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Subchapter 4. Construction Safety Orders  
Article 4. Dusts, Fumes, Mists, Vapors, and Gases

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## §1529. Asbestos.

### (a) Scope and application.

(1) This section regulates asbestos exposure in all construction work as defined in Section 1502 including but not limited to the following:

(A) Demolition or salvage of structures where asbestos is present;

(B) Removal or encapsulation of materials containing asbestos;

(C) Construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain asbestos;

(D) Installation of products containing asbestos;

(E) Asbestos spill/emergency cleanup;

(F) Transportation, disposal, storage, containment of and housekeeping activities involving asbestos or products containing asbestos, on the site or location at which construction activities are performed;

(G) Excavation which may involve exposure to asbestos as a natural constituent which is not related to asbestos mining and milling activities;

(H) Routine facility maintenance; and

(I) Erection of new electric transmission and distribution lines and equipment, and alteration, conversion and improvement of the existing transmission and distribution lines and equipment.

(2) Whenever employee exposures to asbestos, as defined in subsection (b) of this section consist only of exposure to tremolite, anthophyllite, and actinolite in the nonasbestiform mineral habit, the provisions of Section 5208.1 shall apply.

(3) The provisions of this section are subject to the requirements of the Occupational Carcinogen Control Act of 1976 (Labor Code, Division 5, Part 10).

(4) Coverage under this Section shall be based on the nature of the work operation involving asbestos exposure.

### (b) Definitions.

"Aggressive-method" means removal or disturbance of building material by sanding, abrading, grinding or other method that breaks, crumbles, or disintegrates intact ACM.

"Amended water" means water to which surfactant (wetting agent) has been added to increase the ability of the liquid to penetrate ACM.

"Asbestos" includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that has been chemically treated and/or altered. For purposes of this standard, "asbestos" includes PACM, as defined below.

"Asbestos-containing material (ACM)", means any material containing more than one percent asbestos.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Authorized person" means any person authorized by the employer and required by work duties to be present in regulated areas.

"Building/facility owner" is the legal entity, including a lessee, which exercises control over management and record keeping functions relating to a building and/or facility in which activities covered by this standard take place.

"Certified Industrial Hygienist (CIH)" means one certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

"Chief" means the Chief of the Division of Occupational Safety and Health, P.O. Box 420603, San Francisco, CA 94142.

"Class I asbestos work" means activities involving the removal of TSI and surfacing ACM and PACM.

"Class II asbestos work" means activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

"Class III asbestos work" means repair and maintenance operations, where "ACM", including TSI and surfacing ACM and PACM, is likely to be disturbed.

"Class IV asbestos work" means maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities.

"Clean room" means an uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

"Closely resemble" means that the major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

"Competent person" means, in addition to one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them, one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them: in addition, for Class I and Class II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR part 763) for supervisor, or its equivalent and, for Class III and Class IV work, who is trained in a manner consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92 (a)(2). Note: For operations involving more than 100 square feet of asbestos containing construction material as defined in subsection (r) of this section the competent person may fulfill the requirement contained in Section 341.9 to specify a certified supervisor for asbestos related work.

"Critical barrier" means one or more layers of plastic sealed over all openings into a work area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

"Decontamination area" means an enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

"Demolition" means the wrecking or taking out of any load- supporting structural member and any related razing, removing, or stripping of asbestos products.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

"Disturbance" means activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM and PACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or waste bag which shall not exceed 60 inches in length and width.

"Employee exposure" means that exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

"Equipment room (change room)" means a contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

"Fiber" means a particulate form of asbestos, 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

"Glovebag" means an impervious plastic bag-like enclosure affixed around not more than a 60 x 60 inch asbestos-containing material, with glove-like appendages through which material and tools may be handled.

"High-efficiency particulate air (HEPA) filter" means a filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

"Homogeneous area" means an area of surfacing material or thermal system insulation that is uniform in color and texture.

"Industrial hygienist" means a professional qualified by education, training, and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards.

"Intact" means that the ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

"Modification" for purposes of subsection (g)(6), means a changed or altered procedure, material or component of a control system, which replaces a procedure, material or component of a required system. Omitting a procedure or component, or reducing or diminishing the stringency or strength of a material or component of the control system is not a "modification" for purposes of subsection (g)(6) of this section.

"Negative Initial Exposure Assessment" means a demonstration by the employer, which complies with the criteria in subsection (f)(2)(C) of this section, that employee exposure during an operation is expected to be consistently below the PELs.

"PACM" means "presumed asbestos-containing material".

"Presumed Asbestos Containing Material" means thermal system insulation and surfacing material found in buildings constructed no later than 1980. The designation of a material as "PACM" may be rebutted pursuant to subsection (k)(5) of this section.

"Project Designer" means a person who has successfully completed the training requirements for an abatement project designer established by 40 U.S.C. Sec. 763.90(g).

"Regulated area" means: an area established by the employer to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos, exceed or there is a reasonable possibility they may exceed the permissible exposure limit. Requirements for regulated areas are set out in subsection (e) of this section.

"Removal" means all operations where ACM and/or PACM is taken out or stripped from structures or substrates, and includes demolition operations.

"Renovation" means the modifying of any existing structure, or portion thereof.

"Repair" means overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

"Surfacing material" means material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).

"Surfacing ACM" means surfacing material which contains more than 1% asbestos.

"Thermal system insulation (TSI)" means ACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain.

"Thermal system insulation ACM" is thermal system insulation which contains more than 1% asbestos.

(c) Permissible exposure limits (PELS).

(1) Time-weighted average limit (TWA). The employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air as an eight (8) hour time-weighted average (TWA), as determined by the method prescribed in Appendix A to this section, or by an equivalent method.

(2) Excursion limit. The employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over a sampling period of thirty (30) minutes, as determined by the method prescribed in Appendix A to this section, or by an equivalent method.

(d) Multi-employer worksites.

(1) On multi-employer worksites, an employer performing work requiring the establishment of a regulated area shall inform other employers on the site of the nature of the employer's work with asbestos and/or PACM, of the existence of and requirements pertaining to regulated areas, and the measures taken to ensure that employees of such other employers are not exposed to asbestos.

(2) Asbestos hazards at a multi-employer work site shall be abated by the contractor who created or controls the source of asbestos contamination. For example, if there is a significant breach of an enclosure containing Class I work, the employer responsible for erecting the enclosure shall repair the breach immediately.

(3) In addition, all employers of employees exposed to asbestos hazards shall comply with applicable protective provisions to protect their employees. For example, if employees working immediately adjacent to a Class I asbestos job are exposed to asbestos due to the inadequate containment of such job, their employer shall either remove the employees from the area until the enclosure breach is repaired; or perform an initial exposure assessment pursuant to subsection (f) of this section.

(4) All employers of employees working adjacent to regulated areas established by another employer on a multi-employer work-site, shall take steps on a daily basis to ascertain the integrity of the enclosure and/or the effectiveness of the control method relied on by the primary asbestos contractor to assure that asbestos fibers do not migrate to such adjacent areas.

(5) All general contractors on a construction project which includes work covered by this standard shall be deemed to exercise general supervisory authority over the work covered by this standard, even though the general contractor is not qualified to serve as the asbestos "competent person" as defined by subsection (b) of this section. As supervisor of the entire project, the general contractor shall ascertain whether the asbestos contractor is in compliance with this standard, and shall require such contractor to come into compliance with this standard when necessary.

(e) Regulated areas.

(1) All Class I, II and III asbestos work shall be conducted within regulated areas. All other operations covered by this standard shall be conducted within a regulated area where airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed a PEL. Regulated areas shall comply with the requirements of subsections (2), (3), (4), and (5) of this subsection.

(2) Demarcation. The regulated area shall be demarcated in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area. Signs shall be provided and displayed pursuant to the requirements of subsection (k)(7) of this section.

(3) Access. Access to regulated areas shall be limited to authorized persons and to persons authorized by the Chief or Director.

(4) Respirators. All persons entering a regulated area where employees are required pursuant to subsection (h)(1) of this section to wear respirators shall be supplied with a respirator selected in accordance with subsection (h)(2) of this section.

(5) Prohibited activities. The employer shall ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.

(6) Competent Persons. The employer shall ensure that all asbestos work performed within regulated areas is supervised by a competent person, as defined in subsection (b) of this section. The duties of the competent person are set out in subsection (o) of this section.

(f) Exposure assessments and monitoring.

(1) General monitoring criteria.

(A) Each employer who has a workplace or work operation where exposure monitoring is required under this section shall perform monitoring to determine accurately the airborne concentrations of asbestos to which employees may be exposed.

(B) Determinations of employee exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee.

(C) Representative 8-hour TWA employee exposure shall be determined on the basis of one or more samples representing full-shift exposure for employees in each work area. Representative 30-minute short-term employee exposures shall be determined on the basis of one or more samples representing 30 minute exposures associated with operations that are most likely to produce exposures above the excursion limit for employees in each work area.

(2) Initial Exposure Assessment.

(A) Each employer who has a workplace or work operation covered by this standard shall ensure that a "competent person" conducts an exposure assessment immediately before or at the initiation of the operation to ascertain expected exposures during that operation or workplace. The assessment must be completed in time to comply with requirements which are triggered by exposure data or the lack of a "negative exposure assessment," and to provide information necessary to assure that all control systems planned are appropriate for that operation and will work properly.

(B) Basis of Initial Exposure Assessment: Unless a negative exposure assessment has been made pursuant to subsection (f)(2)(C) of this section, the initial exposure assessment shall, if feasible, be based on monitoring conducted pursuant to subsection (f)(1)(C) of this section. The assessment shall take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the employer which indicate the levels of airborne asbestos likely to be encountered on the job. For Class I asbestos work, until the employer conducts exposure monitoring and documents that employees on that job will not be exposed in excess of the PELs, or otherwise makes a negative exposure assessment pursuant to subsection (f)(2)(C) of this section, the employer shall presume that employees are exposed in excess of the TWA and excursion limit.

(C) Negative Exposure Assessment: For any one specific asbestos job which will be performed by employees who have been trained in compliance with the standard, the employer may demonstrate that employee exposures will be below the PELs by data which conform to the following criteria;

1. Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the TWA and excursion limit under those work conditions having the greatest potential for releasing asbestos; or

2. Where the employer has monitored prior asbestos jobs for the PEL and the excursion limit within 12 months of the current or projected job, the monitoring and analysis were performed in compliance with the asbestos standard in effect; and the data were obtained during work operations conducted under workplace conditions "closely resembling" the

processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job, and these data show that under the conditions prevailing and which will prevail in the current workplace there is a high degree of certainty that employee exposures will not exceed the TWA and excursion limit; or

3. The results of initial exposure monitoring of the current job made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee covering operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

(3) Periodic monitoring.

(A) Class I and II operations. The employer shall conduct daily monitoring that is representative of the exposure of each employee who is assigned to work within a regulated area who is performing Class I or II work, unless the employer pursuant to subsection (f)(2)(C) of this section, has made a negative exposure assessment for the entire operation.

(B) All operations under the standard other than Class I and II operations. The employer shall conduct periodic monitoring of all work where exposures are expected to exceed a PEL, at intervals sufficient to document the validity of the exposure prediction.

(C) Exception: When all employees required to be monitored daily are equipped with supplied-air respirators operated in the pressure demand mode, or other positive pressure mode respirator, the employer may dispense with the daily monitoring required by this subsection. However, employees performing class I work using a control method which is not listed in subsection (g)(4)(A), (B), or (C) of this section or using a modification of a listed control method, shall continue to be monitored daily even if they are equipped with supplied-air respirators.

(4) Termination of monitoring. (A) If the periodic monitoring required by subsection (f)(3) of this section reveals that employee exposures, as indicated by statistically reliable measurements, are below the permissible exposure limit and excursion limit the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

(B) Additional monitoring. Notwithstanding the provisions of subsections (f)(2), (f)(3), and (f)(4) of this section, the employer shall institute the exposure monitoring required under subsection (f)(3) of this section whenever there has been a change in process, control equipment, personnel or work practices that may result in new or additional exposures above the permissible exposure limit and/or excursion limit or when the employer has any reason to suspect that a change may result in new or additional exposures above the permissible exposure limit and/or excursion limit. Such additional monitoring is required regardless of whether a "negative exposure assessment" was previously produced for a specific job.

(5) Employee Notification of Monitoring Results.

(A) As soon as possible but not later than 5 working days following receipt of monitoring results required by this section, the employer shall notify affected employees of the monitoring results.

(B) The employer shall notify affected employees of the results of monitoring representing the employee's exposure in writing either individually or by posting at a centrally located place that is accessible to affected employees.

(C) The written notification required by subsection (f)(5)(A) of this section shall include the corrective action being taken by the employer to reduce employee exposure to or below the PEL and/or excursion limit wherever monitoring results have indicated that the PEL and/or excursion limit has been exceeded.

(6) Observation of monitoring.

(A) The employer shall provide affected employees and their designated representatives an opportunity to observe any monitoring of employee exposure to asbestos conducted in accordance with this section.

(B) When observation of the monitoring of employee exposure to asbestos requires entry into an area where the use of protective clothing or equipment is required, the observer shall be provided with and be required to use such clothing and equipment and shall comply with all other applicable safety and health procedures.

## (g) Methods of compliance

(1) Engineering controls and work practices for all operations covered by this section. The employer shall use the following engineering controls and work practices in all operations covered by this section, regardless of the levels of exposure:

(A) Vacuum cleaners equipped with HEPA filters to collect all debris and dust containing ACM and PACM, except as provided in subsection (g)(8)(B) of this section in the case of roofing material.

(B) Wet methods, or wetting agents, to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup, except where employers demonstrate that the use of wet methods is infeasible due to for example, the creation of electrical hazards, equipment malfunction, and, in roofing, except as provided in subsection (g)(8)(B) of this section; and

(C) Prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers except in roofing operations, where the procedures specified in subsection (g)(8)(B) of this section apply.

(2) In addition to the requirements of subsection (g)(1) of this section, the employer shall use the following control methods to achieve compliance with the TWA permissible exposure limit and excursion limit prescribed by subsection (c) of this section;

(A) Local exhaust ventilation equipped with HEPA filter dust collection systems;

(B) Enclosure or isolation of processes producing asbestos dust;

(C) Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;

(D) Use of other work practices and engineering controls that the Assistant Secretary can show to be feasible.

(E) Wherever the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the permissible exposure limit and/or excursion limit prescribed in subsection (c) of this section, the employer shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with the requirements of subsection (h) of this section.

(3) Prohibitions. The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM or PACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

(A) High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

(B) Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

(C) Dry sweeping, shoveling or other dry clean-up of dust and debris containing ACM and PACM.

(D) Employee rotation as a means of reducing employee exposure to asbestos.

(4) Class I Requirements. In addition to the provisions of subsections (g)(1) and (2) of this section, the following engineering controls and work practices and procedures shall be used.

(A) All Class I work, including the installation and operation of the control system shall be supervised by a competent person as defined in subsection (b) of this section;

(B) For all Class I jobs involving the removal of more than 25 linear or 10 square feet of thermal system insulation or surfacing material; for all other Class I jobs, where the employer cannot produce a negative exposure assessment pursuant to subsection (f)(2)(C) of this section, or where employees are working in areas adjacent to the regulated area, while the Class I work is or being performed, the employer shall use one of the following methods to ensure that airborne asbestos does not migrate from the regulated area:

1. Critical barriers shall be placed over all the openings to the regulated area, except where activities are performed outdoors; or

2. The employer shall use another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area, as verified by perimeter area surveillance during each work shift at each boundary of the regulated area, showing no visible asbestos dust; and perimeter area monitoring showing that clearance levels contained in 40 CFR Part 763, Subpart E, of the EPA Asbestos in Schools Rule are met, or that perimeter area levels, measured by Phase Contrast Microscopy (PCM) are no more than background levels representing the same area before the asbestos work began. The results of such monitoring shall be made known to the employer no later than 24 hours from the end of the work shift represented by such monitoring.

Exception: For work completed outdoors where employees are not working in areas adjacent to the regulated areas, this subsection (g)(4)(B) is satisfied when the specific control methods in subsection (g)(5) of this section are used.

(C) For all Class I jobs, HVAC systems shall be isolated in the regulated area by sealing with a double layer of 6 mil plastic or the equivalent;

(D) For all Class I jobs, impermeable dropcloths shall be placed on surfaces beneath all removal activity;

(E) For all Class I jobs, all objects within the regulated area shall be covered with impermeable dropcloths or plastic sheeting which is secured by duct tape or an equivalent.

(F) For all Class I jobs where the employer cannot produce a negative exposure assessment, or where exposure monitoring shows that a PEL is exceeded, the employer shall ventilate the regulated area to move contaminated air away from the breathing zone of employees toward a HEPA filtration or collection device.

(5) Specific control methods for Class I work. In addition, Class I asbestos work shall be performed using one or more of the following control methods pursuant to the limitations stated below:

(A) Negative Pressure Enclosure (NPE) systems: NPE systems may be used where the configuration of the work area does not make the erection of the enclosure infeasible, with the following specifications and work practices.

1. Specifications:

- a. The negative pressure enclosure (NPE) may be of any configuration,
- b. At least 4 air changes per hour shall be maintained in the NPE,
- c. A minimum of -0.02 column inches of water pressure differential, relative to outside pressure, shall be maintained within the NPE as evidenced by manometric measurements,
- d. The NPE shall be kept under negative pressure throughout the period of its use, and
- e. Air movement shall be directed away from employees performing asbestos work within the enclosure, and toward a HEPA filtration or a collection device.

2. Work Practices:

- a. Before beginning work within the enclosure and at the beginning of each shift, the NPE shall be inspected for breaches and smoke-tested for leaks, and any leaks sealed.
- b. Electrical circuits in the enclosure shall be deactivated, unless equipped with ground-fault circuit interrupters.

(B) Glove bag systems may be used to remove PACM and/or ACM from straight runs of piping and elbows and other connections with the following specifications and work practices:

1. Specifications:

- a. Glovebags shall be made of 6 mil thick plastic and shall be seamless at the bottom.
- b. Glovebags used on elbows and other connections must be designed for that purpose and used without modifications.

2. Work Practices:

- a. Each glovebag shall be installed so that it completely covers the circumference of pipe or other structure where the work is to be done.
- b. Glovebags shall be smoke-tested for leaks and any leaks sealed prior to use.
- c. Glovebags may be used only once and may not be moved.
- d. Glovebags shall not be used on surfaces whose temperature exceeds 150 °F.
- e. Prior to disposal, glovebags shall be collapsed by removing air within them using a HEPA vacuum.
- f. Before beginning the operation, loose and friable material adjacent to the glovebag/box operation shall be wrapped and sealed in two layers of six mil plastic or otherwise rendered intact,
- g. Where system uses attached waste bag, such bag shall be connected to collection bag using hose or other material which shall withstand pressure of ACM waste and water without losing its integrity:
- h. Sliding valve or other device shall separate waste bag from hose to ensure no exposure when waste bag is disconnected:
- i. At least two persons shall perform Class I glovebag removal operations.

(C) Negative Pressure Glove Bag Systems. Negative pressure glove bag systems may be used to remove ACM or PACM from piping.

1. Specifications: In addition to specifications for glove bag systems above, negative pressure glove bag systems shall attach HEPA vacuum systems or other devices to bag to prevent collapse during removal.

2. Work Practices:

- a. The employer shall comply with the work practices for glove bag systems in subsection (g)(5)(B)2.d. of this section.
- b. The HEPA vacuum cleaner or other device used to prevent collapse of bag during removal shall run continually during the operation until it is completed at which time the bag shall be collapsed prior to removal of the bag from the pipe.
- c. Where a separate waste bag is used along with a collection bag and discarded after one use, the collection bag may be reused if rinsed clean with amended water before reuse.

(D) Negative Pressure Glove Box Systems: Negative pressure glove boxes may be used to remove ACM or PACM from pipe runs with the following specifications and work practices.

1. Specifications:

- a. Glove boxes shall be constructed with rigid sides and made from metal or other material which can withstand the weight of the ACM and PACM and water used during removal:
- b. A negative pressure generator shall be used to create negative pressure in the system:
- c. An air filtration unit shall be attached to the box:
- d. The box shall be fitted with gloved apertures:
- e. An aperture at the base of the box shall serve as a bagging outlet for waste ACM and water:
- f. A back-up generator shall be present on site:
- g. Waste bags shall consist of 6 mil thick plastic double-bagged before they are filled or plastic thicker than 6 mil.

2. Work practices:

- a. At least two persons shall perform the removal:
- b. The box shall be smoke-tested for leaks and any leaks sealed prior to each use.
- c. Loose or damaged ACM adjacent to the box shall be wrapped and sealed in two layers of 6 mil plastic prior to the job, or otherwise made intact prior to the job.
- d. A HEPA filtration system shall be used to maintain pressure barrier in box.

(E) Water Spray Process System. A water spray process system may be used for removal of ACM and PACM from cold line piping if, employees carrying out such process have completed a 40-hour separate training course in its use, in addition to training required for employees performing Class I work. The system shall meet the following specifications and shall be performed by employees using the following work practices.

1. Specifications:

- a. Piping shall be surrounded on 3 sides by rigid framing,
- b. A 360 degree water spray, delivered through nozzles supplied by a high pressure separate water line, shall be formed around the piping.
- c. The spray shall collide to form a fine aerosol which provides a liquid barrier between workers and the ACM and PACM.

2. Work Practices:

- a. The system shall be run for at least 10 minutes before removal begins.
- b. All removal shall take place within the water barrier.
- c. The system shall be operated by at least three persons, one of whom shall not perform removal, but shall check equipment, and ensure proper operation of the system.
- d. After removal, the ACM and PACM shall be bagged while still inside the water barrier.

(F) A small walk-in enclosure which accommodates no more than two persons (mini-enclosure) may be used if the disturbance or removal can be completely contained by the enclosure with the following specifications and work practices.

1. Specifications:

- a. The fabricated or job-made enclosure shall be constructed of 6 mil plastic or equivalent:
- b. The enclosure shall be placed under negative pressure by means of a HEPA filtered vacuum or similar ventilation unit:

2. Work practices:

- a. Before use, the mini-enclosure shall be inspected for leaks and smoke tested to detect breaches, and any breaches sealed.
- b. Before reuse, the interior shall be completely washed with amended water and HEPA-vacuumed.
- c. During use, air movement shall be directed away from the employee's breathing zone within the mini-enclosure.

(6) Alternative control methods for Class I work. Class I work may be performed using a control method which is not referenced in subsection (g)(5) of this section, or which modifies a control method referenced in subsection (g)(5) of this section, if the following provisions are complied with:

(A) The control method shall enclose, contain or isolate the processes or source of airborne asbestos dust, or otherwise capture or redirect such dust before it enters the breathing zone of employees.

(B) A certified industrial hygienist or licensed professional engineer who is also qualified as a project designer as defined in subsection (b) of this section, shall evaluate the work area, the projected work practices and the engineering controls and shall certify in writing that the planned control method is adequate to reduce direct and indirect employee exposure to below the PELs under worst-case conditions of use, and that the planned control method will prevent asbestos contamination outside the regulated area, as measured by clearance sampling which meets the requirements of EPA's Asbestos in Schools rule issued under AHERA, or perimeter monitoring which meets the criteria in subsection (g)(4)(B)2. of this section.

1. Where the TSI or surfacing material to be removed is 25 linear or 10 square feet or less, the evaluation required in subsection (g)(6) of this section may be performed by a "competent person", and may omit consideration of perimeter or clearance monitoring otherwise required.
2. The evaluation of employee exposure required in subsection (g)(6) of this section, shall include and be based on sampling and analytical data representing employee exposure during the use of such method under worst-case conditions and by employees whose training and experience are equivalent to employees who are to perform the current job.

(7) Work Practices and Engineering Controls for Class II work.

(A) All Class II work, shall be supervised by a competent person as defined in subsection (b) of this section.

(B) For all indoor Class II jobs, where the employer has not produced a negative exposure assessment pursuant to subsection (f)(2)(C) of this section, or where during the job, changed conditions indicate there may be exposure above the PEL or where the employer does not remove the ACM in a substantially intact state, the employer shall use one of the following methods to ensure that airborne asbestos does not migrate from the regulated area;

1. Critical barriers shall be placed over all openings to the regulated area; or,
2. The employer shall use another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area, as verified by perimeter area monitoring or clearance monitoring which meets the criteria set out in subsection (g)(4)(B)2. of this section.

(C) Impermeable dropcloths shall be placed on surfaces beneath all removal activity;

(D) All Class II asbestos work shall be performed using the work practices and requirements set out above in subsection (g)(1)(A) through (C) of this section.

(8) Additional Controls for Class II work. Class II asbestos work shall also be performed by complying with the work practices and controls designated for each type of asbestos work to be performed, set out in this subsection. Where more than one control method may be used for a type of asbestos work, the employer may choose one or a combination of designated control methods. Class II work also may be performed using a method allowed for Class I work, except that glove bags and glove boxes are allowed if they fully enclose the Class II material to be removed.

(A) For removing vinyl and asphalt flooring materials which contain ACM or for which, in buildings constructed no later than 1980, the employer has not verified the absence of ACM pursuant to subsection (g)(8)(A)9. of this section. The employer shall ensure that employees comply with the following work practices and that employees are trained in these practices pursuant to subsection (k)(9) of this section:

1. Flooring or its backing shall not be sanded.
2. Vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) shall be used to clean floors.
3. Resilient sheeting shall be removed by cutting with wetting of the snip point and wetting during delamination. Rip-up of resilient sheet floor material is prohibited.
4. All scraping of residual adhesive and/or backing shall be performed using wet methods.
5. Dry sweeping is prohibited.
6. Mechanical chipping is prohibited unless performed in a negative pressure enclosure which meets the requirements of subsection (g)(5)(A) of this section.
7. Tiles shall be removed intact, unless the employer demonstrates that intact removal is not possible.
8. When tiles are heated and can be removed intact, wetting may be omitted.
9. Resilient flooring material including associated mastic and backing shall be assumed to be asbestos-containing unless an industrial hygienist determines that it is asbestos-free using recognized analytical techniques.

(B) For removing roofing material which contains ACM the employer shall ensure that the following work practices are followed:

1. Roofing material shall be removed in an intact state to the extent feasible.
2. Wet methods shall be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards.
3. Cutting machines shall be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety.
4. When removing built-up roofs with asbestos-containing roofing felts and an aggregate surface using a power roof cutter, all dust resulting from the cutting operation shall be collected by a HEPA dust collector, or shall be HEPA vacuumed by vacuuming along the cut line. When removing built-up roofs with asbestos containing roofing felts and a smooth surface using a power roof cutter, the dust resulting from the cutting operation shall be collected either by a HEPA dust collector or HEPA vacuuming along the cut line, or by gently sweeping and then carefully and completely wiping up the still-wet dust and debris left along the cut line. The dust and debris shall be immediately bagged or placed in covered containers.
5. Asbestos-containing material that has been removed from a roof shall not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it shall be lowered to the ground via covered, dust-tight chute, crane or hoist:
  - a. Any ACM that is not intact shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift. While the material remains on the roof it shall either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.
  - b. Intact ACM shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift.

6. Upon being lowered, unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.
7. Roof level heating and ventilation air intake sources shall be isolated or the ventilation system shall be shut down.
8. Notwithstanding any other provision of this section, removal or repair of sections of intact roofing less than 25 square feet in area does not require use of wet methods or HEPA vacuuming as long as manual methods which do not render the material nonintact are used to remove the material and no visible dust is created by the removal method used. In determining whether a job involves less than 25 square feet, the employer shall include all removal and repair work performed on the same roof on the same day.

(C) When removing cementitious asbestos-containing siding and shingles or transite panels containing ACM on building exteriors (other than roofs, where subsection (g)(8)(B) of this section applies) the employer shall ensure that the following work practices are followed:

1. Cutting, abrading or breaking siding, shingles, or transite panels, shall be prohibited unless the employer can demonstrate that methods less likely to result in asbestos fiber release cannot be used.
2. Each panel or shingle shall be sprayed with amended water prior to removal.
3. Unwrapped or unbagged panels or shingles shall be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift.
4. Nails shall be cut with flat, sharp instruments.

(D) When removing gaskets containing ACM, the employer shall ensure that the following work practices are followed:

1. If a gasket is visibly deteriorated and unlikely to be removed intact, removal shall be undertaken within a glovebag as described in subsection (g)(5)(B) of this section.
2. The gasket shall be immediately placed in a disposal container.
3. Any scraping to remove residue must be performed wet.

(E) When performing any other Class II removal of asbestos containing material for which specific controls have not been listed in subsections (g)(8)(A) through (D) of this section, the employer shall ensure that the following work practices are complied with.

1. The material shall be thoroughly wetted with amended water prior to and during its removal.
2. The material shall be removed in an intact state unless the employer demonstrates that intact removal is not possible.
3. Cutting, abrading or breaking the material shall be prohibited unless the employer can demonstrate that methods less likely to result in asbestos fiber release are not feasible.
4. Asbestos-containing material removed, shall be immediately bagged or wrapped, or kept wetted until transferred to a closed receptacle, no later than the end of the work shift.

(F) Alternative Work Practices and Controls. Instead of the work practices and controls listed in subsection (g)(8)(A) through (E) of this section, the employer may use different or modified engineering and work practice controls if the following provisions are complied with.

1. The employer shall demonstrate by data representing employee exposure during the use of such method under conditions which closely resemble the conditions under which the method is to be used, that employee exposure will not exceed the PELs under any anticipated circumstances.
2. A competent person shall evaluate the work area, the projected work practices and the engineering controls, and shall certify in writing, that the different or modified controls are adequate to reduce direct and indirect employee exposure to below the PELs under all expected conditions of use and that the method meets the requirements of this standard. The evaluation shall include and be based on data representing employee exposure during the use of such method under conditions which closely resemble the conditions under which the method is to be used for the current job, and by employees whose training and experience are equivalent to employees who are to perform the current job.

(9) Work Practices and Engineering Controls for Class III asbestos work. Class III asbestos work shall be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees.

(A) The work shall be performed using wet methods.

(B) To the extent feasible, the work shall be performed using local exhaust ventilation.

(C) Where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material, the employer shall use impermeable dropcloths, and shall isolate the operation using mini-enclosures or glove bag systems pursuant to subsection (g)(5) of this section or another isolation method.

(D) Where the employer does not produce a "negative exposure assessment" for a job, or where monitoring results show the PEL has been exceeded, the employer shall contain the area using impermeable dropcloths and plastic barriers or their equivalent, or shall isolate the operation using a control system listed in and in compliance with subsection (g)(5) of this section.

(E) Employees performing Class III jobs, which involve the disturbance of thermal system insulation or surfacing material, or where the employer does not produce a "negative exposure assessment" or where monitoring results show a PEL has been exceeded, shall wear respirators which are selected, used and fitted pursuant to provisions of subsection (h) of this section.

(10) Class IV asbestos work. Class IV asbestos jobs shall be conducted by employees trained pursuant to the asbestos awareness training program set out in subsection (k)(9) of this section. In addition, all Class IV jobs shall be conducted in conformity with the requirements set out in subsection (g)(1) of this section, mandating wet methods, HEPA vacuums, and prompt clean up of debris containing ACM or PACM.

(A) Employees cleaning up debris and waste in a regulated area where respirators are required shall wear respirators which are selected, used and fitted pursuant to provisions of subsection (h) of this section.

(B) Employers of employees who clean up waste and debris in, and employers in control of, areas where friable thermal system insulation or surfacing material is accessible, shall assume that such waste and debris contain asbestos.

(11) Alternative methods of compliance for installation, removal, repair, and maintenance of certain roofing and pipeline coating materials. Notwithstanding any other provision of this section, an employer who complies with all provisions of this subsection (g)(11) when installing, removing, repairing, or maintaining intact pipeline asphaltic wrap, or roof cements, mastics, coatings, or flashings which contain asbestos fibers encapsulated or coated by bituminous or resinous compounds shall be deemed to be in compliance with this section. If an employer does not comply with all provisions of this subsection (g)(11), or if during the course of the job the material does not remain intact, the provisions of subsection (g)(8) of this section apply instead of this subsection (g)(11).

(A) Before work begins and as needed during the job, a competent person who is capable of identifying asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, and who has the authority to take prompt corrective measures to eliminate such hazards, shall conduct an inspection of the worksite and determine that the roofing material is intact and will likely remain intact.

(B) All employees performing work covered by this subsection (g)(11) shall be trained in a training program that meets the requirements of subsection (k)(9)(H).

(C) The material shall not be sanded, abraded, or ground. Manual methods which do not render the material non-intact shall be used.

(D) Material that has been removed from a roof shall not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it shall be lowered to the ground via covered, dust-tight chute, crane or hoist. All such material shall be removed from the roof as soon as is practicable, but in any event no later than the end of the work shift.

(E) Where roofing products which have been labeled as containing asbestos pursuant to subsection (k)(8) of this section are installed on non-residential roofs during operations covered by this subsection (g)(11), the employer shall notify the building owner of the presence and location of such materials no later than the end of the job.

(F) All removal or disturbance of pipeline asphaltic wrap shall be performed using wet methods.

(h) Respiratory protection.

(1) General. For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this subsection. Respirators must be used during:

(A) Class I asbestos work.

(B) Class II asbestos work where the ACM is not removed in a substantially intact state,

(C) Class II and III asbestos work which is not performed using wet methods, except for removal of ACM from sloped roofs when a negative exposure assessment has been made and the ACM is removed in an intact state.

(D) Class II and III asbestos work for which a "negative exposure assessment" has not been conducted.

(E) Class III asbestos work when TSI or surfacing ACM or PACM is being disturbed.

(F) Class IV asbestos work performed within regulated areas where employees performing other work are required to use respirators.

(G) Work operations covered by this section where employees are exposed above the TWA or excursion limit.

(H) Emergencies.

(2) Respirator program.

(A) The employer must implement a respiratory protection program in accordance with section 5144(b) through (d) (except (d)(1)(C)), and (f) through (m).

(B) No employee shall be assigned to asbestos work that requires respirator use if, based on their most recent medical examination, the examining physician determines that the employee will be unable to function normally while using a respirator, or that the safety or health of the employee or other employees will be impaired by the employee's respirator use. Such employees must be assigned to another job or given the opportunity to transfer to a different position that they can perform. If such a transfer position is available, it must be with the same employer, in the same geographic area, and with the same seniority, status, rate of pay, and other job benefits the employee had just prior to such transfer.

(3) Respirator selection.

(A) The employer shall select, and provide to employees, the appropriate respirators as specified in Section 5144(d)(3)(A)1; however, employers shall not select or use filtering facepiece respirators for use against asbestos fibers.

(B) The employer shall provide HEPA filters for powered and non-powered air-purifying respirators.

(C) The employer shall provide a tight fitting powered, air-purifying respirator in lieu of any negative-pressure respirator selected according to subsection (h)(3)(A) whenever:

1. An employee chooses to use this type of respirator; and
2. This respirator will provide adequate protection to the employee.

(D) The employer shall provide a half-mask air purifying respirator, other than a filtering facepiece respirator, equipped with high efficiency filters whenever the employee performs:

1. Class II and III asbestos work and a negative exposure assessment has not been conducted by the employer;
2. Class III jobs where TSI or surfacing ACM or PACM is being disturbed.

(E) In addition to the above selection criteria, when employees are in a regulated area where Class I work is being performed, a negative exposure assessment of the area has not been produced, and the exposure assessment of the area indicates the exposure level will exceed 1 f/cc as an 8-hour time weighted average, employers must provide the employees with a full facepiece supplied-air respirator operated in the pressure-demand mode and equipped with an auxiliary positive pressure self-contained breathing apparatus. When the exposure assessment of the area indicates the exposure level will not exceed 1 f/cc as an 8-hour time weighted average, employers must provide the employees with one of the following respirators:

1. A tight-fitting powered air-purifying respirator equipped with high efficiency filters;
2. A full facepiece supplied air-respirator operated in the pressure-demand mode equipped with HEPA egress cartridges or an auxiliary positive-pressure, self-contained breathing apparatus (SCBA); or
3. A full facepiece supplied-air respirator operated in the pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus.

(i) Protective clothing.

(1) General. The employer shall provide or require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos that exceed the TWA and/or excursion limit prescribed in subsection (c) of this section, or for which a required negative exposure assessment is not produced, and for any employee performing Class I operations which involve the removal of over 25 linear or 10 square feet of TSI or surfacing ACM and PACM. The employer shall prohibit the removal of asbestos from protective clothing and equipment by blowing, shaking, or brushing.

(2) Laundering.

(A) The employer shall ensure that laundering of contaminated clothing is done so as to prevent the release of airborne asbestos in excess of the TWA or excursion limit prescribed in subsection (c) of this section.

(B) Any employer who gives contaminated clothing to another person for laundering shall inform such person of the requirement in subsection (i)(2)(A) of this section to effectively prevent the release of airborne asbestos in excess of the TWA and excursion limit prescribed in subsection (c) of this section.

(3) Contaminated clothing. Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and be labeled in accordance with subsection (k) of this section.

(4) Inspection of protective clothing.

(A) The competent person shall examine worksuits worn by employees at least once per workshift for rips or tears that may occur during performance of work.

(B) When rips or tears are detected while an employee is working, rips and tears shall be immediately mended, or the worksuit shall be immediately replaced.

(j) Hygiene facilities and practices for employees.

(1) Requirements for employees performing Class I asbestos jobs involving over 25 linear or 10 square feet of TSI or surfacing ACM and PACM.

(A) Decontamination areas: the employer shall establish a decontamination area that is adjacent and connected to the regulated area for the decontamination of such employees. The decontamination area shall consist of an equipment room, shower area, and clean room in series. The employer shall ensure that employees enter and exit the regulated area through the decontamination area.

1. Equipment room. The equipment room shall be supplied with impermeable, labeled bags and containers for the containment and disposal of contaminated protective equipment.

2. Shower area. Shower facilities shall be provided which comply with Section 3366(f) of the General Industry Safety Orders, unless the employer can demonstrate that they are not feasible. The showers shall be adjacent both to the equipment room and the clean room, unless the employer can demonstrate that this location is not feasible. Where the employer can demonstrate that it is not feasible to locate the shower between the equipment room and the clean room, or where the work is performed outdoors, the employers shall ensure that employees:

A. Remove asbestos contamination from their worksuits in the equipment room using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or

B. Remove their contaminated worksuits in the equipment room, then don clean worksuits, and proceed to a shower that is not adjacent to the work area.

3. Clean change room. The clean room shall be equipped with a locker or appropriate storage container for each employee's use. When the employer can demonstrate that it is not feasible to provide a clean change area adjacent to the work area or where the work is performed outdoors, the employer may permit employees engaged in Class I asbestos jobs to clean their protective clothing with a portable HEPA-equipped vacuum before such employees leave the regulated area. Following showering, such employees however must then change into street clothing in clean change areas provided by the employer which otherwise meet the requirements of this section.

(B) Decontamination area entry procedures. The employer shall ensure that employees:

1. Enter the decontamination area through the clean room;
2. Remove and deposit street clothing within a locker provided for their use; and
3. Put on protective clothing and respiratory protection before leaving the clean room.
4. Before entering the regulated area, the employer shall ensure that employees pass through the equipment room.

(C) Decontamination area exit procedures. The employer shall ensure that:

1. Before leaving the regulated area, employees shall remove all gross contamination and debris from their protective clothing.
2. Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers.
3. Employees shall not remove their respirators in the equipment room.
4. Employees shall shower prior to entering the clean room.
5. After showering, employees shall enter the clean room before changing into street clothes.

(D) Lunch Areas. Whenever food or beverages are consumed at the worksite where employees are performing Class I asbestos work, the employer shall provide lunch areas in which the airborne concentrations of asbestos are below the permissible exposure limit and/or excursion limit.

(2) Requirements for Class I work involving less than 25 linear or 10 square feet of TSI or surfacing ACM and PACM, and for Class II and Class III asbestos work operations where exposures exceed a PEL or where there is no negative exposure assessment produced before the operation.

(A) The employer shall establish an equipment room or area that is adjacent to the regulated area for the decontamination of employees and their equipment which is contaminated with asbestos which shall consist of an area covered by a impermeable drop cloth on the floor or horizontal working surface.

(B) The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area (as determined by visible accumulations).

(C) Work clothing must be cleared with a HEPA vacuum before it is removed.

(D) All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the equipment room or area.

(E) The employer shall ensure that employees enter and exit the regulated area through the equipment room or area.

(3) Requirements for Class IV work. Employers shall ensure that employees performing Class IV work within a regulated area comply with the hygiene practice required of employees performing work which has a higher classification within that regulated area. Otherwise employers of employees cleaning up debris and material which is TSI or surfacing ACM or identified as PACM shall provide decontamination facilities for such employees which are required by subsection (j)(2) of this section.

(4) Smoking in work areas. The employer shall ensure that employees do not smoke in work areas where they are occupationally exposed to asbestos because of activities in that work area.

(k) Communication of hazards.

(1) Hazard communication.

(A) This section applies to the communication of information concerning asbestos hazards in construction activities to facilitate compliance with this standard. Most asbestos-related construction activities involve previously installed building materials. Building owners often are the only and/or best sources of information concerning them. Therefore, they, along with employers of potentially exposed employees, are assigned specific information conveying and retention duties under this section. Installed Asbestos Containing Building Material. Employers and building owners shall identify TSI and sprayed or troweled on surfacing materials in buildings as asbestos-containing, unless they determine in compliance with subsection (k)(5) of this section that the material is not asbestos-containing. Asphalt and vinyl flooring material installed no later than 1980 must also be considered as asbestos containing unless the employer, pursuant to subsection (g)(8)(A)9. of this section determines that it is not asbestos-containing. If the employer/building owner has actual knowledge, or should have known through the exercise of due diligence, that other materials are asbestos-containing, they too must be treated as such. When communicating information to employees pursuant to this standard, owners and employers shall identify "PACM" as ACM. Additional requirements relating to communication of asbestos work on multi-employer worksites are set out in subsection (d) of this section.

(B) The employer shall include asbestos in the program established to comply with the Hazard Communication Standard (HCS) (Section 5194). The employer shall ensure that each employee has access to labels on containers of asbestos and safety data sheets, and is trained in accordance with the provisions of HCS and subsections (k)(9) and (10) of this section. The employer shall provide information on at least the following hazards: Cancer and lung effects.

(2) Duties of building and facility owners.

(A) Before work subject to this standard is begun, building and facility owners shall determine the presence, location, and quantity of ACM and/or PACM at the work site pursuant to subsection (k)(1) of this section.

(B) Building and/or facility owners shall notify the following persons of the presence, location and quantity of ACM or PACM, at the work sites in their buildings and facilities. Notification either shall be in writing, or shall consist of a personal communication between the owner and the person to whom notification must be given or their authorized representatives:

1. Prospective employers applying or bidding for work whose employees reasonably can be expected to work in or adjacent to areas containing such material;

2. Employees of the owner who will work in or adjacent to areas containing such material:
3. On multi-employer worksites, all employers of employees who will be performing work within or adjacent to areas containing such materials;
4. Tenants who will occupy areas containing such material.

(3) Duties of employers whose employees perform work subject to this standard in or adjacent to areas containing ACM and PACM. Building/facility owners whose employees perform such work shall comply with these provisions to the extent applicable.

(A) Before work in areas containing ACM and PACM is begun; employers shall identify the presence, location, and quantity of ACM, and/or PACM therein pursuant to subsection (k)(1) of this section.

(B) Before work under this standard is performed employers of employees who will perform such work shall inform the following persons of the location and quantity of ACM and/or PACM present in the area and the precautions to be taken to insure that airborne asbestos is confined to the area.

1. Owners of the building/facility;
2. Employees who will perform such work and employers of employees who work and/or will be working in adjacent areas.

(C) Within 10 days of the completion of such work, the employer whose employees have performed work subject to this standard, shall inform the building/facility owner and employers of employees who will be working in the area of the current location and quantity of PACM and/or ACM remaining in the area and final monitoring results, if any.

(4) In addition to the above requirements, all employers who discover ACM and/or PACM on a worksite shall convey information concerning the presence, location and quantity of such newly discovered ACM and/or PACM to the owner and to other employers of employees working at the work site, within 24 hours of the discovery.

(5) Criteria to rebut the designation of installed material as PACM.

(A) At any time, an employer and/or building owner may demonstrate, for purposes of this standard, that PACM does not contain asbestos. Building owners and/or employers are not required to communicate information about the presence of building material for which such a demonstration pursuant to the requirements of subsection (k)(5)(B) of this section has been made. However, in all such cases, the information, data and analysis supporting the determination that PACM does not contain asbestos, shall be retained pursuant to subsection (n) of this section.

(B) An employer or owner may demonstrate that PACM does not contain more than 1% asbestos by the following:

1. Having completed an inspection conducted pursuant to the requirements of AHERA (40 CFR Part 763, Subpart E) which demonstrates that the material is not ACM or;
2. Performing tests of the material containing PACM which demonstrate that no ACM is present in the material. Such tests shall include analysis of bulk samples collected in the manner described in 40 CFR 763.86. The tests, evaluation and sample collection shall be conducted by an accredited inspector or by a CIH. Analysis of samples shall be performed by persons or laboratories with proficiency demonstrated by current successful participation in a nationally recognized testing program such as the National Voluntary Laboratory Accreditation Program (NVLAP) or the National Institute for Standards and Technology (NIST) or the Round Robin for bulk samples administered by the American Industrial Hygiene Association (AIHA) or an equivalent nationally-recognized round robin testing program.

(C) The employer and/or building owner may demonstrate that flooring material including associated mastic and backing does not contain asbestos, by a determination of an industrial hygienist based upon recognized analytical techniques showing that the material is not ACM.

(6) At the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and which contain thermal system insulation and surfacing ACM and/or PACM, the building owner shall post signs which identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that ACM and/or PACM will not be disturbed. The employer shall ensure, to the extent feasible, that employees who come in contact with these signs can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

(7) Signs.

(A) Warning signs that demarcate the regulated area shall be provided and displayed at each location where a regulated area is required to be established by subsection (e) of this section. Signs shall be posted at such a distance from such a location that an employee may read the signs and take necessary protective steps before entering the area marked by the signs.

(B) 1. The warning signs required by subsection (k)(7) of this section shall bear the following information:

DANGER  
ASBESTOS  
MAY CAUSE CANCER  
CAUSES DAMAGE TO LUNGS  
AUTHORIZED PERSONNEL ONLY

2. In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

3. Prior to June 1, 2016, employers may use the following legend in lieu of that specified in subsection (k)(7)(B)1. of this section:

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

4. Prior to June 1, 2016, employers may use the following legend in lieu of that specified in subsection (k)(7)(B)2. of this section:

## RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

(C) The employer shall ensure that employees working in and contiguous to regulated areas comprehend the warning signs required to be posted by subsection (k)(7)(A) of this section. Means to ensure employee comprehension may include the use of foreign languages, pictographs and graphics.

(8) Labels.

(A) Labels shall be affixed to all products containing asbestos and to all containers containing such products, including waste containers. Where feasible, installed asbestos products shall contain a visible label.

(B) The employer shall ensure that such labels comply with subsection (k) of this section.

(C) The employer shall ensure that labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers bear the following information:

DANGER

CONTAINS ASBESTOS FIBERS

MAY CAUSE CANCER

CAUSES DAMAGE TO LUNGS

DO NOT BREATHE DUST

AVOID CREATING DUST

(D)1. Prior to June 1, 2015, employers may include the following information on raw materials, mixtures or labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers in lieu of the labeling requirements in subsections (k)(8)(B) and (k)(8)(C) of this section:

DANGER

CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

CANCER AND LUNG DISEASE HAZARD

2. Labels shall contain a warning statement against breathing asbestos fibers.

(E) The provisions for labels required by subsections (k)(8)(A) through (k)(8)(C) do not apply where:

1. Asbestos fibers have been modified by a bonding agent, coating, binder, or other material, provided that the manufacturer can demonstrate that, during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the permissible exposure limit and/or excursion limit will be released, or

2. Asbestos is present in a waste product in concentrations less than 1.0 percent.

NOTE: Section 5194 of the General Industry Safety Orders requires that manufactured and imported products containing more than 0.1% asbestos by weight be labeled with an appropriate warning. The exemptions specified in subsection (k)(7)(E) only apply to waste products or waste containers.

(F) When a building owner/or employer identifies previously installed PACM and/or ACM, labels or signs shall be affixed or posted so that employees will be notified of what materials contain PACM and/or ACM. The employer shall attach such labels in areas where they will clearly be noticed by employees who are likely to be exposed, such as at the entrance to mechanical room/areas. Signs required by subsection (k)(6) of this section may be posted in lieu of labels so long as they contain information required for labelling. The employer shall ensure, to the extent feasible, that employees who come in contact with these signs or labels can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

(9) Employee Information and Training.

(A) The employer shall, at no cost to the employee, institute a training program for all employees who are likely to be exposed in excess of a PEL and for all employees who perform Class I through IV asbestos operations, and shall ensure their participation in the program.

(B) Training shall be provided prior to or at the time of initial assignment and at least annually thereafter. Employees engaged in asbestos-related work that requires employer registration under Section 341.6 or engaged in asbestos cement pipe operations as defined in subsection (r), shall be trained and certified by a Division approved training provider. To be approved by the Division, training providers shall (1) apply to the Division for course approval and (2) pay fees covering the cost of the approval process to the Division as specified in regulations promulgated by the Division pursuant to the provisions of Chapter 3.5 (beginning with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

(C) Training for Class I operations and for Class II operations that require the use of critical barriers (or equivalent isolation methods) and/or negative pressure enclosures under this section shall be the equivalent in curriculum training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement workers training (40 CFR Part 763, Subpart E, Appendix C).

(D) Training for other Class II work.

1. For work with asbestos containing material involving roofing materials, flooring materials, siding materials, ceiling tiles, or transite panels, training shall include at a minimum all the elements included in subsection (k)(9)(H) of this section and in addition, the specific work practices and engineering controls set forth in subsection (g) of this section which specifically relate to that category. Such course shall include "hands-on" training and shall take at least 8 hours.
2. An employee who works with more than one of the categories of material specified in subsection (k)(9)(D)1. of this section shall receive training in the work practices applicable to each category of material that the employee removes and each removal method that the employee uses.
3. For Class II operations not involving the categories of material specified in subsection (k)(9)(D)1. of this section, training shall be provided which shall include at a minimum all the elements included in subsection (k)(9)(H) of this section and in addition, the specific work practices and engineering controls set forth in subsection (g) of this section which specifically relate to the category of material being removed, and shall include "hands-on" training in the work practices applicable to each category of material that the employee removes and each removal method that the employee uses.

(E) Training for Class III employees shall be consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(2). Such a course shall also include "hands-on" training and shall take at least 16 hours.

EXCEPTION: For Class III operations for which the competent person determines that the EPA curriculum does not adequately cover the training needed to perform that activity, training shall include as a minimum all the elements included in subsection (k)(9)(H) of this section and in addition, the specific work practices and engineering controls set forth in subsection (g) of this section which specifically relate to that activity, and shall include "hands-on" training in the work practices applicable to each category of material that the employee disturbs.

(F) Training for employees performing Class IV operations shall be consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(1). Such a course shall include available information concerning the locations of thermal system insulation and surfacing ACM/PACM, and asbestos-containing flooring material, or flooring material where the absence of asbestos has not yet been certified; and instruction in recognition of damage, deterioration, and delamination of asbestos containing building materials. Such course shall take at least 2 hours.

(G) Training for employees who are likely to be exposed in excess of the PEL and who are not otherwise required to be trained under subsections (k)(9)(C) through (F) of this section, shall meet the requirements of subsection (k)(9)(H) of this section.

(H) The training program shall be conducted in a manner that the employee is able to understand. In addition to the content required by provisions in subsections (k)(9)(C) through (F) of this section, the employer shall ensure that each such employee is informed of the following:

1. Methods of recognizing asbestos, including the requirement in subsection (k)(1) of this section to presume that certain building materials contain asbestos;
2. The health effects associated with asbestos exposure;
3. The relationship between smoking and asbestos in producing lung cancer;
4. The nature of operations that could result in exposure to asbestos, the importance of necessary protective controls to minimize exposure including, as applicable, engineering controls, work practices, respirators, housekeeping procedures, hygiene facilities, protective clothing, decontamination procedures, emergency procedures, and waste disposal procedures, and any necessary instruction in the use of these controls and procedures where Class III and IV work will be or is performed, the contents of EPA 20T-2003, "Managing Asbestos In-Place" July 1990 or its equivalent in content;
5. The purpose, proper use, fitting instructions, and limitations of respirators as required by Section 5144;
6. The appropriate work practices for performing the asbestos job;
7. Medical surveillance program requirements;
8. The content of this standard including appendices;
9. The names, addresses and phone numbers of public health organizations which provide information, materials and/or conduct programs concerning smoking cessation. The employer may distribute the list of such organizations contained in Appendix J to this section, to comply with this requirement; and
10. The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels.

(10) Access to training materials.

(A) The employer shall make readily available to affected employees without cost, written materials relating to the employee training program, including a copy of this regulation.

(B) The employer shall provide to the Chief and the Director, upon request, all information and training materials relating to the employee information and training program.

(C) The employer shall inform all employees concerning the availability of self-help smoking cessation program material. Upon employee request, the employer shall distribute such material, consisting of NIH Publication No. 89-1647, or equivalent self-help material, which is approved or published by a public health organization listed in Appendix J to this section.

(I) Housekeeping.

(1) Vacuuming. Where vacuuming methods are selected, HEPA filtered vacuuming equipment must be used. The equipment shall be used and emptied in a manner that minimizes the reentry of asbestos into the workplace.

(2) Waste disposal. Asbestos waste, scrap, debris, bags, containers, equipment, and contaminated clothing consigned for disposal shall be collected and disposed of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers except in roofing operations, where the procedures specified in subsection (g)(8)(B) of this section apply.

(3) Care of asbestos-containing flooring material.

(A) All vinyl and asphalt flooring material shall be maintained in accordance with this subsection unless the building/facility owner demonstrates, pursuant to subsection (g)(8)(A)9. of this section that the flooring does not contain asbestos.

(B) Sanding of flooring material is prohibited.

(C) Stripping of finishes shall be conducted using low abrasion pads at speeds lower than 300 rpm and wet methods.

(D) Burnishing or dry buffing may be performed only on flooring which has sufficient finish so that the pad cannot contact the flooring material.

(4) Waste and debris and accompanying dust in an area containing accessible thermal system insulation or surfacing ACM/PACM or visibly deteriorated ACM:

(A) shall not be dusted or swept dry, or vacuumed without using a HEPA filter;

(B) shall be promptly cleaned up and disposed of in leak tight containers.

(m) Medical surveillance.

(1) General

(A) Employees covered.

1. The employer shall institute a medical surveillance program for all employees who, for a combined total of 30 or more days per year, are engaged in Class I, II and III work or are exposed at or above the permissible exposure limit. For purposes of this paragraph, any day in which a worker engages in Class II or Class III operations or a combination thereof on intact material for one hour or less (taking into account the entire time spent on the removal operation, including cleanup) and, while doing so, adheres fully to the work practices specified in this standard, shall not be counted.

2. For employees otherwise required by this standard to wear a negative pressure respirator, employers shall ensure employees are physically able to perform the work and use the equipment. This determination shall be made under the supervision of a physician.

(B) Examination.

1. The employer shall ensure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and are provided at no cost to the employee and at a reasonable time and place.

2. Persons other than such licensed physicians who administer the pulmonary function testing required by this section shall complete a training course in spirometry sponsored by an appropriate academic or professional institution.

(2) Medical examinations and consultations.

(A) Frequency. The employer shall make available medical examinations and consultations to each employee covered under subsection (m)(1)(A) of this section on the following schedules:

1. Prior to assignment of the employee to an area where negative- pressure respirators are worn;

2. When the employee is assigned to an area where exposure to asbestos may be at or above the permissible exposure limit for 30 or more days per year, or engage in Class I, II or III work for a combined total of 30 or more days per year, a medical examination must be given within 10 working days following the thirtieth day of exposure;

3. And at least annually thereafter.

4. If the examining physician determines that any of the examinations should be provided more frequently than specified, the employer shall provide such examinations to affected employees at the frequencies specified by the physician.

5. Exception: No medical examination is required of any employee if adequate records show that the employee has been examined in accordance with this subsection within the past 1 year period.

6. Employers shall provide a medical examination at the termination of employment for any employee who has been exposed to airborne concentrations of asbestos at or above the permissible exposure limit and/or excursion limit. The medical examination shall be given within 30 calendar days before or after the date of termination of employment.

(B) Content. Medical examinations made available pursuant to subsections (m)(2)(A)1. through (m)(2)(A)3. of this section shall include:

1. A medical and work history with special emphasis directed to the pulmonary, cardiovascular, and gastrointestinal systems.

2. On initial examination, the standardized questionnaire contained in Part 1 of Appendix D to this section, and, on annual examination, the abbreviated standardized questionnaire contained in Part 2 of Appendix D to this section.

3. A physical examination directed to the pulmonary and gastrointestinal systems, including a chest roentgenogram to be administered in accordance with Table 2 below, and pulmonary function tests of forced vital capacity (FVC) and forced expiratory volume at one second (FEV(1)). Interpretation and classification of chest roentgenograms shall be conducted in accordance with Appendix E to this section.

TABLE 2

## FREQUENCY OF CHEST X-RAYS

<i>YEARS SINCE</i>	<i>AGE OF EMPLOYEE</i>	
<i>FIRST</i>		
<i>EXPOSURE</i>	<i>LESS THAN 40</i>	<i>40 AND OLDER</i>
0-10	EVERY 3 YEARS	ANNUALLY*
10+	ANNUALLY*	ANNUALLY*

\*Oblique x-rays need only be performed every 3 years.

4. Any other examinations or tests deemed necessary by the examining physician.

(3) Information provided to the physician. The employer shall provide the following information to the examining physician:

(A) A copy of this standard and Appendices D, E, and I to this section;

(B) A description of the affected employee's duties as they relate to the employee's exposure;

(C) The employee's representative exposure level or anticipated exposure level;

(D) A description of any personal protective and respiratory equipment used or to be used; and

(E) Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

(4) Physician's written opinion.

(A) The employer shall obtain a written opinion from the examining physician. This written opinion shall contain the results of the medical examination and shall include:

1. The physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos;
2. Any recommended limitations on the employee or on the use of personal protective equipment such as respirators; and
3. A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
4. A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure.

(B) The employer shall instruct the physician not to reveal in the written opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to asbestos.

(C) The employer shall provide a copy of the physician's written opinion to the affected employee within 30 days from its receipt.

(n) Recordkeeping.

(1) Objective data relied on pursuant to subsection (f) to this section.

(A) Where the employer has relied on objective data that demonstrates that products made from or containing asbestos or the activity involving such products or material are not capable of releasing fibers of asbestos in concentrations at or above the permissible exposure limit and/or excursion limit under the expected conditions of processing, use, or handling to satisfy the requirements of subsection (f), the employer shall establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption.

(B) The record shall include at least the following information:

1. The product qualifying for exemption;
2. The source of the objective data;
3. The testing protocol, results of testing, and/or analysis of the material for the release of asbestos;
4. A description of the operation exempted and how the data support the exemption; and
5. Other data relevant to the operations, materials, processing, or employee exposures covered by the exemption.

(C) The employer shall maintain this record for the duration of the employer's reliance upon such objective data.

(2) Exposure measurements.

(A) The employer shall keep an accurate record of all measurements taken to monitor employee exposure to asbestos as prescribed in subsection (f) of this section.

Note: The employer may utilize the services of competent organizations such as industry trade associations and employee associations to maintain the records required by this section.

(B) This record shall include at least the following information:

1. The date of measurement;
2. The operation involving exposure to asbestos that is being monitored;
3. Sampling and analytical methods used and evidence of their accuracy;
4. Number, duration, and results of samples taken;
5. Type of protective devices worn, if any; and
6. Name, social security number, and exposure of the employees whose exposures are represented.

(C) The employer shall maintain this record for at least thirty (30) years, in accordance with Section 3204 of the General Industry Safety Orders.

(3) Medical surveillance.

(A) The employer shall establish and maintain an accurate record for each employee subject to medical surveillance by subsection (m) of this section, in accordance with Section 3204 of the General Industry Safety Orders.

(B) The record shall include at least the following information:

1. The name and social security number of the employee;
2. A copy of the employee's medical examination results, including the medical history, questionnaire responses, results of any tests, and physician's recommendations.
3. Physician's written opinions;
4. Any employee medical complaints related to exposure to asbestos; and
5. A copy of the information provided to the physician as required by subsection (m) of this section.

(C) The employer shall ensure that this record is maintained for the duration of employment plus thirty (30) years, in accordance with Section 3204 of the General Industry Safety Orders.

(4) Training records. The employer shall maintain all employee training records for one (1) year beyond the last date of employment by that employer.

(5) Data to Rebut PACM. Where the building owner and employer have relied on data to demonstrate that PACM is not asbestos-containing, such data shall be maintained for as long as they are relied upon to rebut the presumption.

(6) Records of Required Notifications. Where the building owner has communicated and received information concerning the identification, location and quantity of ACM and PACM, written records of such notifications and their content shall be maintained by the building owner for the duration of ownership and shall be transferred to successive owners of such buildings/facilities.

(7) Availability.

(A) The employer, upon written request, shall make all records required to be maintained by this section available to the Chief and the Director for examination and copying.

(B) The employer, upon request, shall make any exposure records required by subsections (f) and (n) of this section available for examination and copying to affected employees, former employees, designated representatives, and the Chief, in accordance with Section 3204 of the General Industry Safety Orders.

(C) The employer, upon request, shall make employee medical records required by subsections (m) and (n) of this section available for examination and copying to the subject employee, anyone having the specific written consent of the subject employee, and the Chief, in accordance with Section 3204 of the General Industry Safety Orders.

(8) Transfer of records.

(A) The employer shall comply with the requirements concerning transfer of records set forth in Section 3204 of the General Industry Safety orders.

(B) Whenever the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director at least 90 days prior to disposal and, upon request, transmit them to the Director.

(o) Competent person.

(1) General. On all construction worksites covered by this standard, the employer shall designate a competent person, having the qualifications and authorities for ensuring worker safety and health required by Sections 1509, 1510, 1512, 1513, 1514, 1523, and 1920 of these orders.

(2) Required Inspections by the Competent Person. Section 1509(a) of these orders, which requires health and safety prevention programs to provide for frequent and regular inspections of the job sites, materials, and equipment to be made by competent persons, is incorporated.

(3) Additional Inspections. In addition, the competent person shall make frequent and regular inspections of the job sites, in order to perform the duties set out below in subsection (o)(3)(A). For Class I jobs, on-site inspections shall be made at least once during each work shift, and at any time at employee request. For Class II, III and IV jobs, on-site inspections shall be made at intervals sufficient to assess whether conditions have changed, and at any reasonable time at employee request.

(A) On all worksites where employees are engaged in Class I or II asbestos work, the competent person designated in accordance with subsection (e)(6) of this section shall perform or supervise the following duties, as applicable:

1. Set up the regulated area, enclosure, or other containment;
2. Ensure (by on-site inspection) the integrity of the enclosure or containment;
3. Set up procedures to control entry to and exit from the enclosure and/or area;
4. Supervise all employee exposure monitoring required by this section and ensure that it is conducted as required by subsection (f) of this section;
5. Ensure that employees working within the enclosure and/or using glove bags wear respirators and protective clothing as required by subsections (h) and (i) of this section;
6. Ensure through on-site supervision, that employees set up, use, and remove engineering controls, use work practices and personal protective equipment in compliance with all requirements;
7. Ensure that employees use the hygiene facilities and observe the decontamination procedures specified in subsection (j) of this section;
8. Ensure that, through on-site inspection, engineering controls are functioning properly and employees are using proper work practices; and,
9. Ensure that notification requirement in subsection (k) of this section are met.

(4) Training for the competent person.

(A) For Class I, and II asbestos work the competent person shall be trained in all aspects of asbestos removal and handling, including: abatement, installation, removal and handling; the contents of this standard; the identification of asbestos; removal procedures, where appropriate; and other practices for reducing the hazard. Such training shall be obtained in a comprehensive course for supervisors, that meets the criteria of EPA's Model Accredited Plan (40 CFR Part 763, Subpart E, Appendix C), such as a course conducted by an EPA-approved or state approved training provider, certified by EPA or a state, or a course equivalent in stringency, content and length.

(B) For Class III and IV asbestos work, the competent person shall be trained in aspects of asbestos handling appropriate for the nature of the work, to include procedures for setting up glove bags and mini-enclosures, practices for reducing asbestos exposures, use of wet methods, the contents of this standard, and the identification of asbestos. Such training shall include successful completion of a course that is consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(2), or its equivalent in stringency, content, and length. Competent persons for Class III and IV work, may also be trained pursuant to the requirements of subsection (o)(4)(A) of this section.

(p) Appendices.

(1) Appendices A, C, D, and E to this section are incorporated as part of this section and the contents of these appendices are mandatory.

(2) Appendices B, F, H, I, J, and K to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

(q) Certified Asbestos Consultants and Certified Site Surveillance Technicians.

(1) The following definitions are applicable to subsection (q) only:

"Asbestos consultant" means any person who contracts to provide professional health and safety services relating to asbestos-containing construction material as defined in this subsection, which comprises 100 square feet or more of surface area. The activities of an asbestos consultant include building inspection, abatement project design, contract administration, sample collection, preparation of asbestos management plans, clearance monitoring, and supervision of site surveillance technicians as defined in this subsection.

"Asbestos-containing construction material" means any manufactured construction material which contains more than one tenth of 1 percent asbestos by weight.

"Certified asbestos consultant" means any asbestos consultant certified by the Division pursuant to this section.

"Certified site surveillance technician" means any surveillance technician certified by the Division pursuant to the section.

"Division" means the Division of Occupational Safety and Health of the California Department of Industrial Relations.

"Site surveillance technician" means any person who acts as an independent on-site representative of an asbestos consultant. The site surveillance technician monitors the asbestos abatement activities of others, provides asbestos air monitoring services for area and personal samples, and performs building surveys and contract administration at the direction of an asbestos consultant.

"State-of-the-art" means all asbestos abatement and control work procedures currently in use which have been demonstrated to be the most effective, reliable, and protective of workers health. As new procedures are developed which demonstrate greater effectiveness, reliability, and worker protection and thereby come into use, they become state-of-the-art.

(2) Certified Asbestos Consultant Criteria.

To obtain certification, an asbestos consultant must apply to the Division and complete all application requirements specified in Section 341.15. In order to qualify as an asbestos consultant, the applicant must meet all of the following requirements:

(A) Achievement of a passing score as determined by the Division on an examination approved or administered by the Division including, but not limited to, the following subjects:

1. The physical characteristics of asbestos;

2. The health effects of asbestos;
3. The regulatory requirements of the Division, the Federal Occupational Safety and Health Administration, the U.S. Environmental Protection Agency, air quality management districts, and the Department of Health Services, including protective clothing, respiratory protection, exposure limits, personal hygiene, medical monitoring, disposal, and general industry safety hazards;
4. State-of-the-art asbestos abatement and control work procedures;
5. Federal Asbestos Hazard Emergency Response Act training information and procedures for inspectors, management planners, and supervisors, as provided for under Subchapter II (commencing with Section 2641) of Chapter 53 of Title 15 of the United States Code, or the equivalent, as determined by the Division; and
6. Information concerning industrial hygiene sampling methodology, including asbestos sampling and analysis techniques and recordkeeping.

(B) Providing such documentation and other information as the Division shall require to substantiate:

1. The possession of a valid and appropriate federal Asbestos Hazard Emergency Response Act [Subchapter II (commencing with Section 2641) of Chapter 53 of Title 15 of the United States Code] certificate, or its equivalent, as determined by the Division; and
2. Any one of the following combinations of education and experience:
  - A. One year of asbestos-related experience and a bachelor of science degree in engineering, architecture, industrial hygiene, construction management, or a related biological or physical science;
  - B. Two years of asbestos-related experience and a bachelor's degree;
  - C. Three years of asbestos-related experience and an associate of arts degree in engineering, architecture, industrial hygiene, construction management, or a related biological or physical science; or
  - D. Four years of asbestos-related experience and a high school diploma or its equivalent.

(3) Certified Site Surveillance Technician Criteria.

To obtain certification, a site surveillance technician must apply to the Division and complete all application requirements specified in Section 341.15. In order to qualify as a site surveillance technician, the applicant must meet all of the following requirements:

(A) Achievement of a passing score as determined by the Division on an examination approved or administered by the Division including, but not limited to, the following subjects:

1. The physical characteristics of asbestos;
2. The health effects of asbestos;
3. The regulatory requirements of the Division, the Federal Occupational Safety and Health Administration, the U.S. Environmental Protection Agency, air quality management districts, and the Department of Health Services, including protective clothing, respiratory protection, exposure limits, personal hygiene, medical monitoring, disposal, and general industry safety hazards;
4. State-of-the-art asbestos abatement and control work procedures.
5. Information concerning industrial hygiene sampling methodology, including sampling techniques and recordkeeping.

(B) Providing such documentation and other information as the Division shall require to substantiate all of the following:

1. Possession of a valid federal Asbestos Hazard Emergency Response Act [Subchapter II (commencing with Section 2641) of Chapter 53 of Title 15 of the United States Code] certificate for the type of work being performed, or its equivalent, as determined by the Division.
2. Six (6) months of asbestos-related experience under the supervision of an asbestos consultant.
3. Possession of a high school diploma or equivalent.

(4) No employer shall engage the services of an asbestos consultant or site surveillance technician unless that person provides proof of certification by the Division.

(r) Report of Use and Asbestos-related Work Registration.

(1) The following definitions are applicable to subsection (r) only:

"Asbestos-containing construction material" means any manufactured construction material which contains more than one tenth of 1 percent asbestos by weight.

"Asbestos-related work" means any activity which by disturbing asbestos-containing construction materials may release asbestos fibers into the air and which is not related to its manufacture, the mining or excavation of asbestos-bearing ore or materials, or the installation or repair of automotive materials containing asbestos. Asbestos-related work does not include the installation, repair, maintenance, or nondestructive removal of asbestos cement pipe used outside of buildings if the work operations do not result in employee exposures to asbestos in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8-hour time-weighted average and the employees and supervisors involved in the work operations are trained and certified by an asbestos cement pipe training program which is approved by the Division.

(2) Report of Use. See section 5203. Note: Employers registered with the Chief in accordance with Sections 341.6 to 341.9 for the purpose of conducting asbestos-related work involving over 100 square feet, as defined in Section 341.6(a), of asbestos-containing construction material shall be deemed to be in

compliance with section 5203 for the asbestos-related work requiring registration. Except that emergencies as defined in section 5203(a) must be reported as required in section 5203(f).

EXCEPTION: An employer need not register all the materials containing asbestos if objective data demonstrates that during all reasonably foreseeable uses, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the permissible exposure limit and/or excursion limit will be released. The objective data shall include at least those elements specified in subsection (n)(1) of this section.

Note: Authority cited: Sections 142.3, 6501.5, 9020, 9021.5, 9021.9, 9030 and 9040, Labor Code. Reference: Sections 142.3, 6501.5, 6501.7, 6501.8, 6501.9, 6502, 9003, 9004(b), 9005, 9006, 9009, 9020, 9021.5, 9021.9, 9030 and 9040, Labor Code; Section 25910, Health and Safety Code; and Sections 7180, 7180.5, 7181, 7182, 7183, 7183.5, 7184, 7185, 7187, 7189, 7189.5 and 7189.7, Business and Professions Code.

### HISTORY

1. New section filed 2-15-91; operative 2-15-91 pursuant to Government Code section 11346.2(d) (Register 91, No. 19).
2. Editorial correction of HISTORY 1. (Register 91, No. 45).
3. Amendment of subsection (b) and NOTE and adoption of subsections (o)(6)-(o)(8) and (t) filed 1-21-92 as an emergency; operative 2-20-92 (Register 92, No. 13).
4. Change without regulatory effect amending definition of chief in subsection (b) filed 3-4-92 pursuant to section 100, title 1, California Code of Regulations (Register 92, No. 19).
5. Amendment of subsection (c)(1) filed 5-1-95; operative 5-31-95 (Register 95, No. 18).
6. Editorial correction of subsection (b) (Register 95, No. 41).
7. Change without regulatory effect deleting duplicate "Certified supervisor" definition filed 12-21-95 pursuant to section 100, title 1, California Code of Regulations (Register 95, No. 51).
8. Repealer and new section filed 5-3-96; operative 7-3-96 (Register 96, No. 18).
9. Amendment of subsections (k)(9)(B), (q)(2)-(3) and (r)(1) definition of "Asbestos-related work," and amendment of Note filed 2-5-97; operative 3-7-97 (Register 97, No. 6).
10. New subsection (h)(2)(F), amendment of subsections (k)(6), (k)(8)(F) and (k)(9)(C)-(k)(9)(D)1., new (k)(9)(D)2.-3. and amendment of subsections (k)(9)(E) and (m)(1)(A)1. filed 10-3-97; operative 10-3-97. Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(3) (Register 97, No. 40).
11. Amendment of former subsections (h)(1)-(h)(4)(B) including subsection renumbering and relettering resulting in newly designated subsections (h)(1)-(h)(3)(D)3. filed 8-25-98; operative 11-23-98 (Register 98, No. 35).
12. Amendment of subsections (r)-(r)(2), repealer of subsection (r)(2)(A), Note 1. and Note 2. designator, amendment of former Note 2., and repealer of subsections (r)(2)(B)-(r)(2)(B)1. and (r)(2)(B)2.-(r)(5) filed 7-6-99; operative 8-5-99 (Register 99, No. 28).
13. Change without regulatory effect amending subsections (h)(3)(D)2.-3. filed 12-20-99 pursuant to section 100, title 1, California Code of Regulations (Register 99, No. 52).
14. Amendment of subsection (g)(5) filed 3-22-2004; operative 3-22-2004. Submitted to OAL for printing only. This filing is necessary to correct a discrepancy between this section and the corresponding federal regulation, 29 CFR 1926.1101, and is not subject to Articles 5 and 6 of the Administrative Procedure Act pursuant to subdivision (a)(3) of Labor Code section 142.3 (Register 2004, No. 13).
15. Amendment of subsection (f)(5)(A) and repealer of subsection (g)(6)(C) filed 7-28-2005; operative 7-28-2005. Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(3) (Register 2005, No. 30).
16. Amendment of subsections (h)(3)(A), new subsection (h)(3)(B), subsection relettering and amendment of newly designated subsections (h)(3)(C), (h)(3)(D), (h)(3)(E) and (h)(3)(E)2.-3. filed 3-6-2007; operative 3-6-2007. Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(3) (Register 2007, No. 10).
17. Amendment of subsection (k)(1), new subsections (k)(1)(A)-(B), amendment of subsections (k)(7)(B)1.-2., new subsections (k)(7)(B)3.-4., repealer and new subsections (k)(8)(B)-(C), new subsection (k)(8)(D)1. and redesignation of former subsection (k)(8)(D) as new subsection (k)(8)(D)2. filed 5-6-2013; operative 5-6-2013 pursuant to Labor Code section 142.3(a)(4)(C). Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(4) (Register 2013, No. 19).
18. Amendment of subsection (k)(1), new subsections (k)(1)(A)-(B), amendment of subsections (k)(7)(B)1.-2., new subsections (k)(7)(B)3.-4., repealer and new subsections (k)(8)(B)-(C), new subsection (k)(8)(D)1. and redesignation of former subsection (k)(8)(D) as new subsection (k)(8)(D)2. refiled 11-6-2013; operative 11-6-2013 pursuant to Labor Code section 142.3(a)(4)(C). Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(4) (Register 2013, No. 45).
19. Repealer of 11-6-2013 order by operation of law 5-6-2014 pursuant to Labor Code 142.3 (Register 2014, No. 19).
20. Amendment of subsection (k)(1), new subsections (k)(1)(A)-(B), amendment of subsections (k)(7)(B)1.-2., new subsections (k)(7)(B)3.-4., repealer and new subsections (k)(8)(B)-(C), new subsection (k)(8)(D)1. and redesignation of former subsection (k)(8)(D) as new subsection (k)(8)(D)2. filed 5-5-2014; operative 5-6-2014 pursuant to Government Code section 11343.4(b)(3) (Register 2014, No. 19).
21. Editorial correction of formatting of subsection (g)(4)(D) (Register 2015, No. 37).





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Subchapter 7. General Industry Safety Orders  
Group 16. Control of Hazardous Substances  
Article 110. Regulated Carcinogens

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## §5208. Asbestos, Appendix F

### Work Practices and Engineering Controls for Automotive Brake and Clutch Inspection, Disassembly, Repair, and Assembly

#### Mandatory

This mandatory appendix specifies engineering controls and work practices that must be implemented by the employer during automotive brake and clutch inspection, disassembly, repair, and assembly operations. Proper use of these engineering controls and work practices by trained employees will reduce employees' asbestos exposure below the permissible exposure level during clutch and brake inspection, disassembly, repair, and assembly operations. The employer shall institute engineering controls and work practices using either the method set forth in paragraph [A] or paragraph [B] of this appendix, or any other method which the employer can demonstrate to be equivalent in terms of reducing employee exposure to asbestos, as defined, and which meets the requirements described in paragraph [C] of this appendix. For those facilities in which no more than 5 pairs of brakes or 5 clutches are inspected, disassembled, reassembled, and/or repaired per week, the method set forth in paragraph [D] of this appendix may be used.

#### [A] Negative Pressure Enclosure/HEPA Vacuum System Method:

- (1) The brake and clutch inspection, disassembly, repair, and assembly operations shall be enclosed to cover and contain the clutch or brake assembly and to prevent the release of asbestos fibers into the worker's breathing zone.
- (2) the enclosure shall be sealed tightly and thoroughly inspected for leaks before work begins on brake and clutch inspection, disassembly, repair, and assembly.
- (3) The enclosure shall be such that the worker can clearly see the operation and shall provide impermeable sleeves through which the worker can handle the brake and clutch inspection, disassembly, repair and assembly. The integrity of the sleeves and ports shall be examined before work begins.
- (4) A HEPA-filtered vacuum shall be employed to maintain the enclosure under negative pressure throughout the operation. Compressed-air may be used to remove asbestos fibers or particles from the enclosure.
- (5) The HEPA vacuum shall be used first to loosen the asbestos-containing residue from the brake and clutch parts, and then to evacuate the loosened asbestos-containing material from the enclosure and capture the material in the vacuum filter.
- (6) The vacuum's filter, when full, shall be first wetted with a fine mist of water, then removed and placed immediately in an impermeable container, labeled according to subsection (j) (4) of this section, and disposed of according to subsection (k) of this section.
- (7) Any spills or releases of asbestos-containing waste material from inside of the enclosure or vacuum hose or vacuum filter shall be immediately cleaned up and disposed of according to subsection (k) of this section.

#### [B] Low Pressure/Wet Cleaning Method:

- (1) A catch basin shall be placed under the brake assembly, positioned to avoid splashes and spills.
- (2) The reservoir shall contain water containing an organic solvent or wetting agent. The flow of liquid shall be controlled such that the brake assembly is gently flooded to prevent the asbestos-containing brake dust from becoming airborne.
- (3) The aqueous solution shall be allowed to flow between the brake drum and brake support before the drum is removed.
- (4) After removing the brake drum, the wheel hub and back of the brake assembly shall be thoroughly wetted to suppress dust.
- (5) The brake support plate, brake shoes and brake components used to attach the brake shoes shall be thoroughly washed before removing the old shoes.
- (6) In systems using filters, the filters when full shall be first wetted with a fine mist of water, then removed and placed immediately in an impermeable container labeled according to subsection (j) (4) of this section, and disposed of according to subsection (k) of this section.
- (7) Any spills of asbestos-containing aqueous solution or any asbestos-containing waste material shall be cleaned up immediately and disposed of according to subsection (k) of this section.
- (8) The use of dry brushing during low pressure/wet cleaning operations is prohibited.

#### [C] Equivalent Methods:

An equivalent method is one which has sufficient written detail so that it can be reproduced, and for which it has been demonstrated that the exposures resulting from the equivalent method are equal to or less than the exposures which would result from the use of the method described in paragraph [A] of this appendix. For

purposes of making this comparison, the employer shall assume that exposures resulting from the use of the method described in paragraph [A] of this appendix shall not exceed 0.016 f/cc, as measured by the OSHA reference method and as averaged over at least 18 personal samples.

[D] Wet Method:

- (1) A spray bottle, hose nozzle, or other implement capable of delivering a fine mist of water or amended water, or other delivery system capable of delivering water at low pressure, shall be used to first thoroughly wet the brake and clutch parts. Brake and clutch components shall then be wiped clean with a cloth.
- (2) The cloth shall be placed in an impermeable container, labeled according to subsection (j) (4) of this section, and then disposed of according to subsection (k) of this section; or the cloth shall be laundered in a way to prevent the release of asbestos fibers in excess of 0.1 fiber per cubic centimeter of air.
- (3) Any spills of solvent or any asbestos-containing waste material shall be cleaned up immediately according to subsection (k) of this section.
- (4) The use of dry brushing during the wet method operations is prohibited.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

HISTORY

1. Appendix F to section 5208 filed 2-15-91; operative 2-15-91 pursuant to Government Code section 11346.2(d) (Register 91, No. 19).
2. Editorial correction of HISTORY 1. (Register 91, No. 45).
3. Repealer and new appendix and Note filed 5-3-96; operative 7-3-96 (Register 96, No. 18).

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Subchapter 4. Construction Safety Orders  
Article 4. Dusts, Fumes, Mists, Vapors, and Gases

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## §1532. Cadmium.

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(a) Scope.

This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, in all construction work where an employee may potentially be exposed to cadmium. Construction work is defined as work involving construction, alteration and/or repair, including but not limited to the following:

- (1) wrecking, demolition or salvage of structures where cadmium or materials containing cadmium are present;
- (2) use of cadmium containing-paints and cutting, brazing, burning, grinding or welding on surfaces that were painted with cadmium-containing paints;
- (3) construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain cadmium, or materials containing cadmium;
- (4) cadmium welding; cutting and welding cadmium-plated steel; brazing or welding with cadmium alloys;
- (5) installation of products containing cadmium;
- (6) electrical grounding with cadmium welding, or electrical work using cadmium-coated conduit;
- (7) maintaining or retrofitting cadmium-coated equipment;
- (8) cadmium contamination/emergency cleanup; and
- (9) transportation, disposal, storage, or containment of cadmium or materials containing cadmium on the site or location at which construction activities are performed.

(b) Definitions.

Action level (AL) is defined as an airborne concentration of cadmium of 2.5 micrograms per cubic meter of air ( $2.5 \mu\text{g}/\text{m}^3$ ), calculated as an 8-hour time-weighted average (TWA).

Authorized person means any person authorized by the employer and required by work duties to be present in regulated areas or any person authorized by the Chief to be in regulated areas.

Chief means the Chief of the Division of Occupational Safety and Health, or designee.

Competent person, in accordance with section 1504, means a person designated by the employer to act on the employer's behalf who is capable of identifying existing and potential cadmium hazards in the workplace and the proper methods to control them in order to protect workers, and has the authority necessary to take prompt corrective measures to eliminate or control such hazards. The duties of a competent person include at least the following: determining prior to the performance of work whether cadmium is present in the workplace; establishing, where necessary, regulated areas and assuring that access to and from those areas is limited to authorized employees; assuring the adequacy of any employee exposure monitoring required by this standard; assuring that all employees exposed to air cadmium levels above the PEL wear appropriate personal protective equipment and are trained in the use of appropriate methods of exposure control; assuring that proper hygiene facilities are provided and that workers are trained to use those facilities; and assuring that the engineering controls required by this standard are implemented, maintained in proper operating condition, and functioning properly.

Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which results in an unexpected and potentially hazardous release of Cadmium.

Employee exposure and similar language referring to the air cadmium level to which an employee is exposed means the exposure to airborne cadmium that would occur if the employee were not using respiratory protective equipment.

Final medical determination is the written medical opinion of the employee's health status by the examining physician under subsections (1)(3)-(12) or, if multiple physician review under subsection (1)(13) or the alternative physician determination under subsection (1)(14) is invoked, it is the final, written medical finding, recommendation or determination that emerges from that process.

High-efficiency particulate air [HEPA] filter means a filter capable of trapping and retaining at least 99.97 percent of mono-dispersed particles of 0.3 micrometers in diameter.

NIOSH means the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

Regulated area means an area demarcated by the employer where an employee's exposure to airborne concentrations of cadmium exceeds, or can reasonably be expected to exceed the permissible exposure limit (PEL).

(c) Permissible Exposure Limit (PEL).

The employer shall assure that no employee is exposed to an airborne concentration of cadmium in excess of five micrograms per cubic meter of air ( $5 \mu\text{g}/\text{m}^3$ ), calculated as an eight-hour time-weighted average exposure (TWA).

(d) Exposure Monitoring.

(1) General.

(A) Prior to the performance of any construction work where employees may be potentially exposed to cadmium, the employer shall establish the applicability of this standard by determining whether cadmium is present in the workplace and whether there is the possibility that employee exposures will be at or above the action level. The employer shall designate a competent person who shall make this determination. Investigation and material testing techniques shall be used, as appropriate, in the determination.

Investigation shall include a review of relevant plans, past reports, safety data sheets, and other available records, and consultations with the property owner and discussions with appropriate individuals and agencies.

(B) Where cadmium has been determined to be present in the workplace, and it has been determined that there is a possibility the employee's exposure will be at or above the action level, the competent person shall identify employees potentially exposed to cadmium at or above the action level.

(C) Determinations of employee exposure shall be made from breathing-zone air samples that reflect the monitored employee's regular, daily 8-hour TWA exposure to cadmium.

(D) Eight-hour TWA exposures shall be determined for each employee on the basis of one or more personal breathing-zone air samples reflecting full shift exposure on each shift, for each job classification, in each work area. Where several employees perform the same job tasks, in the same job classification, on the same shift, in the same work area, and the length, duration, and level of cadmium exposures are similar, an employer may sample a representative fraction of the employees instead of all employees in order to meet this requirement. In representative sampling, the employer shall sample the employee(s) expected to have the highest cadmium exposures.

## (2) Specific.

(A) Initial monitoring. Except as provided for in subsection (d)(2)(C), where a determination conducted under subsection (d)(1)(A) shows the possibility of employee exposure to cadmium at or above the action level, the employer shall conduct exposure monitoring as soon as practicable that is representative of the exposure for each employee in the workplace who is or may be exposed to cadmium at or above the action level.

(B) In addition, if the employee periodically performs tasks that may expose the employee to a higher concentration of airborne cadmium, the employee shall be monitored while performing those tasks.

(C) Where the employer has objective data, as defined in subsection (n)(2), demonstrating that employee exposure to cadmium will not exceed airborne concentrations at or above the action level under the expected conditions of processing, use, or handling, the employer may rely upon such data instead of implementing initial monitoring.

(D) Where a determination conducted under subsections (d)(1) or (d)(2) is made that a potentially exposed employee is not exposed to airborne concentrations of cadmium at or above the action level, the employer shall make a written record of such determination. The record shall include at least the monitoring data developed under subsections (d)(2)(A)-(C), where applicable, and shall also include the date of determination, and the name and social security number of each employee.

## (3) Monitoring Frequency (periodic monitoring).

(A) If the initial monitoring or periodic monitoring reveals employee exposures to be at or above the action level, the employer shall monitor at a frequency and pattern needed to assure that the monitoring results reflect with reasonable accuracy the employee's typical exposure levels, given the variability in the tasks performed, work practices, and environmental conditions on the job site, and to assure the adequacy of respiratory selection and the effectiveness of engineering and work practice controls.

(B) If the initial monitoring or the periodic monitoring indicates that employee exposures are below the action level and that result is confirmed by the results of another monitoring taken at least seven days later, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.

#### (4) Additional Monitoring.

The employer also shall institute the exposure monitoring required under subsections (d)(2)(A) and (d)(3) whenever there has been a change in the raw materials, equipment, personnel, work practices, or finished products that may result in additional employees being exposed to cadmium at or above the action level or in employees already exposed to cadmium at or above the action level being exposed above the PEL, or whenever the employer or competent person has any reason to suspect that any other change might result in such further exposure.

#### (5) Employee Notification of Monitoring Results.

(A) No later than five working days after the receipt of the results of any monitoring performed under this section, the employer shall notify each affected employee individually in writing of the results. In addition, within the same time period, the employer shall post the results of the exposure monitoring in an appropriate location that is accessible to all affected employees.

(B) Wherever monitoring results indicate that employee exposure exceeds the PEL, the employer shall include in the written notice a statement that the PEL has been exceeded and a description of the corrective action being taken by the employer to reduce employee exposure to or below the PEL.

#### (6) Accuracy of Measurement.

The employer shall use a method of monitoring and analysis that has an accuracy of not less than plus or minus 25 percent (+25%), with a confidence level of 95 percent, for airborne concentrations of cadmium at or above the action level and the permissible exposure limit.

#### (e) Regulated Areas.

##### (1) Establishment.

The employer shall establish a regulated area wherever an employee's exposure to airborne concentrations of cadmium is, or can reasonably be expected to be in excess of the permissible exposure limit (PEL).

##### (2) Demarcation.

Regulated areas shall be demarcated from the rest of the workplace in any manner that adequately establishes and alerts employees of the boundaries of the regulated area, including employees who are or may be incidentally in the regulated areas, and that protects persons outside the area from exposure to airborne concentrations of cadmium in excess of the PEL.

##### (3) Access.

Access to regulated areas shall be limited to authorized persons.

##### (4) Provision of Respirators.

Each person entering a regulated area shall be supplied with and required to use a respirator, selected in accordance with subsection (g)(2).

##### (5) Prohibited Activities.

The employer shall assure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas, or carry the products associated with any of these activities into regulated areas or store such products in those areas.

(f) Methods of Compliance.

(1) Compliance Hierarchy.

(A) Except as specified in subsection (f)(1)(B), the employer shall implement engineering and work practice controls to reduce and maintain employee exposure to cadmium at or below the PEL, except to the extent that the employer can demonstrate that such controls are not feasible.

(B) The requirement to implement engineering controls to achieve the PEL does not apply where the employer demonstrates the following:

1. the employee is only intermittently exposed; and
2. the employee is not exposed above the PEL on 30 or more days per year (12 consecutive months)

(C) Wherever engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, the employer nonetheless shall implement such controls to reduce exposures to the lowest levels achievable. The employer shall supplement such controls with respiratory protection that complies with the requirements of subsection (g) and the PEL.

(D) The employer shall not use employee rotation as a method of compliance.

(2) Specific Operations.

(A) Abrasive blasting. Abrasive blasting on cadmium or cadmium-containing materials shall be conducted in a manner that will provide adequate protection.

(B) Heating cadmium and cadmium-containing materials. Welding, cutting, and other forms of heating of cadmium or cadmium-containing materials shall be conducted in accordance with the requirements of sections 1536 and 1537, where applicable.

(3) Prohibitions.

(A) High speed abrasive disc saws and similar abrasive power equipment shall not be used for work on cadmium or cadmium-containing materials unless they are equipped with appropriate engineering controls to minimize emissions, if the exposure levels are above the PEL.

(B) Materials containing cadmium shall not be applied by spray methods, if exposures are above the PEL, unless employees are protected with supplied-air respirators with full facepiece, hood, helmet, suit, operated in positive pressure mode and measures are instituted to limit overspray and prevent contamination of adjacent areas.

(4) Mechanical Ventilation.

(A) When ventilation is used to control exposure, measurements that demonstrate the effectiveness of the system in controlling exposure, such as capture velocity, duct velocity, or static pressure shall be made as necessary to maintain its effectiveness.

(B) Measurements of the system's effectiveness in controlling exposure shall be made as necessary within five working days of any change in production, process, or control that might result in a significant increase in employee exposure to cadmium.

(C) Recirculation of air. If air from exhaust ventilation is recirculated into the workplace, the system shall have a high efficiency filter and be monitored to assure effectiveness.

(D) Procedures shall be developed and implemented to minimize employee exposure to cadmium when maintenance of ventilation systems and changing of filters is being conducted.

(5) Compliance Program.

(A) Where employee exposure to cadmium exceeds the PEL and the employer is required under subsection (f)(1) to implement controls to comply with the PEL prior to the commencement of the job, the employer shall establish and implement a written compliance program to reduce employee exposure to or below the PEL. To the extent that engineering and work practice controls cannot reduce exposures to or below the PEL, the employer shall include in the written compliance program the use of appropriate respiratory protection to achieve compliance with the PEL.

(B) Written compliance programs shall be reviewed and updated as often and as promptly as necessary to reflect significant changes in the employer's compliance status or significant changes in the lowest air cadmium level that is technologically feasible.

(C) A competent person shall review the comprehensive compliance program initially and after each change.

(D) Written compliance programs shall be provided upon request for examination and copying to the Chief, NIOSH, affected employees, and designated employee representatives.

(g) Respiratory Protection.

(1) General. For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this subsection. Respirators must be used during:

(A) Periods necessary to install or implement feasible engineering and work practice controls when employee exposures exceed the PEL;

(B) Maintenance and repair activities and during those brief or intermittent operations where exposures exceed the PEL and engineering and work practice controls are not feasible, or are not required;

(C) Work operations in the regulated areas specified in subsection (e);

(D) Work operations for which the employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures to or below the PEL;

(E) Emergencies;

(F) Work operations for which an employee who is exposed to cadmium at or above the action level requests a respirator; and

(G) Work operations for which engineering controls are not required under subsection (f)(1)(B) to reduce employee exposures that exceed the PEL.

(2) Respirator program.

(A) The employer must implement a respiratory protection program in accordance with section 5144(b) (except (d)(1)(C)) through (m).

(B) If an employee exhibits breathing difficulty during fit testing or respirator use, the employer must provide the employee with a medical examination in accordance with subsection (1)(6)(B) to determine if the employee can use a respirator while performing the required duties.) (6)(B) to determine if the employee

can use a respirator while performing the required duties.)(6)(B) to determine if the employee can use a respirator while performing the required duties.

(C) No employee must use a respirator when, based on their most recent medical examination, the examining physician determines that the employee will be unable to function normally while using a respirator. If the physician determines the employee must be limited in, or removed from, their current job because of the employee's inability to use a respirator, the job limitation or removal must be conducted in accordance with subsections (1)(11) and (12).

### (3) Respirator Selection.

(A) The employer must select, and provide to employees, the appropriate respirators specified in Section 5144(d)(3)(A)1.

(B) The employer shall provide a powered, air-purifying respirator (PAPR) in lieu of a negative pressure respirator wherever:

1. An employee entitled to a respirator chooses to use this type of respirator; and
2. This respirator will provide adequate protection to the employee.

(C) The employer shall provide employees with full facepiece respirators when they experience eye irritation.

(D) The employer shall provide HEPA filters for powered and non-powered air-purifying respirators.

### (h) Emergency Situations.

The employer shall develop and implement a written plan for dealing with emergency situations involving substantial releases of airborne cadmium. The plan shall include provisions for the use of appropriate respirators and personal protective equipment. In addition, employees not essential to correcting the emergency situation shall be restricted from the area and normal operations halted in that area until the emergency is abated.

### (i) Protective Work Clothing and Equipment.

#### (1) Provision and Use.

If an employee is exposed to airborne cadmium above the PEL or where skin or eye irritation is associated with cadmium exposure at any level, the employer shall provide at no cost to the employee, and assure that the employee uses, appropriate protective work clothing and equipment that prevents contamination of the employee and the employee's garments. Protective work clothing and equipment includes, but is not limited to:

(A) Coveralls or similar full-body work clothing;

(B) Gloves, head coverings, and boots or foot coverings; and

(C) Face shields, vented goggles, or other appropriate protective equipment that complies with sections 1514 to 1522.

#### (2) Removal and Storage.

(A) The employer shall assure that employees remove all protective clothing and equipment contaminated with cadmium at the completion of the work shift and do so only in change rooms provided in accordance with subsection (j)(1).

(B) The employer shall assure that no employee takes cadmium-contaminated protective clothing or equipment from the workplace, except for employees authorized to do so for purposes of laundering, cleaning, maintaining, or disposing of cadmium-contaminated protective clothing and equipment at an appropriate location or facility away from the workplace.

(C) The employer shall assure that contaminated protective clothing and equipment, when removed for laundering, cleaning, maintenance, or disposal, is placed and stored in sealed, impermeable bags or other closed, impermeable containers that are designed to prevent dispersion of cadmium dust.

(D) The employer shall assure that containers of contaminated protective clothing and equipment that are to be taken out of the change rooms or the workplace for laundering, cleaning, maintenance or disposal shall bear labels in accordance with subsection (m)(3)(B) of this section.

### (3) Cleaning, Replacement, and Disposal.

(A) The employer shall provide the protective clothing and equipment required by subsection (i)(1) in a clean and dry condition as often as necessary to maintain its effectiveness, but in any event at least weekly. The employer is responsible for cleaning and laundering the protective clothing and equipment required by this subsection to maintain its effectiveness and is also responsible for disposing of such clothing and equipment.

(B) The employer also is responsible for repairing or replacing required protective clothing and equipment as needed to maintain its effectiveness. When rips or tears are detected while an employee is working they shall be immediately mended, or the worksuit shall be immediately replaced.

(C) The employer shall prohibit the removal of cadmium from protective clothing and equipment by blowing, shaking, or any other means that disperses cadmium into the air.

(D) The employer shall assure that any laundering of contaminated clothing or cleaning of contaminated equipment in the workplace is done in a manner that prevents the release of airborne cadmium in excess of the permissible exposure limit prescribed in subsection (c).

(E) The employer shall inform any person who launders or cleans protective clothing or equipment contaminated with cadmium of the potentially harmful effects of exposure to cadmium, and that the clothing and equipment should be laundered or cleaned in a manner to effectively prevent the release of airborne cadmium in excess of the PEL.

### (j) Hygiene Areas and Practices.

#### (1) General.

For employees whose airborne exposure to cadmium is above the PEL, the employer shall provide clean change rooms, handwashing facilities, showers, and lunchroom facilities that comply with sections 1524, 1526 and 1527.

#### (2) Change Rooms.

The employer shall assure that change rooms are equipped with separate storage facilities for street clothes and for protective clothing and equipment, which are designed to prevent dispersion of cadmium and contamination of the employee's street clothes.

#### (3) Showers and Handwashing Facilities.

(A) The employer shall assure that employees whose airborne exposure to cadmium is above the PEL shower during the end of the work shift.

(B) The employer shall assure that employees who are exposed to cadmium above the PEL wash their hands and faces prior to eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics.

(4) Lunchroom Facilities.

(A) The employer shall assure that the lunchroom facilities are readily accessible to employees, that tables for eating are maintained free of cadmium, and that no employee in a lunchroom facility is exposed at any time to cadmium at or above a concentration of  $2.5\mu\text{g}/\text{m}^3$ .

(B) The employer shall assure that employees do not enter lunchroom facilities with protective work clothing or equipment unless surface cadmium has been removed from the clothing and equipment by HEPA vacuuming or some other method that removes cadmium dust without dispersing it.

(k) Housekeeping.

(1) All surfaces shall be maintained as free as practicable of accumulations of cadmium.

(2) All spills and sudden releases of material containing cadmium shall be cleaned up as soon as possible.

(3) Surfaces contaminated with cadmium shall, wherever possible, be cleaned by vacuuming or other methods that minimize the likelihood of cadmium becoming airborne.

(4) HEPA-filtered vacuuming equipment or equally effective filtration methods shall be used for vacuuming. The equipment shall be used and emptied in a manner that minimizes the reentry of cadmium into the workplace.

(5) Shoveling, dry or wet sweeping, and brushing may be used only where vacuuming or other methods that minimize the likelihood of cadmium becoming airborne have been tried and found not to be effective.

(6) Compressed air shall not be used to remove cadmium from any surface unless the compressed air is used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air.

(7) Waste, scrap, debris, bags, containers, personal protective equipment, and clothing contaminated with cadmium and consigned for disposal shall be collected and disposed of in sealed impermeable bags or other closed, impermeable containers. These bags and containers shall be labeled in accordance with subsection (m)(3)(B) of this section.

(l) Medical Surveillance.

(1) General.

(A) Scope.

1. Currently exposed - The employer shall institute a medical surveillance program for all employees who are or may be exposed at or above the action level and all employees who perform the following tasks, operations or jobs: electrical grounding with cadmium welding; cutting, brazing, burning, grinding or welding on surfaces that were painted with cadmium-containing paints; electrical work using cadmium-coated conduit; use of cadmium containing paints; cutting and welding cadmium-plated steel; brazing or welding with cadmium alloys; fusing of reinforced steel by cadmium welding; maintaining or retrofitting cadmium-coated equipment; and, wrecking and demolition where cadmium is present. A medical surveillance program will not be required if the employer demonstrates that the employee:

- a. is not currently exposed by the employer to airborne concentrations of cadmium at or above the action level on 30 or more days per year (twelve consecutive months); and,
- b. is not currently exposed by the employer in those tasks on 30 or more days per year (twelve consecutive months).

2. Previously exposed - The employer shall also institute a medical surveillance program for all employees who might previously have been exposed to cadmium by the employer prior to the effective date of this standard in tasks specified under subsection (l)(1)(A)1., unless the employer demonstrates that the employee did not in the years prior to the effective date of this section work in those tasks for the employer with exposure to cadmium for an aggregated total of more than 12 months.

(B) To determine an employee's fitness for using a respirator, the employer shall provide the limited medical examination specified in subsection (l)(6).

(C) The employer shall assure that all medical examinations and procedures required by this section are performed by or under the supervision of a licensed physician, who has read and is familiar with the health effects section of Appendix A, the regulatory text of this section, the protocol for sample handling and lab selection in Appendix F, and the questionnaire of Appendix D.

(D) The employer shall provide the medical surveillance required by this section, including multiple physician review under subsection (l)(13) without cost to employees, and at a time and place that is reasonable and convenient to employees.

(E) The employer shall assure that the collecting and handling of biological samples of cadmium in urine (CdU), cadmium in blood (CdB), and beta-2 microglobulin in urine ( $\beta_2$ -M) taken from employees under this section is done in a manner that assures their reliability and that analysis of biological samples of cadmium in urine (CdU), cadmium in blood (CdB), and beta-2 microglobulin in urine ( $\beta_2$ -M) taken from employees under this section is performed in laboratories with demonstrated proficiency to perform the particular analysis. (See Appendix F.)

(2) Initial Examination.

(A) For employees covered by medical surveillance under subsection (l)(1)(A), the employer shall provide an initial medical examination. The examination shall be provided to those employees within 30 days after initial assignment to a job with exposure to cadmium or no later than 90 days after the effective date of this section, whichever date is later.

(B) The initial medical examination shall include:

1. A detailed medical and work history, with emphasis on: past, present, and anticipated future exposure to cadmium; any history of renal, cardiovascular, respiratory, hematopoietic, reproductive, and/or musculo-skeletal system dysfunction; current usage of medication with potential nephrotoxic side-effects; and smoking history and current status; and

2. Biological monitoring that includes the following tests:

- a. Cadmium in urine (CdU), standardized to grams of creatinine (g/Cr);

- b. Beta-2 microglobulin in urine ( $\beta_2$ -M), standardized to grams of creatinine (g/Cr), with pH specified, as described in Appendix F; and

- c. Cadmium in blood (CdB), standardized to liters of whole blood (lwb).

(C) Recent Examination: An initial examination is not required to be provided if adequate records show that the employee has been examined in accordance with the requirements of subsection (1)(2)(B) within the past 12 months. In that case, such records shall be maintained as part of the employee's medical record and the prior exam shall be treated as if it were an initial examination for the purposes of subsections (1)(3) and (4).

(3) Actions Triggered by Initial Biological Monitoring:

(A) If the results of the biological monitoring tests in the initial examination show the employee's CdU level to be at or below  $3\mu\text{g/g}$  Cr,  $\beta_2\text{-M}$  level to be at or below  $300\mu\text{g/g}$  Cr and CdB level to be at or below  $5\mu\text{g/lwb}$ , then:

1. for employees who are subject to medical surveillance under subsections (1)(1)(A)1. because of current or anticipated exposure to cadmium, the employer shall provide the minimum level of periodic medical surveillance in accordance with the requirements in subsection (1)(4)(A); and
2. for employees who are subject to medical surveillance under subsection (1)(1)(A)2. because of prior but not current exposure, the employer shall provide biological monitoring for CdU,  $\beta_2\text{-M}$ , and CdB one year after the initial biological monitoring and then the employer shall comply with the requirements of subsection (1)(4)(F).

(B) For all employees who are subject to medical surveillance under subsection (1)(1)(A), if the results of the initial biological monitoring tests show the level of CdU to exceed  $3\mu\text{g/g}$  Cr, the level of  $\beta_2\text{-M}$  to be in excess of  $300\mu\text{g/g}$  Cr, or the level of CdB to be in excess of  $5\text{mg/lwb}$ , the employer shall:

1. within two weeks after receipt of biological monitoring results, reassess the employee's occupational exposure to cadmium as follows:
  - a. reassess the employee's work practices and personal hygiene;
  - b. reevaluate the employee's respirator use, if any, and the respirator program;
  - c. review the hygiene facilities;
  - d. reevaluate the maintenance and effectiveness of the relevant engineering controls;
  - e. assess the employee's smoking history and status;
2. within 30 days after the exposure reassessment, specified in (1)(3)(B)1., take reasonable steps to correct any deficiencies found in the reassessment that may be responsible for the employee's excess exposure to cadmium; and,
3. within 90 days after receipt of biological monitoring results, provide a full medical examination to the employee in accordance with the requirements of subsection (1)(4)(B). After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. If the physician determines that medical removal is not necessary, then until the employee's CdU level falls to or below  $3\mu\text{g/g}$  Cr,  $\beta_2\text{-M}$  level falls to or below  $300\text{mg/g}$  Cr and CdB level falls to or below  $5\text{mg/lwb}$ , the employer shall:
  - a. Provide biological monitoring in accordance with subsection (1)(2)(B)2. on a semiannual basis; and
  - b. Provide annual medical examinations in accordance with subsection (1)(4)(B).

(C) For all employees who are subject to medical surveillance under subsection (1)(1)(A), if the results of the initial biological monitoring tests show the level of CdU to be in excess of 15µg/g Cr, or the level of CdB to be in excess of 15mg/lwb, or the level of  $\beta_2$ -M to be in excess of 1,500µg/g Cr, the employer shall comply with the requirements of subsections (1)(3)(B)1.-2.. Within 90 days after receipt of biological monitoring results, the employer shall provide a full medical examination to the employee in accordance with the requirements of subsection (1)(4)(B). After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. However, if the initial biological monitoring results and the biological monitoring results obtained during the medical examination both show that: CdU exceeds 15µg/g Cr; or CdB exceeds 15mg/lwb; or  $\beta_2$ -M exceeds 1500µg/g Cr, and in addition CdU exceeds 3µg/g Cr or CdB exceeds 5mg/liter of whole blood, then the physician shall medically remove the employee from exposure to cadmium at or above the action level. If the second set of biological monitoring results obtained during the medical examination does not show that a mandatory removal trigger level has been exceeded, then the employee is not required to be removed by the mandatory provisions of this subsection. If the employee is not required to be removed by the mandatory provisions of this subsection or by the physician's determination, then until the employee's CdU level falls to or below 3µg/g Cr,  $\beta_2$ -M level falls to or below 300µg/g Cr and CdB level falls to or below 5mg/lwb, the employer shall:

1. Periodically reassess the employee's occupational exposure to cadmium;
2. Provide biological monitoring in accordance with subsection (1)(2)(B)2. on a quarterly basis; and
3. Provide semiannual medical examinations in accordance with subsection (1)(4)(B).

(D) For all employees to whom medical surveillance is provided, beginning on January 1, 1999, and in lieu of subsection (1)(3)(C), whenever the results of initial biological monitoring tests show the employee's CdU level to be in excess of 7µg/g Cr, or  $\beta_2$ -M level to be in excess of 750µg/g Cr, or CdB level to be in excess of 10mg/lwb, the employer shall comply with the requirements of subsection (1)(3)(B)1.-2.. Within 90 days after receipt of biological monitoring results, the employer shall provide a full medical examination to the employee in accordance with the requirements of subsection (1)(4)(B). After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. However, if the initial biological monitoring results and the biological monitoring results obtained during the medical examination both show that: CdU exceeds 7µg/g Cr; or CdB exceeds 10mg/lwb; or  $\beta_2$ -M exceeds 750µg/g Cr, and in addition CdU exceeds 3µg/g Cr or CdB exceeds 5mg/liter of whole blood, then the physician shall medically remove the employee from exposure to cadmium at or above the action level. If the second set of biological monitoring results obtained during the medical examination does not show that a mandatory removal trigger level has been exceeded, then the employee is not required to be removed by the mandatory provisions of this subsection. If the employee is not required to be removed by the mandatory provisions of this subsection or by the physician's determination, then until the employee's CdU level falls to or below 3µg/g Cr,  $\beta_2$ -M level falls to or below 300µg/g Cr and CdB level falls to or below 5mg/lwb, the employer shall:

1. Periodically reassess the employee's occupational exposure to cadmium;
2. Provide biological monitoring in accordance with subsection (1)(2)(B)2. on a quarterly basis; and
3. Provide semiannual medical examinations in accordance with subsection (1)(4)(B).

(4) Periodic Medical Surveillance.

(A) For each employee who is covered by medical surveillance under subsection (1)(1)(A)1. because of current or anticipated exposure to cadmium, the employer shall provide at least the minimum level of periodic medical surveillance, which consists of periodic medical examinations and periodic biological monitoring. A periodic medical examination shall be provided within one year after the initial examination required by subsection (1)(2) and thereafter at least biennially. Biological sampling shall be provided at least annually either as part of a periodic medical examination or separately as periodic biological monitoring.

(B) The periodic medical examination shall include:

1. A detailed medical and work history, or update thereof, with emphasis on: past, present and anticipated future exposure to cadmium; smoking history and current status; reproductive history; current use of medications with potential nephrotoxic side-effects; any history of renal, cardiovascular, respiratory, hematopoietic, and/or musculo-skeletal system dysfunction; and as part of the medical and work history, for employees who wear respirators, questions 3-11 and 25-32 in Appendix D;
2. A complete physical examination with emphasis on: blood pressure, the respiratory system, and the urinary system;
3. A 14 inch by 17 inch, or a reasonably standard sized posterior-anterior chest X-ray (after the initial X-ray, the frequency of chest X-rays is to be determined by the examining physician);
4. Pulmonary function tests, including forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV1);
5. Biological monitoring, as required in subsection (1)(2)(B)2.;
6. Blood analysis, in addition to the analysis required under subsection (1)(2)(B)2., including blood urea nitrogen, complete blood count, and serum creatinine;
7. Urinalysis, in addition to the analysis required under subsection (1)(2)(B)2., including the determination of albumin, glucose, and total and low molecular weight proteins;
8. For males over 40 years old, prostate palpation, or other at least as effective diagnostic test(s), and;
9. Any additional tests or procedures deemed appropriate by the examining physician.

(C) Periodic biological monitoring shall be provided in accordance with subsection (1)(2)(B)2..

(D) If the results of periodic biological monitoring or the results of biological monitoring performed as part of the periodic medical examination show the level of the employee's CdU,  $\beta_2$ -M, or CdB to be in excess of the levels specified in subsections (1)(3)(B) or (C); or, beginning on January 1, 1999, in excess of the levels specified in subsection (1)(3)(B) or (D), the employer shall take the appropriate actions specified in subsections (1)(3)(B)-(D), respectively.

(E) For previously exposed employees under subsection (1)(1)(A)2.:

1. If the employee's levels of CdU did not exceed  $3\mu\text{g/g Cr}$ , CdB did not exceed  $5\text{mg/lwb}$ , and  $\beta_2$ -M did not exceed  $300\mu\text{g/g Cr}$  in the initial biological monitoring tests, and if the results of the followup biological monitoring required by subsection (1)(3)(A)2. one year after the initial examination confirm the previous results, the employer may discontinue all periodic medical surveillance for that employee.

2. If the initial biological monitoring results for CdU, CdB, or  $\beta_2$ -M were in excess of the levels specified in (1)(3)(A), but subsequent biological monitoring results required by (1)(3)(B)-(D) show that the employee's CdU levels no longer exceed  $3\mu\text{g/g Cr}$ , CdB levels no longer exceed  $5\text{mg/lwb}$ , and  $\beta_2$ -M levels no longer exceed  $300\mu\text{g/g Cr}$ , the employer shall provide biological monitoring for CdU, CdB, and  $\beta_2$ -M one year after these most recent biological monitoring results. If the results of the followup biological monitoring, specified in this subsection, confirm the previous results, the employer may discontinue all periodic medical surveillance for that employee.

3. However, if the results of the follow-up tests specified in (1)(4)(E)1. or 2. indicate that the level of the employee's CdU,  $\beta_2$ -M, or CdB exceeds these same levels, the employer is required to provide annual medical examinations in accordance with the provisions of subsection (1)(4)(B) until the results of biological monitoring are consistently below these levels or the examining physician determines in a written medical opinion that further medical surveillance is not required to protect the employee's health.

(F) A routine, biennial medical examination is not required to be provided in accordance with subsections (1)(3)(A) and (1)(4) if adequate medical records show that the employee has been examined in accordance with the requirements of subsection (1)(4)(B) within the past 12 months. In that case, such records shall be maintained by the employer as part of the employee's medical record, and the next routine, periodic medical examination shall be made available to the employee within two years of the previous examination.

#### (5) Actions Triggered by Medical Examinations:

(A) If the results of a medical examination carried out in accordance with this section indicate any laboratory or clinical finding consistent with cadmium toxicity that does not require employer action under subsections (1)(2), (3) or (4), the employer shall take the following steps and continue to take them until the physician determines that they are no longer necessary.

1. Periodically reassess: the employee's work practices and personal hygiene; the employee's respirator use, if any; the employee's smoking history and status; the respiratory protection program; the hygiene facilities; the maintenance and effectiveness of the relevant engineering controls; and take all reasonable steps to correct the deficiencies found in the reassessment that may be responsible for the employee's excess exposure to cadmium.

2. Provide semi-annual medical reexaminations to evaluate the abnormal clinical sign(s) of cadmium toxicity until the results are normal or the employee is medically removed; and

3. Where the results of tests for total proteins in urine are abnormal, provide a more detailed medical evaluation of the toxic effects of cadmium on the employee's renal system.

#### (6) Examination for Respirator Use:

(A) To determine an employee's fitness for respirator use, the employer shall provide a medical examination that includes the elements specified in (1)(6)(A)1.-4.. This examination shall be provided prior to the employee's being assigned to a job that requires the use of a respirator or no later than 90 days after this section goes into effect, whichever date is later, to any employee without a medical examination within the preceding 12 months that satisfies the requirements of this subsection.

1. A detailed medical and work history, or update thereof, with emphasis on: past exposure to cadmium; smoking history and current status; any history of renal, cardiovascular, respiratory, hematopoietic, and/or musculo-skeletal system dysfunction; a description of the job for which the respirator is required; and questions 3-11 and 25-32 in Appendix D;

2. A blood pressure test;

3. Biological monitoring of the employee's levels of CdU, CdB and  $\beta_2$ -M in accordance with the requirements of subsection (1)(2)(B)2., unless such results already have been obtained within the twelve months; and

4. Any other test or procedure that the examining physician deems appropriate.

(B) After reviewing all the information obtained from the medical examination required in subsection (1)(6)(A), the physician shall determine whether the employee is fit to wear a respirator.

(C) Whenever an employee has exhibited difficulty in breathing during a respirator fit test or during use of a respirator, the employer, as soon as possible, shall provide the employee with a periodic medical examination in accordance with subsection (1)(4)(B) to determine the employee's fitness to wear a respirator.

(D) Where the results of the examination required under subsection (1)(6)(A), (B) or (C) are abnormal, medical limitation or prohibition of respirator use shall be considered. If the employee is allowed to wear a respirator, the employee's ability to continue to do so shall be periodically evaluated by a physician.

(7) Emergency Examinations:

(A) In addition to the medical surveillance required in subsections (1)(2)-(6), the employer shall provide a medical examination as soon as possible to any employee who may have been acutely exposed to cadmium because of an emergency.

(B) The examination shall include the requirements of subsection (1)(4)(B), with emphasis on the respiratory system, other organ systems considered appropriate by the examining physician, and symptoms of acute overexposure, as identified in subsections II(B)(1)-(2) and IV of Appendix A.

(8) Termination of Employment Examination:

(A) At termination of employment, the employer shall provide a medical examination in accordance with subsection (1)(4)(B), including a chest X-ray where necessary, to any employee to whom at any prior time the employer was required to provide medical surveillance under subsections (1)(1)(A) or (1)(7). However, if the last examination satisfied the requirements of subsection (1)(4)(B) of this standard and was less than six months prior to the date of termination, no further examination is required unless otherwise specified in subsections (1)(3) or (1)(5);

(B) In addition, if the employer has discontinued all periodic medical surveillance under (1)(4)(E), no termination of employment medical examination is required.

(9) Information Provided to the Physician:

The employer shall provide the following information to the examining physician:

(A) A copy of this standard and appendices;

(B) A description of the affected employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to cadmium;

(C) The employee's former, current, and anticipated future levels of occupational exposure to cadmium;

(D) A description of any personal protective equipment, including respirators, used or to be used by the employee, including when and for how long the employee has used that equipment; and

(E) Relevant results of previous biological monitoring and medical examinations.

(10) Physician's Written Medical Opinion:

(A) The employer shall promptly obtain a written, signed medical opinion from the examining physician for each medical examination performed on each employee. This written opinion shall contain:

1. The physician's diagnosis for the employee;
2. The physician's opinion as to whether the employee has any detected medical condition(s) that would place the employee at increased risk of material impairment to health from further exposure to cadmium, including any indications of potential cadmium toxicity;
3. The results of any biological or other testing or related evaluations that directly assess the employee's absorption of cadmium;
4. Any recommended removal from, or limitation on the activities or duties of the employee or on the employee's use of personal protective equipment, such as respirators;
5. A statement that the physician has clearly and carefully explained to the employee the results of the medical examination, including all biological monitoring results and any medical conditions related to cadmium exposure that require further evaluation or treatment, and any limitation on the employee's diet or use of medications.

(B) The employer shall promptly obtain a copy of the results of any biological monitoring provided by an employer to an employee independently of a medical examination under subsections (1)(2) and (1)(4), and, in lieu of a written medical opinion, an explanation sheet explaining those results.

(C) The employer shall instruct the physician not to reveal orally or in the written medical opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to cadmium.

(11) Medical Removal Protection (MRP):

(A) General.

1. The employer shall temporarily remove an employee from work where there is excess exposure to cadmium on each occasion that medical removal is required under subsections (1)(3), (1)(4), or (1)(6) and on each occasion that a physician determines in a written medical opinion that the employee should be removed from such exposure. The physician's determination may be based on biological monitoring results, inability to wear a respirator, evidence of illness, other signs or symptoms of cadmium-related dysfunction or disease, or any other reason deemed medically sufficient by the physician.
2. The employer shall medically remove an employee in accordance with subsection (1)(11) regardless of whether at the time of removal a job is available into which the removed employee may be transferred.
3. Whenever an employee is medically removed under subsection (1)(11), the employer shall transfer the removed employee to a job where the exposure to cadmium is within the permissible levels specified in that subsection as soon as one becomes available.

4. For any employee who is medically removed under the provisions of subsection (1)(11)(A), the employer shall provide follow-up medical examinations semi-annually until, in a written medical opinion, the examining physician determines that either the employee may be returned to his/her former job status or the employee must be permanently removed from excess cadmium exposure.

5. The employer may not return an employee who has been medically removed for any reason to his/her former job status until a physician determines in a written medical opinion that continued medical removal is no longer necessary to protect the employee's health.

(B) Where an employee is found unfit to wear a respirator under subsection (1)(6)(B), the employer shall remove the employee from work where exposure to cadmium is above the PEL.

(C) Where removal is based upon any reason other than the employee's inability to wear a respirator, the employer shall remove the employee from work where exposure to cadmium is at or above the action level.

(D) Except as specified in subsection (1)(11)(E), no employee who was removed because his/her level of CdU, CdB and/or  $\beta_2$ -M exceeded the trigger levels in subsections (1)(3) or (1)(4) may be returned to work with exposure to cadmium at or above the action level until the employee's levels of CdU fall to or below  $3\mu\text{g/g Cr}$ , CdB fall to or below  $5\text{mg/lwb}$ , and  $\beta_2$ -M fall to or below  $300\mu\text{ g/g Cr}$ .

(E) However, when in the examining physician's opinion continued exposure to cadmium will not pose an increased risk to the employee's health and there are special circumstances that make continued medical removal an inappropriate remedy, the physician shall fully discuss these matters with the employee, and then in a written determination may return a worker to his/her former job status despite what would otherwise be unacceptably high biological monitoring results. Thereafter and until such time as the employee's biological monitoring results have decreased to levels where he/she could have been returned to his/her former job status, the returned employee shall continue medical surveillance as if he/she were still on medical removal. Until such time, the employee is no longer subject to mandatory medical removal. Subsequent questions regarding the employee's medical removal shall be decided solely by a final medical determination.

(F) Where an employer, although not required by this section to do so, removes an employee from exposure to cadmium or otherwise places limitations on an employee due to the effects of cadmium exposure on the employee's medical condition, the employer shall provide the same medical removal protection benefits to that employee under subsection (1)(12) as would have been provided had the removal been required under subsection (1)(11).

#### (12) Medical Removal Protection Benefits.

(A) The employer shall provide medical removal protection benefits to an employee for up to a maximum of 18 months each time, and while the employee is temporarily medically removed under subsection (1)(11).

(B) For purposes of this section, the requirement that the employer provide medical removal protection benefits means that the employer shall maintain the total normal earnings, seniority, and all other employee rights and benefits of the removed employee, including the employee's right to his/her former job status, as if the employee had not been removed from the employee's job or otherwise medically limited.

(C) Where, after 18 months on medical removal because of elevated biological monitoring results, the employee's monitoring results have not declined to a low enough level to permit the employee to be returned to his/her former job status:

1. the employer shall make available to the employee a medical examination pursuant to this section in order to obtain a final medical determination as to whether the employee may be

returned to his/her former job status or must be permanently removed from excess cadmium exposure; and

2. the employer shall assure that the final medical determination indicates whether the employee may be returned to his/her former job status and what steps, if any, should be taken to protect the employee's health;

(D) The employer may condition the provision of medical removal protection benefits upon the employee's participation in medical surveillance provided in accordance with this section.

(13) Multiple Physician Review.

(A) If the employer selects the initial physician to conduct any medical examination or consultation provided to an employee under this section, the employee may designate a second physician to:

1. Review any findings, determinations, or recommendations of the initial physician; and
2. Conduct such examinations, consultations, and laboratory tests as the second physician deems necessary to facilitate this review.

(B) The employer shall promptly notify an employee of the right to seek a second medical opinion after each occasion that an initial physician provided by the employer conducts a medical examination or consultation pursuant to this section. The employer may condition its participation in, and payment for, multiple physician review upon the employee doing the following within fifteen (15) days after receipt of this notice, or receipt of the initial physician's written opinion, whichever is later:

1. Informing the employer that he or she intends to seek a medical opinion; and
2. Initiating steps to make an appointment with a second physician.

(C) If the findings, determinations, or recommendations of the second physician differ from those of the initial physician, then the employer and the employee shall assure that efforts are made for the two physicians to resolve any disagreement.

(D) If the two physicians have been unable to quickly resolve their disagreement, then the employer and the employee, through their respective physicians, shall designate a third physician to:

1. Review any findings, determinations, or recommendations of the other two physicians; and
2. Conduct such examinations, consultations, laboratory tests, and discussions with the other two physicians as the third physician deems necessary to resolve the disagreement among them.

(E) The employer shall act consistently with the findings, determinations, and recommendations of the third physician, unless the employer and the employee reach an agreement that is consistent with the recommendations of at least one of the other two physicians.

(14) Alternate Physician Determination.

The employer and an employee or designated employee representative may agree upon the use of any alternate form of physician determination in lieu of the multiple physician review provided by subsection (1)(13), so long as the alternative is expeditious and at least as protective of the employee.

(15) Information the Employer Must Provide the Employee.

(A) The employer shall provide a copy of the physician's written medical opinion to the examined employee within five working days after receipt thereof.

(B) The employer shall provide the employee with a copy of the employee's biological monitoring results and an explanation sheet explaining the results within five working days after receipt thereof.

(C) Within 30 days after a request by an employee, the employer shall provide the employee with the information the employer is required to provide the examining physician under subsection (l)(9).

(16) Reporting.

In addition to other medical events that are required to be reported on the Cal/OSHA Form No. 200, the employer shall report any abnormal condition or disorder caused by occupational exposure to cadmium associated with employment as specified in Title 8, Section 14301.

(m) Communication of Cadmium Hazards to Employees.

(1) Hazard communication. The employer shall include cadmium in the program established to comply with the Hazard Communication Standard (HCS) (Section 5194). The employer shall ensure that each employee has access to labels on containers of cadmium and safety data sheets, and is trained in accordance with the provisions of HCS and subsection (m)(4) of this section. The employer shall provide information on at least the following hazards: Cancer; lung effects; kidney effects; and acute toxicity effects.

(2) Warning Signs.

(A) Warning signs shall be provided and displayed in regulated areas. In addition, warning signs shall be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.

(B) Warning signs required by subsection (m)(2)(A) shall bear the following legend:

DANGER  
CADMIUM  
MAY CAUSE CANCER  
CAUSES DAMAGE TO LUNGS AND KIDNEYS  
WEAR RESPIRATORY PROTECTION IN THIS AREA  
AUTHORIZED PERSONNEL ONLY

(C) The employer shall ensure that signs required by this subsection (m)(2) are illuminated, cleaned, and maintained as necessary so that the legend is readily visible.

(D) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in subsection (m)(2)(B) of this section:

DANGER  
CADMIUM  
CANCER HAZARD

CAN CAUSE LUNG AND KIDNEY DISEASE

AUTHORIZED PERSONNEL ONLY

RESPIRATORS REQUIRED IN THIS AREA

(3) Warning Labels.

(A) Shipping and storage containers containing cadmium or cadmium compounds shall bear appropriate warning labels, as specified in subsection (m)(1).

(B) The warning labels for containers of cadmium-contaminated protective clothing, equipment, waste, scrap, or debris shall include at least the following information:

DANGER

CONTAINS CADMIUM

MAY CAUSE CANCER

CAUSES DAMAGE TO LUNGS AND KIDNEYS

AVOID CREATING DUST

(C) Where feasible, installed cadmium products shall have a visible label or other indication that cadmium is present.

(D) Prior to June 1, 2015, employers may include the following information on shipping and storage containers containing cadmium, cadmium compounds, or cadmium-contaminated clothing, equipment, waste, scrap, or debris in lieu of the labeling requirements specified in subsections (m)(3)(A) and (m)(3)(B) of this section:

DANGER

CONTAINS CADMIUM

CANCER HAZARD

AVOID CREATING DUST

CAN CAUSE LUNG AND KIDNEY DISEASE

(4) Employee Information and Training.

(A) The employer shall institute a training program for all employees who are potentially exposed to cadmium, assure employee participation in the program, and maintain a record of the contents of such program.

(B) Training shall be provided prior to or at the time of initial assignment to a job involving potential exposure to cadmium and at least annually thereafter.

(C) The employer shall make the training program understandable to the employee and shall assure that each employee is informed of the following:

1. The health hazards associated with cadmium exposure, with special attention to the information incorporated in Appendix A;

2. The quantity, location, manner of use, release, and storage of cadmium in the workplace and the specific nature of operations that could result in exposure to cadmium, especially exposures above the PEL;
3. The engineering controls and work practices associated with the employee's job assignment;
4. The measures employees can take to protect themselves from exposure to cadmium, including modification of such habits as smoking and personal hygiene, and specific procedures the employer has implemented to protect employees from exposure to cadmium such as appropriate work practices, emergency procedures, and the provision of personal protective equipment;
5. The purpose, proper selection, fitting, proper use, and limitations of respirators and protective clothing;
6. The purpose and a description of the medical surveillance program required by subsection (l);
7. The contents of this section and its appendices, and,
8. The employee's rights of access to records under section 3204(e) and (g).

(D) Additional access to information and training program and materials.

1. The employer shall make a copy of this section and its appendices readily available to all affected employees and shall provide a copy without cost if requested.
2. Upon request, the employer shall provide to the Chief or NIOSH all materials relating to the employee information and the training program.

(5) Multi-employer Workplace.

In a multi-employer workplace, an employer who produces, uses, or stores cadmium in a manner that may expose employees of other employers to cadmium shall notify those employers of the potential hazard in accordance with subsection (e) of the hazard communication standard, section 5194.

(n) Recordkeeping.

(1) Exposure Monitoring.

(A) The employer shall establish and keep an accurate record of all air monitoring for cadmium in the workplace.

(B) This record shall include at least the following information:

1. The monitoring date, shift, duration, air volume, and results in terms of an 8-hour TWA of each sample taken, and if cadmium is not detected, the detection level;
2. The name, social security number, and job classification of all employees monitored and of all other employees whose exposures the monitoring result is intended to represent, including, where applicable, a description of how it was determined that the employee's monitoring result could be taken to represent other employee's exposures;
3. A description of the sampling and analytical methods used and evidence of their accuracy;

4. The type of respiratory protective device, if any, worn by the monitored employee and by any other employee whose exposure the monitoring result is intended to represent;
5. A notation of any other conditions that might have affected the monitoring results.
6. Any exposure monitoring or objective data that were used and the levels.

(C) The employer shall maintain this record for at least thirty (30) years, in accordance with section 3204.

(D) The employer shall also provide a copy of the results of an employee's air monitoring prescribed in subsection (d) of this standard to an industry trade association and to the employee's union, if any, or, if either of such associations or unions do not exist, to another comparable organization that is competent to maintain such records and is reasonably accessible to employers and employees in the industry.

(2) Objective Data for Exemption from Requirement for Initial Monitoring.

(A) For purposes of this section, objective data are information demonstrating that a particular product or material containing cadmium or a specific process, operation, or activity involving cadmium cannot release dust or fumes in concentrations at or above the action level even under the worst-case release conditions. Objective data can be obtained from an industry-wide study or from laboratory product test results from manufacturers of cadmium-containing products or materials. The data the employer uses from an industry-wide survey must be obtained under workplace conditions closely resembling the processes, types of material, control methods, work practices and environmental conditions in the employer's current operations.

(B) The employer shall maintain the record for at least 30 years of the objective data relied upon.

(3) Medical Surveillance.

(A) The employer shall establish and maintain an accurate record for each employee covered by medical surveillance under subsection (l)(1)(A).

(B) The record shall include at least the following information about the employee:

1. Name, social security number, and description of duties;
2. A copy of the physician's written opinions and of the explanation sheets for biological monitoring results;
3. A copy of the medical history, and the results of any physical examination and all test results that are required to be provided by this section, including biological tests, X-rays, pulmonary function tests, etc., or that have been obtained to further evaluate any condition that might be related to cadmium exposure;
4. The employee's medical symptoms that might be related to exposure to cadmium; and
5. A copy of the information provided to the physician as required by subsection (l)(9).

(C) The employer shall assure that this record is maintained for the duration of employment plus thirty (30) years, in accordance with section 3204.

(D) At the employee's request, the employer shall promptly provide a copy of the employee's medical record, or update as appropriate, to a medical doctor or a union specified by the employee.

(4) Training.

The employer shall certify that employees have been trained by preparing a certification record which includes the identity of the person trained, the signature of the employer or the person who conducted the training, and the date the training was completed. The certification records shall be prepared at the completion of training and shall be maintained on file for one (1) year beyond the date of training of that employee.

(5) Availability.

(A) Except as otherwise provided for in this section, access to all records required to be maintained by subsections (n)(1)-(4) shall be in accordance with the provisions of section 3204.

(B) Within 15 days after a request, the employer shall make an employee's medical records required to be kept by subsection (n)(3) available for examination and copying to the subject employee, to designated representatives, to anyone having the specific written consent of the subject employee, and after the employee's death or incapacitation, to the employee's family members.

(6) Transfer of Records.

Whenever an employer ceases to do business and there is no successor employer or designated organization to receive and retain records for the prescribed period, the employer shall comply with the requirements concerning transfer of records set forth in section 3204 (h).

(o) Observation of Monitoring.

(1) Employee Observation.

The employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to cadmium.

(2) Observation Procedures.

When observation of monitoring requires entry into an area where the use of protective clothing or equipment is required, the employer shall provide the observer with that clothing and equipment and shall assure that the observer uses such clothing and equipment and complies with all other applicable safety and health procedures.

(p) Reporting requirements. See section 5203.

(q) Dates.

(1) Effective Date.

This section shall become effective on June 14, 1993.

(2) Start-up Dates.

All obligations of this section commence on the effective date except as follows:

(A) Exposure monitoring. Except for small businesses [nineteen (19) or fewer employees], initial monitoring required by subsection (d)(2) shall be completed as soon as possible and in any event no later than 60 days after the effective date of this standard. For small businesses, initial monitoring required by subsection (d)(2) shall be completed as soon as possible and in any event no later than 120 days after the effective date of this standard.

(B) The permissible exposure limit (PEL). Except for small businesses, as defined under subsection (q)(2)(A) above, the employer shall comply with the PEL established by subsection (c) as soon as possible and in any event no later than 90 days after the effective date. For small businesses, the employer shall comply with the PEL established by subsection (c) as soon as possible and in any event no later than 150 days after the effective date of this section.

(C) Regulated areas. Except for small businesses, as defined under subsection (q)(2)(A) above, regulated areas required to be established by subsection (e) shall be set up as soon as possible after the results of exposure monitoring are known and in any event no later than 90 days after the effective date of this section. For small businesses, regulated areas required to be established by subsection (e) shall be set up as soon as possible after the results of exposure monitoring are known and in any event no later than 150 days after the effective date of this section.

(D) Respiratory protection. Except for small businesses, as defined under subsection (q)(2)(A) above, respiratory protection required by subsection (g) shall be provided as soon as possible and in any event no later than 90 days after the effective date of this section. For small businesses, respiratory protection required by subsection (g) shall be provided as soon as possible and in any event no later than 150 days after the effective date of this section.

(E) Compliance program. Except for small businesses, as defined under subsection (q)(2)(A) above, written compliance programs required by subsection (f)(2) shall be completed and available as soon as possible and in any event no later than 90 days after the effective date of this section. For small businesses, written compliance programs required by subsection (f)(2) shall be completed and available as soon as possible and in any event no later than 180 days after the effective date of this section.

(F) Methods of compliance. Except for small businesses, as defined under subsection (q)(2)(A) above, the engineering controls required by subsection (f)(1) shall be implemented as soon as possible and in any event no later than 120 days after the effective date of this section. For small businesses, the engineering controls required by subsection (f)(1) shall be implemented as soon as possible and in any event no later than 240 days after the effective date of this section. Work practice controls shall be implemented as soon as possible. Work practice controls that are directly related to engineering controls to be implemented shall be implemented as soon as possible after such engineering controls are implemented.

(G) Hygiene and lunchroom facilities. Except for small businesses, as defined under subsection (q)(2)(A) above, handwashing facilities, showers, change rooms and eating facilities required by subsection (j), whether permanent or temporary, shall be provided as soon as possible and in any event no later than 60 days after the effective date of this section. For small businesses, handwashing facilities, showers, change rooms and eating facilities required by subsection (j), whether permanent or temporary, shall be provided as soon as possible and in any event no later than 120 days after the effective date of this section.

(H) Employee information and training. Except for small businesses, as defined under subsection (q)(2)(A) above, employee information and training required by subsection (m)(4) of this standard shall be provided as soon as possible and in any event no later than 90 days after the effective date of this standard. For small businesses, employee information and training required by subsection (m)(4) of this standard shall be provided as soon as possible and in any event no later than 180 days after the effective date of this standard.

(I) Medical surveillance. Except for small businesses, as defined under subsection (q)(2)(A) above, initial medical examinations required by subsection (l) of this standard shall be provided as soon as possible and in any event no later than 90 days after the effective date of this standard. For small businesses, initial medical examinations required by subsection (l) of this standard shall be provided as soon as possible and in any event no later than 180 days after the effective date of this standard.

(r) Appendices.

(1) Appendix C to this section is incorporated as part of this section, and compliance with its contents is mandatory.

(2) Except where portions of appendices A, B, D, E, and F to this section are expressly incorporated in requirements of this section, these appendices are purely informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

Note: Authority cited: Sections 142.3, 9020, 9030 and 9040, Labor Code. Reference: Sections 142.3, 9004(d), 9009, 9020, 9030, 9031 and 9040, Labor Code.

## HISTORY

1. Repealer and new section filed 4-30-93; operative 6-14-93 (Register 93, No. 18). For prior history, see Register 84, No. 50.
2. Editorial correction of printing error in subsection (b) (Register 93, No. 22).
3. Change without regulatory effect, repealing appendices A-D and adding internal cross-references, and amending internal cross-references for appendices E-F, filed 9-30-96 pursuant to section 100, title 1, California Code of Regulations (Register 96, No. 40).
4. Amendment of subsections (a)(6), (f)(5)(A), (g)(2)(A) (Table 1), (l)(1)(A)1., (l)(3)(A)2., (l)(4)(D)-(l)(4)(D)2., (l)(6)(D), (l)(8)(B) and (m)(4)(C)8. and amendment of Note filed 1-2-97; operative 1-2-97 pursuant to Government Code section 11343.4(d). Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(3) (Register 97, No. 1).
5. Amendment of former subsections (g)(1)-(g)(4)(E) including subsection renumbering and relettering resulting in newly designated subsections (g)(1)-(g)(3)(B)2., and amendment of editorial reference following appendix C heading filed 8-25-98; operative 11-23-98 (Register 98, No. 35).
6. Amendment of subsection (p) and repealer of subsections (p)(1)-(4) filed 7-6-99; operative 8-5-99 (Register 99, No. 28).
7. Amendment of subsection (g) and (g)(2)(A) filed 7-31-2003; operative 8-30-2003 (Register 2003, No. 31).
8. Amendment of subsections (g)(3)(A) and new subsections (g)(3)(C)-(D) filed 3-6-2007; operative 3-6-2007. Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(3) (Register 2007, No. 10).
9. Amendment of subsections (i)(2)(D) and (k)(7), repealer and new subsection (m)(1), amendment of subsection (m)(2)(B), repealer and new subsection (m)(2)(C), new subsection (m)(2)(D), amendment of subsections (m)(3)(A)-(B), repealer and new subsection (m)(3)(C) and new subsection (m)(3)(D) filed 5-6-2013; operative 5-6-2013 pursuant to Labor Code section 142.3(a)(4)(C). Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(4) (Register 2013, No. 19).
10. Amendment of subsections (i)(2)(D) and (k)(7), repealer and new subsection (m)(1), amendment of subsection (m)(2)(B), repealer and new subsection (m)(2)(C), new subsection (m)(2)(D), amendment of subsections (m)(3)(A)-(B), repealer and new subsection (m)(3)(C) and new subsection (m)(3)(D) refiled 11-6-2013; operative 11-6-2013 pursuant to Labor Code section 142.3(a)(4)(C). Submitted to OAL for printing only pursuant to Labor Code section 142.3(a)(4) (Register 2013, No. 45).
11. Repealer of 11-6-2013 order by operation of law 5-6-2014 pursuant to Labor Code 142.3 (Register 2014, No. 19).
12. Amendment of subsections (d)(1)(A), (i)(2)(D) and (k)(7), repealer and new subsection (m)(1), amendment of subsection (m)(2)(B), repealer and new subsection (m)(2)(C), new subsection (m)(2)(D), amendment of

subsections (m)(3)(A)-(B), repealer and new subsection (m)(3)(C) and new subsection (m)(3)(D) filed 5-5-2014; operative 5-6-2014 pursuant to Government Code section 11343.4(b)(3) (Register 2014, No. 19).

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