessment is also unnecessary. OSHA believes that the revised regulations

are already regulating at the margin of what is feasible, in terms of levels to be achieved, and controls which are required. OSHA has imposed necessary, feasible and well supported work practices for custodial work, which should reduce custodial exposures well below the historic levels (indeterminate) which may have been experienced by the workers studied in the above reports.

More generally, there would be remaining significant risk at this new 0.1 f/cc exposure limit if there were not other provisions to these standards. However, the exposure limit is accompanied by mandated work practice controls and requirements for hazard communication, training and other provisions. Together these will very substantially reduce that remaining significant risk, although the exact amount of that reduction cannot be quantified. In addition, it would be difficult to measure accurately in the industrial setting levels lower than those in these standards. OSHA believes its approach of setting a PEL which is reliably measurable, yet, imposing work practices and ancillary provisions for operations regardless of measured fiber levels will result in risk reduction well below that expected from just enforcing the 0.1 f/cc PEL. Thus, a lower PEL would not produce significant worker benefit.

(4) Multi-Employer Worksites

Paragraph (d) Construction and Shipyard Employment Standards. OSHA is retitling paragraph (d) "multi-employer worksites." The first provision, the same regulatory text as in the 1986 construction standard, requires that an employer whose work requires the establishment of a regulated area must inform other on-site employers of the asbestos work, and how other employees will be protected from hazards stemming from that work. In addition, new provisions follow which set out the compliance responsibilities of employers on multi-employer worksites.

In 1990, OSHA had proposed more comprehensive provisions governing communication of asbestos hazards among all employers, building and facility owners and employees, in a revised paragraph (d). These final standards expand communication provisions but repositions them in paragraph (k), "communication of hazards." A discussion of those provisions is found below in this preamble under that heading.

Paragraphs (d)(2) and (3) set out the compliance responsibilities of employers on multi-employer worksites. They acknowledge that on asbestos work sites, like other construction sites, employees exposed to a hazard are not always the employees of the employer who created the hazard.

Paragraph (d)(2) incorporates the rules now applied in enforcement actions governing multi-employer construction sites generally, to assure that all employees on such a site receive the protection intended by the standards. (See *Gelco Builders, Inc.* 6 BNA 1104). The standard explicitly requires asbestos hazards to be abated "by the contractor who created or controls the source of asbestos contamination."

In addition, paragraph (d)(3) sets forth the duties of the employer of employees who are exposed to asbestos hazards, but who did not create the source of contamination. One, such employer may request the contractor with control of the hazard to take corrective action. For