Shipyard Industry

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA 2268
1998 (Revised)

The informational booklet is intended to provide a generic, nonexhaustive overview of a particular standards-related topic. This publication does not itself alter or determine compliance responsibilities, which are set forth in OSHA standards themselves, and the *Occupational Safety and Health Act*. Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements, the reader should consult current administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the courts.

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Shipyard Industry

U.S. Department of Labor
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Occupational Safety and Health Administration
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Authority: Sec. 41, 44 Stat. 1444; sec 1, 72 Stat. 835; 33 U.S.C. 941; secs. 6 and 8, 84 Stat 1593, 1599, 1600; 29 U.S.C. 655, 657.

Foreword

This booklet contains all the safety and health standards specific to the Shipyard Industry contained in *Title 29 Code of Federal Regulations (CFR) Part 1915*, as of July 1, 1994. Also included are brief discussions on the following:

1. The importance of regular employee training to establish and reinforce employee awareness in the areas of job safety and health.

2. The elements of a safety and health program that can be used by employers to develop effective programs at their worksites.

A brief description of the OSHA onsite consultation program available to employers is also included at the end of this publication.

Hazards not covered by Shipyard Industry standards may be covered by General Industry standards contained in 29 CFR Part 1910 (OSHA Subscription Service, Volume 1). Where a hazard is covered by both the Shipyard Industry standards and the General Industry standards, only the Shipyard Industry standard will be cited by OSHA inspectors (described in more detail in 29 CFR 1910.5).

In addition, OSHA regulations regarding general agency practices and procedures are applicable to shipyard employment. Particular attention is directed to the provisions of 29 CFR Part 1904, Recording and Reporting Occupational Injuries and Illnesses.

There are no geographical limitations to the maritime jurisdiction on shore other than the limitations of the *Occupational Safety and Health Act* itself. Employees of employers performing maritime activities on the shore, pier, terminal, yard, shipyard, machine shop, riverbank, etc., as well as on the vessels afloat or in drydocks or graving docks, are now covered by the Shipyard standards.

States administering their own occupational safety and health program through plans approved under Section 18(b) of the *Occupational Safety and Health Act of 1970* must adopt standards and enforce requirements that are at least as effective as Federal requirements. There are currently 25 States and territories with approved State plans: 23 covering private and public sectors and 2 covering State and local government employees only (see list of States at the end of this booklet).

Maritime Coverage Under State Plans

Most states with federally approved safety and health plans have chosen not to extend their coverage to maritime employment. In those jurisdictions, only state and local government maritime workers are covered. Federal OSHA retains responsibility for all other maritime coverage. A few state plans—California, Minnesota, Oregon, Vermont, and Washington—include some coverage for private sector onshore maritime workers. For a more detailed summary of maritime coverage under particular state plans, see also *Title 29 Code of Federal Regulations*, Part 1952. These regulations and other OSHA information are also available online at www.osha.gov.

Guidelines for Workplace Safety and Health Programs in the Shipyard Industry

Data and studies show that effective management of workplace safety and health can substantially reduce worker deaths, injuries, and illnesses and the costs associated with them. In response, many states have regulations and guidelines on workplace safety and health programs (SHPS). Occupational safety and health organizations and professionals as well as insurance companies also have programs. These programs are called accident prevention programs, injury and illness and prevention programs, and total quality management programs.

This section contains guidelines for establishing an effective program for managing workplace safety and health in the shipyard industry. The Maritime Advisory Committee for Occupational Safety and Health (MACOSH) for both shipyards (SIC 3731) and boatyards (SIC 3732) developed the guidelines. According to MACOSH, all workplaces in the shipyard industry should have a safety and health program regardless of whether the workplace is large or small or whether the hazards are many or few.

These guidelines for establishing an effective program for managing workplace safety and health apply to shipyards and boatyards.

Basic Elements

The following basic elements are essential for an effective workplace safety and health program:

- Management Commitment and Leadership
- Employee Participation
- Hazard Identification, Assessment and Control
- Accident and Incident Investigation
- Training
- Program Evaluation
- Recordkeeping
- Procedures for Multi-Employer Workplaces

A review of SHPs that have been shown to be effective in reducing workplace injuries and illnesses indicates that the basic elements listed are present in some form. The elements are flexible and performance-based so that they can be adapted to the workplace size, conditions, and the nature of the hazards present. Each element is discussed below.

Management Commitment

The employer needs to demonstrate commitment to the workplace safety and health program. There are basic ways in which the employer can show commitment:

- Establish a workplace policy on safety and health,
- Define the responsibilities of supervisory and nonsupervisory employees for managing safety and health at the workplace, and
- Provide appropriate authority and adequate resources to develop and carry out the program.

Management commitment and leadership are widely accepted as preconditions for an effective SHP. An effective SHP is driven from the highest levels of the organization through to front line employees. Such leadership provides the motivating force and sets the tone for the entire program. Only management can assert and continually reaffirm that worker protection is a fundamental value of the organization, on par with other organizational functions such as production. Likewise, only management can assure that the SHP program is integrated into the management structure and fabric of the company. And only management can assure that organizational resources are properly directed to activities that support the SHP.

To demonstrate management commitment, the employer should clearly state a workplace policy on the prevention and control of workplace hazards. Typically, such policies set forth the employer's goals for the SHP, pledge to give the SHP priority with other business goals and activities and establish expectations of managers, supervisors, employees and other persons in working toward the goals of the program.

Some specific ways in which management leadership and commitment to the SHP can be demonstrated are listed below. In small workplaces, employers may carry out these program responsibilities themselves instead of delegating them to other persons in the workplace.

- Endorsement of the SHP and workplace policy at the very highest levels of management,
- Clear assignment of responsibilities for the SHP,
- Provision of authority and adequate monetary and non-monetary resources to develop, implement and maintain the SHP. Resources include training, equipment and release time to perform their safety and health duties,

- Establishing accountability for safety and health. For example, effective management of workplace safety and health can be made part of job performance reviews,
- Regular communication with employees (supervisory, non-supervisory, contract and temporary) about the SHP and workplace safety and health issues. Forms of communication include individual discussions with employees, posted information, distribution of written materials, and "tool box" meetings, and
- Prompt responses to employee reports and recommendations about safety and health.

Employee Participation

The employer needs to provide opportunities for employees to participate in establishing, implementing, and evaluating the SHP. To be effective an SHP needs the involvement of all persons in the shipyard — managers, ship superintendents, foremen, crane operators, shipfitters, welders, engineers, maintenance, procurement, health care, and human resource personnel. Employee participation from throughout the workplace is important because often the successful identification, prevention and control of hazards requires a response that cuts across organizational units within a business. Employees should be encouraged to participate in all aspects of the SHP, from developing and planning to implementing and evaluating the program. One of the fundamental aspects of employee participation is establishing a way for employees to make reports. Employees need to feel free to and be encouraged to report work-related injuries, illnesses and hazards as well as make recommendations about appropriate ways to address hazards. Prompt responses to such reports is an essential way employers can show that employee input is desired.

There are many different forms that employee participation can take. Employee participation can be **individual** and **direct** such as employee interviews or surveys. At small workplaces, for example, employee involvement may be accomplished by the employer talking to workers during the course of a workplace walkthrough. Other methods of achieving this goal, particularly in small and medium-sized workplaces, include establishing safety stewards, holding frequent safety meetings, and using an employee suggestion system.

In larger businesses, **joint labor-management safety and health committees** are a commonly-used method with employee representatives selected by the union or elected by employees. The size and make-up of the committee is likely to vary depending on the size of the workplace and the nature of the operations and hazards present.

For example, at many unionized workplaces, employee safety committees work independent of management on various tasks. At other unionized workplaces, nonsupervisory employees participate with management on a central workplace safety and health committee. In addition, at some workplaces employee or joint committees are used for specific purposes, such as inspecting the workplace for hazards, investigating accidents and incidents, and training employees.

Whether the workplace is unionized or not, successful employee participation relies on two things: knowledge and respect. Persons who participate in the program or have workplace safety and health responsibilities need training so they are able to carry out their responsibilities successfully. With regard to respect, at unionized workplaces, it is respect between representatives of organizations. At non-union workplaces, it is respect among individuals.

Large Shipyard

Typically, large shipyards are unionized and tend to use a joint labor-management committee. Management and labor are equally represented on the committee. Usually, the position of committee chair alternates between employee and management representatives. The powers and functions of the committee are established through negotiation. Although the tasks of the committee depend upon the outcome of these negotiations, these committees typically:

- Review and analyze injury and illness records,
- Conduct periodic workplace inspections,
- Conduct job safety/hazard analyses,
- Conduct accident and incident investigations,
- Respond to reports of workplace safety and health problems,
- Develop safe work procedures,
- Evaluate safety and health training activities, and
- Evaluate safety and health programs, including the activities and materials.

Medium Shipyard/Large Boatyard

Employee involvement at non-unionized workplaces is likely to be achieved differently from unionized workplaces. In these workplaces employee participation may be less formal than the committee structure. For example, employers may gather employee input through surveys, self audits of jobs, employee meetings, and a reporting and response system. To achieve effective participation in these workplaces, the employer will need to assure that their

participation is desired and will be taken seriously. This includes a strong workplace policy that protects employees from discrimination or retaliation when they get involved in safety and health activities. Employees can participate usefully in all facets of the SHP, including:

- Conducting workplace inspections,
- Conducting job analyses,
- Conducting accident investigations, and
- Training fellow workers.

Small Shipyard or Boatyard

In situations where the workforce is small (10 employees or less), at an isolated location (e.g., sea trials), or shipyard tasks are performed only periodically (e.g., "topside" repairs on a ship being unloaded at a marine terminal), employee involvement may be less formal. For example, employers may get employee input through direct communication about workplace safety and health concerns. "Tool box" and instructional meetings between employees and crew leaders is another way employers can get input from employees. Employee suggestion boxes are yet another way to get employee input. Even though the SHP may be more informal in small workplaces, employers still need to take steps to assure that employees are not inhibited from raising safety and health concerns.

Hazard Identification, Assessment, and Control

The employer's SHP needs to be effective in identifying, assessing, and controlling serious workplace hazards to which employees are reasonably likely to be exposed.

To identify such workplace hazards, the employer should periodically:

- Physically inspect the workplace,
- Review available safety and health information, and
- Evaluate the seriousness of identified hazards that are not covered by OSHA standards.

Once serious workplace hazards are identified and assessed, the employer needs to assure that they are controlled. The process of controlling hazards should include:

- Timely abatement of unsafe or unhealthy conditions,
- Interim worker protections where hazards cannot be abated immediately, and
- Monitoring progress toward complete abatement.

The core function of any workplace SHP is to "find and fix" hazards that endanger employees, and to implement systems that prevent hazards from recurring or being introduced into the workplace. This element of worker protection programs thus has the most immediate and direct effect on injury and illness prevention.

The hazard assessment and control process should address at least "serious hazards," workplace hazards that are causing or likely to cause death or serious physical harm to employees. This includes hazards covered by OSHA standards. This also includes all chemical, physical, biological, and ergonomic hazards not covered by OSHA standards that are causing or likely to cause death or serious physical injury or impairment.

Hazard assessment and control needs to be a "systematic process." A systematic process is one where the employer has established activities, procedures or practices to implement or support the basic element. In addition, it means that the program activities are both ongoing and conducted on some routine basis which is appropriate to the particular workplace or the conditions and hazards present.

There are many procedures employers can use to identify and evaluate serious workplace hazards. These include:

- Reviewing records of injuries and illnesses. A review of OSHA 200 logs can help employers learn what has caused problems in the past and how they can be avoided in the future. Small employers who are not required to keep OSHA 200 logs, should review worker compensation claims.

- Review other safety and health information. In addition to injury and illness records, the employer may have other information that indicates hazards may be present in the workplace. Such information may include reports from the employer's insurance company, "safety alerts" distributed by trade associations and other organizations of which the employer is a member, accident investigations, infirmary logs, and employee safety and health complaints.

- Conducting workplace walk-arounds. Looking at the workplace and recording conditions and actions that appear to be hazardous is another useful way to identify hazards. The walk-around should be from one end of the workplace to the other. In addition, following a process from its beginning to end can help an employer identify problems and conditions that warrant closer examination.

- Using checklists to inspect the workplace. Checklists can be developed based upon common hazards that have occurred or are known to be present in particular operations or processes. Employers also can use checklists developed by their insurance company or trade associations in which they are members.

- Performing job (or hazard) analyses. This process of breaking a job down into its component steps or work tasks, can help the employer pinpoint what factors may be contributing to the problem. By identifying hazards associated with specific tasks, the employer may be more successful in finding ways to eliminate or control the hazards.

- Investigating accidents. These investigations can reveal the chain of events or unsafe acts or conditions that led up to the accident.

The assessment and control of hazards are interrelated. Often the assessment process itself will reveal obvious workplace corrections that are needed. Once serious hazards have been identified and analyzed, the employer needs to control them. In workplaces where the hazard assessment indicates quite a few serious hazards are present or may take time to abate, the employer may need to prioritize their control. (Hazards that are the most serious or have already resulted in death, injury or illness should be addressed first.) In such cases, employers need to set timetables for abatement and carefully track their progress in meeting those goals. Employees should be allowed and encouraged to participate in this process.

The best way to control hazards is in the design phase where the employer can make changes that will prevent the hazard from ever being brought into the workplace. As such, the SHP should emphasize "proactive" safety and health. Engineers, maintenance and procurement personnel should be encouraged to work together and with suppliers and manufacturers to anticipate and solve problems at the earliest stages. Smaller businesses should be encouraged to use the resources of trade associations to find new equipment, materials, and processes that will not expose employees to serious hazards.

Where serious hazards are present in the workplace, the employer needs to implement feasible controls to eliminate and or reduce the workplace hazards. In controlling hazards, employers should follow the established hierarchy of controls. The hierarchy of controls is a widely-accepted, tiered intervention strategy for controlling workplace

hazards. The three tiers, in order of preferred control methods, are:

- Engineering and work practice controls. Engineering controls are physical changes to jobs that control exposure to hazards. They include changes to or redesign of workstations, equipment, materials, and processes. Work practices are safe work methods and correct operation of equipment.

- Administrative controls. Administrative controls are procedures and methods that significantly reduce daily exposure to hazards by altering the way in which work is performed. Administrative controls include job rotation, alternative tasks, redesign of work methods, and rest breaks.

- Personal protective equipment. PPE are devices worn or used while working to protect the employee from exposure to workplace hazards. PPE includes respirators, safety glasses or goggles, hearing protectors, gloves, and steel-tipped safety shoes.

Accident and Incident Investigation

The employer should promptly investigate workplace fatalities, injuries, illnesses, and potentially hazardous incidents ("near misses"). The Hazard Assessment and Control component of the SHP is primarily a proactive measure; that is, aggressive implementation of this element may mean that the employer is able to identify and control all workplace hazards before any employee has been injured or become ill. At the same time employers should investigate incidents in which an employee is injured, becomes ill, or narrowly escapes death or serious injury. (These incidents are often called "near misses.") Although such investigations are reactive ways to improve workplace safety and health, they are important enough to be considered a basic element of a SHP. This is especially true for smaller workplaces where there may not be significant injury and illness trend data to review. Investigations are warranted for serious incidents; that is, whenever an accident or incident has resulted in death or serious physical harm or created a substantial risk of such occurrence.

A careful and thorough analysis will identify conditions and actions that contributed to or led up to the incident. Once the causal factors are revealed, the employer can make the necessary corrections to prevent recurrence.The most successful investigations involve various persons in

the organizational structure. In smaller workplaces, supervisors and employees working in the job in question can provide valuable insight. In larger workplaces, safety and health specialists, specially trained employees and supervisors, members of safety and health committees, engineers, and maintenance are examples of persons who should be involved in evaluating accidents and "near misses." Regardless of the size of the workplace, the guiding principle is that investigations should be promptly performed and the findings should be accompanied by appropriate corrections and program changes in order to prevent a further occurrence.

Training

The employer needs to ensure that each employee who is exposed to a serious hazard is provided with effective training. In addition, the employer needs to ensure that all employees, both supervisory and nonsupervisory, who are responsible for the SHP are provided with training so they are able to carry out their responsibilities.

Employees who are exposed to serious hazards must be trained so that they are able to assist in protecting themselves and other employees. While many OSHA standards do set forth training requirements, it is important that employees who are exposed to serious hazards for which there are no standards or no training requirements are provided with training. This is not to suggest that a SHP should duplicate or substitute for current OSHA training requirements. Rather that SHP training is meant to generally educate employees about workplace hazard awareness and prevention.

Effective training is not "one size fits all." The ways and mechanisms employers use to provide training are likely to vary significantly depending on factors such as workplace size, the type of operations being performed, and the nature of the workplace hazards. Therefore, it's not feasible that general SHP guidelines should or could specify the number of hours, frequency or format training should take. In fact, elaborate or formal training programs solely related to safety and health may not always be required. Some employers may develop and provide their own training while other employers may rely on contractors or organizations to train their employees. Some employers may utilize formal classroom training every year while other employees rely on regular "tool box" meetings for safety and health information. Some employers may provide specific safety and health training while other employers integrate safety and health issues into other employee training

sessions. A key to effective training is integrating safety and health issues into all organizational activities. Safety and health training is often most effective when incorporated into other training such as training on job performance requirements and job practices.

While training needs to be appropriate to the safety and health conditions of the workplace, there are fundamental topics that safety and health training should cover:

- The nature of the hazards to which the employee is exposed and how to recognize them,
- What the employer is doing to control these hazards,
- Protective measures that the employee needs to follow to prevent or minimize exposure to these hazards,
- Procedures to be followed in an emergency,
- The employer's safety and health program, and
- The employee's role in that program, including opportunities to participate in it.

For training to be effective it needs to be provided in a manner that employees are able to understand. This means that the employer, in developing and providing training, needs to consider the educational levels, literacy and language skills of the employees. Training should also provide employees with an opportunity to ask questions and receive answers about safety and health issues.

Once an employer has established a SHP, employees should be trained. However, effective SHPs do not stop with initial training of current employees and as new employees are hired. Rather, SHPs should include continuing education on both a routine and as-needed basis. Also, training and training materials should be evaluated to ensure that they are effective in providing employees with information necessary to protect them from injury and illness.

In addition to general awareness training, it is important that both supervisory and non-supervisory employees who are responsible for the SHP receive sufficient training to enable them to carry out their program responsibilities. Such training should at least cover hazard identification methods, job analysis methods, control implementation and evaluation, and problem solving.

Program Evaluation

The employer needs to evaluate the SHP to ensure that it is effective in identifying and controlling serious hazards, and appropriate for workplace conditions. Where significant deficiencies are found, the program should be corrected or updated in a timely manner.

Every SHP needs to be evaluated periodically in order to ensure that it is effective in preventing and reducing workplace injuries and illnesses. While it is possible that the evaluation process is likely to differ among employers, the evaluation should demonstrate that specific consideration is given to the following:

- Assessing the need and appropriateness of existing goals and objectives; and
- Identifying areas where the program needs to be adjusted.

There are many different measures that employers can use to document program effectiveness. Some examples of commonly-used measures include:

- Analysis of injury and illness statistics. This could include analysis of company as well as industry-wide statistics on number of cases, incidence rates, and lost-workdays,
- Review of company safety committee reports and recommendations. This could include a review of the number of reports and response time,
- Analysis of insurance and workers' compensation data. This could include analysis of the number of claims, costs per claim, total medical costs, worker compensation experience modifiers, and insurance premiums,
- Analysis of productivity. This could include a review of total production outputs and reject rates.

Maintaining an effective SHP is an ongoing process. Therefore, the employer needs to evaluate the program periodically. The frequency of program evaluation is likely to vary based on factors such as workplace size and conditions. However, employers should at least evaluate the program shortly after controls are implemented and thereafter at some regular interval that is appropriate to the workplace. For many employers, program evaluation is normally conducted on an annual basis that is consistent with other aspects of the employer's overall management or fiscal plan. Where the evaluation reveals significant deficiencies or indicates improvements in worker safety and health are not occurring, it is important that the employer make necessary changes in the program to correct or update the problems.

Procedures for Multi-Employer Workplaces

At multi-employer workplaces, host and contract employers should exchange available information on workplace hazards, safety rules, and emergency procedures with any

other employer whose employees also may be exposed to those hazards. This exchange of information should address the reasonable allocation of workplace safety and health responsibilities among the employers.

Host employers (e.g., general contractors) should inform the contract employers (e.g., subcontractors) of any known safety and health hazards to which the contract employees may be exposed prior to starting any work. The host employer also should inform contract employers of applicable provisions of the host employer's SHP.

Contract employers should ensure that host employers are aware of hazards presented by contract work and how contract employers are addressing them. Contract employers also should instruct their employees about the hazards to which they may be exposed at the multi-employer workplace and the host employer's program for addressing those hazards.

In an increasing number of maritime workplaces, there are multiple employers. The presence of multiple employers introduces additional problems and complexities in the communication and coordination of worker safety and health. There needs to be two-way communication between host and contract employers as well as reasonable allocation of workplace safety and health responsibilities among these employers that takes account of this added complexity. Generally, the host employer is in the best position to ensure that communication and coordination of workplace safety and health is taking place. This is because the host employer often controls the means and methods of work. However, contract employers also have a role in workplace safety and health. Contract employers may also introduce hazards into the workplace that could endanger host employees. Also, contract employers may discover previously unidentified hazards. In such cases, it is important that the contract employer advise the host employer so no person at the workplace, regardless of which employer they work for, gets injured or becomes ill.

Recordkeeping

The employer should maintain records in order to be able to demonstrate the effectiveness of the SHP. Employers need to maintain enough records that will allow them to know what hazards need to be controlled and to evaluate the effectiveness of the SHP in reducing deaths, injuries and illnesses. For example, reviewing workplace injury experience over a period of time may reveal patterns of injury with common causes which can be addressed.

Using baseline data and yearly updates will also allow the employer to evaluate whether the program has been successful in addressing workplace hazards. Various factors determine what records an employer needs to maintain. More specifically, recordkeeping may be very informal or unnecessary for smaller workplaces or workplaces where very few hazards are present. For example, in a small workplace the employer's notes from a workplace "walk-around" may be the extent of the program records. On the other hand, larger workplaces or workplaces with safety and health committees may maintain detailed records on various aspects of the program such as inspection and accident investigation records and reports, job checklist and employee survey results, and even committee meetings. Examples of some records that employers typically maintain on workplace safety and health include:

- First reports of injury,
- OSHA 200 logs,
- Safety and health committee reports,
- Accident and "near miss" investigations, and
- Job/hazard analyses.

Subpart A—General Provisions

§1915.1—Purpose and Authority

The provisions in this part constitute safety and health regulations issued by the Secretary pursuant to section 41 of the Longshoremen's and Harbor Workers' Compensation Act, as amended (33 U.S.C. 941) and occupational safety and health standards issued by the Secretary pursuant to section 6 of the *Occupational Safety and Health Act of 1970* (29 U.S.C. 655).

§1915.2—Scope and Application

(a) Except where otherwise provided, the provisions of this part shall apply to all ship repairing, shipbuilding and shipbreaking employment and related employment.

(b) This part does not apply to matters under the control of the United States Coast Guard within the scope of Title 52 of the Revised Statutes and acts supplementary or amendatory thereto (46 U.S.C. secs. 1-1388 passim) including, but not restricted to, the master, ship's officer, crew members, design, construction and maintenance of the vessel, its gear and equipment; to matters within the regulatory authority of the United States Coast Guard to safeguard vessels, harbors, ports and waterfront facilities under the provisions of the Espionage Act of June 17 1917, as amended (50 U.S.C. 191 et seq.; 22 U.S.C. 401 et seq.); including the provisions of Executive Order 10173, as amended by Executive Orders 10277 and 10352 (3 CFR, 1949-1953 Comp., pp. 356, 778 and 873); or to matters within the regulatory authority of the United States Coast Guard with respect to lights, warning devices, safety equipment and other matters relating to the promotion of safety of lives and property under section 4(e) of the *Outer Continental Shelf Lands Act* (43 U.S.C. 1333).

§1915.3—Responsibility

(a) The responsibility for compliance with the regulations of this part is placed upon "employers" as defined in § 1915.4

(b) This part does not apply to owners, operators, agents or masters of vessels unless such persons are acting as "employers." However, this part is not intended to relieve owners, operators, agents or masters of vessels who are not "employers" from responsibilities or duties now placed upon them by law, regulation or custom.

(c) The responsibilities placed upon the competent person herein shall be deemed to be the responsibilities of the employer.

§ 1915.4—Definitions

(a) The term “shall” indicates provisions which are mandatory.

(b) The term “Secretary” means the Secretary of Labor.

(c) The term “employer” means an employer, any of whose employees are employed, in whole or in part, in ship repairing, shipbuilding, shipbreaking or related employments as defined in this section on the navigable waters of the United States, including dry docks, graving docks and marine railways.

(d) The term “employee” means any person engaged in ship repairing, shipbuilding, shipbreaking or related employments on the navigable waters of the United States, including dry docks, graving docks and marine railways, other than the master, ship’s officers, crew of the vessel, or any person engaged by the master to repair any vessel under 18 net tons.

(e) The term “gangway” means any ramp-like or stair-like means of access provided to enable personnel to board or leave a vessel including accommodation ladders, gangplanks and brows.

(f) The term “vessel” includes every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water, including special purpose floating structures not primarily designed for or used as a means of transportation on water.

(g) For purposes of § 1915.74, the term “barge” means an unpowered, flat bottom, shallow draft vessel including scows, carfloats and lighters. For purposes of this section the term does not include ship shaped or deep draft barges.

(h) For purposes of § 1915.74, the term “river tow boat” means a shallow draft, low free board, self-propelled vessel designed to tow river barges by pushing ahead. For purposes of this section, the term does not include other towing vessels.

(i) The term “shipyard employment” means ship repairing, shipbuilding, shipbreaking and related employments.

(j) The terms “ship repair” and “ship repairing” mean any repair of a vessel including, but not restricted to, alterations, conversions, installation, cleaning, painting, and maintenance work.

(k) The term “shipbuilding” means the construction of a vessel, including the installation of machinery and equipment.

(1) The term “shipbreaking” means any breaking down of a vessel’s structure for the purpose of scrapping the vessel, including the removal of gear. equipment or any component part of a vessel.

(m) The term “related employment” means any employment performed as an incident to or in conjunction with ship repairing, shipbuilding or shipbreaking work, including, but not restricted to, inspection, testing, and employment as a watchman.

(n) The term “hazardous substance” means a substance which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritant, or otherwise harmful is likely to cause injury.

(o) The term “competent person” for purposes of this part means a person who is capable of recognizing and evaluating employee exposure to hazardous substances or to other unsafe conditions and is capable of specifying the necessary protection and precautions to be taken to ensure the safety of employees as required by the particular regulation under the condition to which it applies. For the purposes of Subparts B, C, and D of this part, except for § 1915.35(b)(8) and § 1915.36(a)(5), to which the above definition applies, the competent person must also meet the additional requirements of § 1915.7.

(p) The term “confined space” means a compartment of small size and limited access such as a double bottom tank, cofferdam, or other space which by its small size and confined nature can readily create or aggravate a hazardous exposure.

(q) The term “enclosed space” means any space, other than a confined space, which is enclosed by bulkheads and overhead. It includes cargo holds, tanks, quarters, and machinery and boiler spaces.

(r) The term “hot work” means riveting, welding, burning or other fire or spark producing operations.

(s) The term “cold work” means any work which does not involve riveting, welding, burning or other fire or spark producing operations.

(t) The term “portable unfired pressure vessel” means any pressure container or vessel used aboard ship, other than the ship’s equipment, containing liquids or gases under pressure, excepting pressure vessels built to ICC regulations under 49 CFR Part 178, Subparts C and H.

(u) The term “powder actuated fastening tool” means a tool or machine which drives a stud, pin, or fastener by means of an explosive charge.

(v) For purposes of § 1915.97, the term “hazardous material” means a material which has one or more of the following characteristics: (1) Has a flash point below 140° F., closed cup, or is subject to spontaneous heating; (2) has a threshold limit value below 500 p.p.m. in the case of a gas or vapor, below 500 mg./m^3 for fumes, and below 25 m.p.p.c.f. in case of a dust; (3) has a single dose oral LD_{50} below 500 mg./kg.; (4) is subject to polymerization with the release of large amounts of energy; (5) is a strong oxidizing or reducing agent; (6) causes first degree burns to skin in short time exposure, or is systemically toxic by skin contact; or (7) in the course of normal operations, may produce dusts, gases, fumes, vapors, mists, or smokes which have one or more of the above characteristics.

§ 1915.5—Reference Specifications, Standards and Codes

Specifications, standards, and codes of agencies of the U.S. Government, to the extent specified in the text, form a part of the regulations of this part. In addition, under the authority vested in the Secretary under the Act, the specifications, standards, and codes of organizations which are not agencies of the U.S. Government, in effect on the date of the promulgation of the regulations of this part as listed below, to the extent specified in the text, form a part of the regulations of this part.

National Fire Protection Association, 60 Batterymarch Park, Quincy, Massachusetts 02269. Subpart B, § 1915.14(a).

Underwriter’s Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611, Subpart B, § 1915.13(b) and (f); Subpart C, §§ 1915.35(b)(7), 1915.36(a)(4); Subpart H, § 1915.132(a).

American National Standards Institute Safety Code for Portable Wood Ladders, A14.1-1959, American National Standards Institute, 11 West 42nd Street, New York, New York 10036, Subpart E. § 1915.72(a)(6).

American National Standards Institute Safety Code for Portable Metal Ladders, A14.2-1956, American National Standards Institute, 11 West 42nd Street, New York, New York 10036, Subpart E. § 1915.72(a)(4).

American National Standards Institute Safety Code for Head, Eye, and Respiratory Protection, Z2.1-1959, American National Standards Institute, 11 West 42nd Street, New York, New York 10036, Subpart 1, §§ 1915.151(a)(1). 1915.153(b).

American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section Vlll, Rules for Construction of Unfired Pressure Vessels, 1963, American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017. Subpart K, § 1915.172(a).

Threshold Limit Values, 1970, American Conference of Governmental Industrial Hygienists, 1014 Broadway, Cincinnati, Ohio 45202, Subpart B, § 1915.12(a)(3) and (b)(3); Subpart C, § 1915.32(b).

American National Standards Institute Safety Code for the Use, Care, and Protection of Abrasive Wheels, B7. 11964, United States of America Standards Institute, Inc., 11 West 42nd Street, New York, New York 10036, Subpart H, § 1915.134(c).

§1915.6—Commercial Diving Operations

Commercial diving operations shall be subject to Subpart T of Part 1910, §§ 1910.401-1910.441 of this chapter.

§1915.7 Competent person.

(a) Application. This section applies to shipyard employment.

(b) Designation. (1) One or more competent persons shall be designated by the employer in accordance with the applicable requirements of this section, unless the requirements of Subparts B, C, D and H of this part are always carried out by a Marine Chemist. *Exception:* The employer may designate any person who meets the applicable portions of the criteria set forth in paragraph (c) of this section as a competent person who is limited to performing testing to the following situations:

(i) Repair work on small craft in boat yards where only combustible gas indicator tests are required for fuel tank leaks or when using flammable paints below decks;

(ii) Building of wooden vessels where, only knowledge of the precautions to be taken when using-flammable paints is required;

(iii) The breaking of vessels where there is no fuel oil or other flammable hazard; and

(iv) Tests and inspections performed to comply with §§ 1915.35(b)(8) and 1915.36(a)(5).

(2)(i) The employer shall maintain either a roster of designated competent persons or a statement that a Marine Chemist will perform the tests or inspections which require a competent person.

(ii) The employer shall make the roster of designated persons or the statement available to employees, the employee's representative, the Director or the Assistant Secretary upon request.

(iii) The roster shall contain, as a minimum, the following:

(A) The employer's name,

(B) The designated competent person's name(s), and

(C) The date the employee was trained as a competent person.

(c) Criteria. The employer shall ensure that each designated competent person has the following skills and knowledge:

(1) Ability to understand and carry out written or oral information or instructions left by Marine Chemist, Coast Guard authorized persons and Certified Industrial Hygienists; and

(2) Knowledge of Subparts B, C, D, and H of this part;

(3) Knowledge of the structure, location, and designation of spaces where work is done;

(4) Ability to calibrate and use testing equipment including but not limited to: oxygen indicators, combustible gas indicators, carbon monoxide indicators, and

carbon dioxide indicators, and to interpret accurately the test results of that equipment;

(5) Ability to perform all required tests and inspections which are or may be performed by a, competent person as set forth in Subparts B, C, D, and H of this part.

(6) Ability to inspect, test, and evaluate spaces to determine the need for further testing by a Certified Industrial Hygienist; and

(7) Ability to maintain records required by this section.

(d) Recordkeeping. (1) When tests and inspections are performed by a competent person, Marine Chemist, or Certified Industrial Hygienist as required by any provisions of subparts B, C, D, or H of this part, the employer shall ensure that the person performing the test and inspection records the location of inspected spaces and the operations performed as well as the test results and any instructions.

(2) The employer shall ensure that the records are posted in the immediate vicinity of the affected operations while work in the spaces is in progress. The records shall be kept on file for a period of at least three months from the completion date of the specific job for which they were generated.

(3) The employer shall ensure that the records are available for inspection by the Assistant Secretary, Director, and employees and their representatives.

Subpart B—Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment

Appendix A to Subpart B — Compliance Assistance Guidelines for Confined and Enclosed Spaces Other Dangerous Atmospheres

Appendix B to Subpart B—Reprint of U.S. Coast Guard Regulations Referenced in Subpart, for Determination of Coast Guard Authorized Persons

§1915.11 Scope application and definitions applicable to this Subpart.

(a) Scope and application. This Subpart applies to work in confined and enclosed spaces and other dangerous atmospheres in shipyard employment including vessel sections and landside operations regardless of geographic locations.

(b) Definitions applicable to this subpart.

Adjacent spaces means those spaces bordering a subject space in all directions, including all points of contact, corners, diagonals, decks, tank tops, and bulkheads.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health or designated representative.

Certified Industrial Hygienist (CIH) means an industrial hygienist who is certified by the American Board of Industrial Hygiene.

Coast Guard authorized person means an individual who meets the requirements of Appendix B to subpart B of part 1915 for tank vessels, for passenger vessels, and for cargo and miscellaneous vessels.

Dangerous atmospheres means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (i.e. escape unaided from a confined or enclosed space), injury, or acute illness.

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

Enter with Restrictions denotes a space where entry for work is permitted only if engineering controls, personal protective equipment, clothing, and time limitations are as specified by the Marine Chemist, Certified Industrial Hygienist, or the shipyard competent person.

Entry means the action by which a person passes through an opening into a space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Hot work means any activity involving riveting, welding, burning, the use of powder-actuated tools or similar fire-producing operations. Grinding, drilling, abrasive blasting or similar spark-producing operations are also considered hot work except when such operations are isolated physically from any atmosphere containing more than 10 per cent of the lower explosive limit of a flammable or combustible substance.

Immediately dangerous to life or health (IDLH) means an atmosphere that poses an immediate threat to life or that is

likely to result in acute or immediate severe health effects.

Inert or inerted atmosphere means an atmospheric condition where:

(1) The oxygen content of the atmosphere in the space is maintained at a level equal to or less than 8.0 per cent by volume or at a level at or below 50 per cent of the amount required to support combustion, whichever is less, or

(2) The space is flooded with water and the vapor concentration of flammable or combustible materials in the free space atmosphere above the water line is less than 10 per cent of the lower explosive limit for the flammable or combustible material.

Labeled means identified with a sign, placard, or other form of written communication, including pictograms, that provide information on the status or condition of the work space to which it is attached.

Lower explosion limit (LEL) means the minimum concentration of vapor in air below which propagation of a flame does not occur in the presence of an ignition source.

Marine Chemist means an individual who possesses a current Marine Chemist Certificate issued by the National Fire Protection Association.

Not Safe for Hot Work denotes a space where hot work may not be performed because the conditions do not meet the criteria for Safe Hot Work.

Nationally Recognized Testing Laboratory (NRTL) means an organization recognized by OSHA in accordance with Appendix A of 29 CFR 1910.7 which tests for safety and lists or labels or accepts equipment and materials that meet all the criteria found in § 1910.7(b)(1) through (b)(4)(ii).

Not Safe for Workers denotes a space where an employee may not enter because the conditions do not meet the criteria for Safe for Workers.

Oxygen-deficient atmosphere means an atmosphere having an oxygen concentration of less than 19.5 percent by volume.

Oxygen-enriched atmosphere means an atmosphere that contains 22.0 percent or more oxygen by volume.

Safe for Hot Work denotes a space that meets all of the following criteria:

(1) The oxygen content of the atmosphere does not exceed 22.0 percent by volume;

(2) The concentration of flammable vapors in the atmosphere is less than 10 percent of the lower explosive limit;

(3) The residues or materials in the space are not capable of producing a higher concentration than permitted in paragraph (1) or (2) of the above, under existing atmospheric conditions in the presence of hot work and while maintained as directed by the Marine Chemist or competent person, and

(4) All adjacent spaces have been cleaned, or inerted, or treated sufficiently to prevent the spread of fire.

Safe for Workers denotes a space that meets the following criteria:

(1) The oxygen content of the atmosphere is at least 19.5 percent and below 22 percent by volume;

(2) The concentration of flammable vapors is below 10 per cent of the lower explosive limit (LEL);

(3) Any toxic materials in the atmosphere associated with cargo, fuel, tank coating, or inerting media are within permissible concentrations at the time of the inspection; and

(4) Any residues or materials associated with the work authorized by the Marine Chemist, Certified Industrial Hygienist, or competent person will not produce uncontrolled release of toxic materials under existing atmospheric conditions while maintained as directed.

Space means an area on a vessel or vessel section within a shipyard such as, but not limited to: cargo tanks or holds; pump or engine rooms; storage lockers; tanks containing flammable or combustible liquids, gases, or solids; rooms within buildings, crawl spaces; tunnels; or accessways. The atmosphere within a space is the entire area within its bounds.

Upper explosive limit (UEL) means the maximum concentration of flammable vapor in air above which propagation of flame does not occur on contact with a source of ignition.

Vessel section means a sub-assembly, module, or other component of a vessel being built, repaired, or broken.

Visual inspection means the physical survey of the space, its surroundings and contents to identify hazards such as, but not limited to, restricted accessibility, residues, unguarded machinery, and piping or electrical systems.

§1915.12 Precautions before entering confined and enclosed spaces and other dangerous atmospheres.

(a) Oxygen content.[1] (1) The employer shall ensure that the following spaces are visually inspected and tested by a competent person to determine the atmosphere's oxygen content prior to initial entry into the space by an employee:

(i) Spaces that have been sealed, such as, but not limited to, spaces that have been coated and closed up, and non-ventilated spaces that have been freshly painted;

(ii) Spaces and adjacent spaces that contain or have contained combustible or flammable liquids or gases;

(iii) Spaces and adjacent spaces that contain or have contained liquids, gases, or solids that are toxic, corrosive, or irritant;

(iv) Spaces and adjacent spaces that have been fumigated; and

(v) Spaces containing materials or residues of materials that create an oxygen-deficient atmosphere.

(2) If the space to be entered contains an oxygen deficient atmosphere, the space shall be labeled "Not Safe for Workers' or, if oxygen-enriched, "Not Safe for Workers—Not safe for Hot Work." If an oxygen-deficient or oxygen-enriched atmosphere is found, ventilation shall be provided at volumes and flow rates sufficient to ensure that the oxygen content is maintained at or above 19.5 percent and below 22.0 percent by volume. The warning label may be removed when the oxygen content is equal to or greater than 19.5 percent and less than 22.0 percent by volume.

(3) An employee may not enter a space where the oxygen content, by volume, is below 19.5 percent or above 22.0 percent. Exception: An employee may enter for emergency rescue or for a short duration for installation of ventilation equipment necessary to start work in the space provided:

[1] **Note to paragraph (a)**: Other provisions for work in IDLH atmospheres are located in Subpart I of this part.

(i) The atmosphere in the space is monitored for oxygen content, by volume, continuously; and

(ii) Respiratory protection and other appropriate personal protective equipment and clothing are provided in accordance with Subpart I of this part.

(b) Flammable atmospheres.[2] **(1)** the employer shall ensure that spaces and adjacent spaces that contain or have contained combustible or flammable liquids or gases are:

(i) Inspected visually by the competent person to determine the presence of combustible or flammable liquids; and

(ii) Tested by a competent person prior to entry by an employee to determine the concentration of flammable vapors and gases within the space.

(2) If the concentration of flammable vapors or gases in the space to be entered is equal to or greater than 10 per cent of the lower explosive limit, the space shall be labeled "Not Safe for Workers" and "Not Safe for Hot Work." Ventilation shall be provided at volumes and flow rates sufficient to ensure that the concentration of flammable vapors is maintained below 10 percent of the lower explosive limit. The warning labels may be removed when the concentration of flammable vapors is below 10 percent of the lower explosive limit.

(3) An employee may not enter a space where the concentration of flammable vapors or gases is equal to or greater than 10 percent of the lower explosive limit. Exception: An employee may enter for emergency rescue or for a short duration for installation of ventilation equipment necessary to start work in the space, provided:

(i) No ignition sources are present;

(ii) The atmosphere in the space is maintained above the upper explosive limit;

(iii) The atmosphere in the space is maintained above the upper explosive limit; and

[2] **Note 1 to paragraph (b)**: Additional provisions for work in IDLH atmospheres are located in Subpart I of this part.
Note 2 to paragraph (b): additional provisions for work in spaces containing a flammable substance which also has a permissible exposure limit, are located in Subpart Z of 29 CFR part 1915, and S 1915.12(c).

(iv) respiratory protection and other appropriate personal protective equipment and clothing are provided in accordance with Subpart I of this part.

(c) Toxic, corrosive, irritant or fumigated atmospheres and residues.[3] **(1)** The employer shall ensure that spaces or adjacent spaces that contain or have contained liquids, gases, or solids that are toxic, corrosive or irritant are:

(i) Inspected visually by the competent person to determine the presence of toxic, corrosive, or irritant residue contaminants; and

(ii) Tested by a competent person prior to initial entry by an employee to determine the air concentration of toxics, corrosives, or irritants within the space.

(2) If a space contains an air concentration of a material which exceeds a part 1915 subpart Z permissible exposure limit (PEL) or is IDLH, the space shall be labeled "Not Safe for Workers." Ventilation shall be provided at volumes and flow rates which will ensure that air concentrations are maintained within the PEL or, in the case of contaminants for which there is no established PEL, below the IDLH. The warning label may be removed when the concentration of contaminants is maintained within the PEL or below IDLH level.

(3) If a space cannot be ventilated to within the PELs or is IDLH, a Marine Chemist or CIH must re-test until the space can be certified "Enter With Restrictions" or "Safe for Workers."

(4) An employee may not enter a space whose atmosphere exceeds a PEL or is IDLH. Exception: An employee may enter for emergency rescue, or for a short duration for installation of ventilation equipment provided;

(i) The atmosphere in the space is monitored continuously;

(ii) Respiratory protection and other necessary and appropriate personal protective equipment and clothing are provided in accordance with Subpart I of this part.

(d) Training of employees entering confined and enclosed spaces or other dangerous atmospheres. **(1)** The employer shall ensure that each employee that enters a confined or enclosed space and other areas with

[3] **Note to paragraph (c):** Other provisions for work in IDLH atmospheres are located in Subpart I of this part.

dangerous atmospheres is trained to perform all required duties safely.

(2) The employer shall ensure that each employee who enters a confined space, enclosed space, or other areas with dangerous atmospheres is trained to:

(i) Recognize the characteristics of the confined space;

(ii) Anticipate and be aware of the hazards that may be faced during entry;

(iii) Recognize the adverse health effects that may be caused by the exposure to a hazard;

(iv) Understand the physical signs and reactions related to exposures to such hazards;

(v) Know what personal protective equipment is needed for safe entry into and exit from the space;

(vi) Use personal protective equipment; and

(vii) Where necessary, be aware of the presence and proper use of barriers that may be needed to protect an entrant from hazards.

(3) The employer shall ensure that each entrant into confined or enclosed spaces or other dangerous atmospheres is trained to exit the space or dangerous atmosphere whenever:

(i) The employer or his or her representative orders evacuation;

(ii) An evacuation signal such as an alarm is activated; or

(iii) The entrant perceives that he or she is in danger.

(4) The employer shall provide each employee with training:

(i) Before the entrant begins work addressed by thissection; and

(ii) Whenever there is a change in operation or in an employee’s duties that present a hazard about which the employee has not previously been trained.

(5) The employer shall certify that the training required by paragraphs (d)(1) through (d(4) of this section has been accomplished.

(i) The certification shall contain the employee's name, the name of the certifier, and the date(s) of the certification.

(ii) The certification shall be available for inspection by the Assistant Secretary, the Director, employees, and their representatives.

(e) Rescue teams.[4] The employer shall either establish a shipyard rescue team or arrange for an outside rescue team which will respond promptly to a request for rescue service.

(1) Shipyard rescue teams shall meet the following criteria:

(i) Each employee assigned to the shipyard team shall be provided with and trained to use the personal protective equipment he or she will need, including respirators and any rescue equipment necessary for making rescues from confined and enclosed spaces and other dangerous atmospheres.

(ii) Each employee assigned to the shipyard rescue team shall be trained to perform his or her rescue functions including confined and enclosed and other dangerous atmosphere entry.

(iii) Shipyard rescue teams shall practice their skills at least once every 12 months. Practice drills shall include the use of mannequins and rescue equipment during simulated rescue operations involving physical facilities that approximate closely those facilities from which rescue may be needed.[5]

(iv) At least one person on each rescue team shall maintain current certification in basic first aid which includes maintenance of an airway, control of bleeding, maintenance of circulation, and cardiopulmonary resuscitation (CPR) skills.

(2) The employer shall inform outside rescue teams of the hazards that the team may encounter when called to perform confined and enclosed space or other dangerous

[4] **Note to paragraph (e)**: The criteria for in-house rescue, listed in paragraph (e)(1) can be used by the employer in evaluating outside rescue services.

atmosphere rescue at the employer's facility so that the rescue team can be trained and equipped.

(f) Exchanging hazard information between employers. Each employer whose employees work in confined and enclosed spaces or other dangerous atmospheres shall ensure that all available information on the hazards, safety rules, and emergency procedures concerning those spaces and atmospheres is exchanged with any other employer whose employees may enter the same spaces.

§1915.13 Cleaning and Other Cold Work

(a) Locations covered by this section. The employer shall ensure that manual cleaning and other cold work are not performed in the following spaces unless the conditions of paragraph (b) of this section have been met:

(1) Spaces containing or having last contained bulk quantities of combustible of flammable liquids or gases; and

(2) Spaces containing or having last contained bulk quantities of liquids, gases or solids that are toxic, corrosive or irritating.

(b) Requirements for performing cleaning or cold work.[6]

(1) Liquid residues of hazardous materials shall be removed from work spaces as thoroughly as practicable before employees start cleaning operations of cold work in a space. Special care shall be taken to prevent the spilling or the draining of these materials into the water surrounding the vessel or, for shore-side operations, onto the surrounding work area.

(2) Testing shall be conducted by a competent person to determine the concentration of flammable, combustible, toxic, corrosive, or irritant vapors within the space prior to the beginning of cleaning or cold work.

(3) Continuous ventilation shall be provided at volumes and flow rates sufficient to ensure that the concentration(s) of:

[5] **Note to paragraph (e)(1)(iii)**: If the team performs an actual rescue during the 12 month period, an additional practice drill for that type of rescue is not required.

[6] See 1915.12(c) of this part and applicable requirements of 29 CFR part 1915, subpart Z for other provisions affecting cleaning and cold work.

(i) Flammable vapor is maintained below 10 percent of the lower explosive limit;[7] and

(ii) Toxic, corrosive, or irritant vapors are maintained within the permissible exposure limits and below IDLH levels.

(4) Testing shall be conducted by the competent person as often as necessary during cleaning or cold work to assure that air concentrations are below 10 percent of the lower explosive limit and within the PELs and below IDLH levels. Factors such as, but not limited to, temperature, volatility of the residues and other existing conditions in and about the spaces are to be considered in determining the frequency of testing necessary to assure a safe atmosphere.

(5) Spills or other releases of flammable, combustible toxic, corrosive, and irritant materials shall be cleaned up as work progresses.

(6)[8] An employee may not enter a confined or enclosed space or other dangerous atmosphere if the concentration of flammable or combustible vapors in work spaces exceeds 10 percent of the lower explosive limit. Exception: An employee may enter for emergency rescue or for a short duration for installation of ventilation equipment provided:

(i) No ignition sources are present;

(ii) The atmosphere in the space is monitored continuously;

(iii) The atmosphere in the space is maintained above the upper explosive limit; and

(iv) Respiratory protection, personal protective equipment, and clothing are provided in accordance with subpart I of this part.

(7) A competent person shall test ventilation discharge areas and other areas where discharged vapors may collect to determine if vapors discharged from the spaces being ventilated are accumulating in concentrations hazardous to employees.

[7] **Note to paragraph (b)(3)(i)**: Spaces containing highly volatile residues may require additional ventilation to keep the concentration of flammable vapors below 10 percent of the lower explosive limit and within the permissible exposure limit.

[8] **Note to paragraph (b)(6)**: Other provisions for work in IDLH and other dangerous atmospheres are located in subpart I of this part.

(8) If the tests required in paragraph (b)(7) of this section indicate that concentrations of exhaust vapors that are hazardous to employees are accumulating, all work in the contaminated area shall be stopped until the vapors have dissipated or been removed.

(9) Only explosion-proof, self-contained portable lamps, or other electric equipment approved by a National Recognized Testing Laboratory (NRTL) for the hazardous location shall be used in spaces described in paragraph (a) of this section until such spaces have been certified as "Safe for Workers."[9,]

(10) The employer shall prominently post signs that prohibit sources of ignition within or near a space that has contained flammable or combustible liquids or gases in bulk quantities:

(i) At the entrance to those spaces;

(ii) In adjacent spaces; and

(iii) In the open area adjacent to shose spaces.

(11) All air moving equipment and its component parts, including duct work, capable of generating a static electric discharge of sufficient energy to create a source of ignition, shall be bonded electrically to the structure of a vessel or vessel section or, in the case of landside spaces, grounded to prevent an electric discharge in the space.

(12) Fans shall have non-sparking blades and portableair ducts shall be of non-sparking materials.

§1915.14 Hot work.

(a) *Hot work requiring testing by a Marine Chemist or Coast Guard authorized person.*[10]

(1) The employer shall ensure that hot work is not performed in or on any of the following confined and enclosed spaces and other dangerous atmospheres, boundaries of spaces or pipelines until the work area has been tested and certified by a Marine Chemist or a U.S. Coast Guard authorized person as "Safe for Hot Work":

[9] **Note to paragraph (b)(9)**: Battery-fed, portable lamps or other electric equipment bearing the approval of a NRTL for the class and division of the location in which they are used are deemed to meet the requirements of this paragraph.

(i) Within, on, or immediately adjacent to spaces that contain or have contained combustible or flammable liquids or gases.

(ii) Within, on, or immediately adjacent to fuel tanks that contain or have last contained fuel; and

(iii) On pipelines, heating coils, pump fittings or other accessories connected to spaces that contain or have last contained fuel. Exception: Within spaces adjacent to spaces in which the flammable gases or liquids have a flash point below 150 degrees Fahrenheit (65.6 degrees Centigrade) and the distance between such spaces and the work is greater than 25 feet (7.5 meters).

(2) The certificate issued by the Marine Chemist or Coast Guard authorized person shall be posted in the immediate vicinity of the affected operations while they are in progress and kept on file for a period of at least three months from the date of the completion of the operation for which the certificate was generated.

(b) Hot work requiring testing by a competent person.

(1) Hot work is not permitted in or on the following spaces or adjacent spaces or other dangerous atmospheres until they have been tested by a competent person and determined to contain no concentrations of flammable vapors equal to or greater than 10 percent of the lower explosive limit:

(i) Dry cargo holds,

(ii) The bilges,

(iii) The engine room and boiler spaces for which a Marine Chemist or a Coast Guard authorized person certificate is not required under paragraph (a)(1)(i) of this section:

(iv) Vessels and vessel sections for which a Marine Chemist or Coast Guard authorized person certificate is not required under paragraph (a)(1)(i) of this section, and

(v) Landside confined and enclosed spaces or other dangerous atmospheres not covered by paragraph (a)(1) of this section.

(2) If the concentration of flammable vapors or gases is equal to or greater than 10 percent of the lower explosive

[10] **Note to paragraph (a)(1)**: The criteria for "Safe for Hot Work" is located in the definition section of subpart B.

limit in the space or an adjacent space where the hot work is to be done, then the space shall be labeled 'Not Safe for Hot Work" and ventilation shall be provided at volumes and flow rates sufficient to ensure that the concentration of flammable vapors or gases is below 10 percent by volume of the lower explosive limit. The warning label may be removed when the concentration of flammable vapors and gases are below the 10 percent lower explosive limit.

§1915.15 Maintenance of safe conditions.

(a) Preventing hazardous materials from entering. Pipelines that could carry hazardous materials into spaces that have been certified "Safe for Workers" or "Safe for Hot Work" shall be disconnected, blanked out, or otherwise blocked by a positive method to prevent hazardous materials from being discharged into the space.

(b) Alteration of existing conditions. When a change that could alter conditions within a tested confined or enclosed space or other dangerous atmosphere occurs, work in the affected space or area shall be stopped. Work may not be resumed until the affected space or area is visually inspected and retested and found to comply with 1915.12, 1915.13, and 1915.14 of this part as applicable.[11]

(c) Tests to maintain the conditions of a Marine Chemist's or Coast Guard authorized person's certificates. A competent person shall visually inspect and test each space certified as "Safe for Workers" or "Safe for Hot Work" as often as necessary to ensure that atmospheric conditions within that space are maintained within the conditions established by the certificate after the certificate has been issued.

(d) Change in the conditions of a Marine Chemist's or Coast Guard authorized person's certificate. If a competent person finds that the atmospheric conditions within a certified space fail to meet the applicable requirements of 1915.12, 1915.13, and 1915.14 of this part, work in the certified space shall be stopped and may not be resumed until the space has been retested by a Marine Chemist or Coast Guard authorized person and a new certificate issued in accordance with 1915.14(a).

(e) ***Tests to maintain a competent person's findings.*** After a competent person has conducted a visual inspection and tests required in 1915.12, 1915.13, and 1915.14 of this

[11] **Note to paragraph (b)**: Examples of changes that would warrant the stoppage of work include: The opening of manholes or other closures or the adjusting of a valve regulating the flow of hazardous materials.

part and determined a space to be safe for an employee to enter, he or she shall continue to test spaces as often as necessary to ensure that the required atmospheric conditions within the tested space are maintained.

(f) Changes in conditions determined by competent person's findings. After the competent person has determined initially that a space is safe for an employee to enter and he or she finds subsequently that the conditions within the tested space fail to meet the requirements of 1915.12, 1915.13, and 1915.14, of this part, as applicable, work shall be stopped until the conditions in the tested space are corrected to comply with 1915.12, 1915.13, and 1915.14, as applicable.

§1915.16. Warning signs and labels.

(a) Employee comprehension of signs and labels. The employer shall ensure that each sign or label posted to comply with the requirements of this subpart is presented in a manner that can be perceived and understood by all employees.

(b) Posting of large work areas. A warning sign or label required by paragraph (a) of this section need not be posted at an individual tank, compartment or work space within a work area if the entire work area has been tested and certified: "Not Safe for Workers" and "Not Safe for Hot Work" and if the sign or label to this effect is posted conspicuously at each means of access to the work area.

Subpart C—Surface Preparation and Preservation

§1915.31—Scope and Application of Subpart

The standards contained in this subpart shall apply to ship repairing and shipbuilding and shall not apply to shipbreaking.

§1915.32—Toxic Cleaning Solvents

(a) When toxic solvents are used, the employer shall employ one or more of the following measures to safeguard the health of employees exposed to these solvents.

(1) The cleaning operation shall be completely enclosed to prevent the escape of vapor into the working space.

(2) Either natural ventilation or mechanical exhaust ventilation shall be used to remove the vapor at the source and to dilute the concentration of vapors in the working space to a concentration which is safe lor the entire work period.

(3) Employees shall be protected against toxic vapors by suitable respiratory protective equipment in accordance wilh the requirements of § 1915.152 (a) and (c), and, where necessary, against exposure of skin and eyes to contact wilh toxic solvents and their vapors by suitable clothing and equipment.

(b) The principles in the threshold limit values to which attention is directed in § 1915.4 will be used by the Depart-lent of Labor in enforcement proceedings in defining a safe concentration of air contaminants.

(c) When flammable solvents are used, precautions shall be taken in accordance wilh the requirements of § 1915.36.

§1915.33—Chemical Paint and Preservative Removers

(a) Employees shall be protected against all skin contact during the handling and application of chemical paint and preservative removers and shall be protected against eye injury by goggles or face shields in accordance with the requirements of § 1915.151 (a) and (b).

(b) When using flammable paint and preservative removers, precautions shall be taken in accordance with the require-ments of § 1915.36.

(e) When using chemical paint and preservative removers which contain volatile and toxic solvents, such as benzol, acetone and amyl acetate, the provisions of § 1915.32 shall be applicable.

(d) When using paint and rust removers containing strong acids or alkalies, employees shall be protected by suitable face shields to prevent chemical burns on the face and neck.

(e) When steam guns are used, all employees working within range of the blast shall be protected by suitable face shields. Metal parts of the steam gun itself shall be insulated to protect the operator against heat burns.

§1915.34—Mechanical Paint Removers

(a) Power tools. (1) Employees engaged in the removal of paints, preservatives, rusts or other coatings by means of power tools shall be protected against eye injury by goggles or face shields in accordance with the requirements of § 1915.151(a).

(2) All portable rotating tools used for the removal of paints, preservatives, rusts or other coatings shall be adequately guarded to protect both the operator and nearby workers from flying missiles.

(3) Portable electric tools shall be grounded in accordance with the requirements of § 1915.132.

(4) In a confined space, mechanical exhaust ventilation sufficient to keep the dust concentration to a minimum shall be used, or employees shall be protected by respiratory protective equipment in accordance with the requirements of § 1915.152 (a) and (d).

(b) Flame removal. (1) Hardened preservative coatings shall not be removed by flame in enclosed spaces unless the employees exposed to fumes are protected by air line respirators in accordance with the requirements of § 1915.152(a). Employees performing such an operation in the open air, and those exposed to the resulting fumes, shall be protected by a fume filter type respirator in accordance with requirements of paragraphs (a) and (d)(2)(iv) of § 1915.152.

(2) Flame or heat shall not be used to remove soft and greasy preservative coatings.

(c) Abrasive blasting. (1) Equipment. Hoses and fittings used for abrasive blasting shall meet the following requirements:

(i) Hoses. Hose of a type to prevent shocks from static electricity shall be used.

(ii) Hose couplings. Hose lengths shall be joined by metal couplings secured to the outside of the hose to avoid erosion and weakening of the couplings.

(iii) Nozzles. Nozzles shall be attached to the hose by fittings that will prevent the nozzle from unintentionally becoming disengaged. Nozzle attachments shall be of metal and shall fit onto the hose externally.

(iv) Dead man control. A dead man control device shall be provided at the nozzle end of the blasting hose either to provide direct cutoff or to signal the pot tender by means of a visual and audible signal to cut off the flow, in the event the blaster loses control of the hose. The pot tender shall be available at all times to respond immediately to the signal.

(2) Replacement. Hoses and all fittings used for abrasive blasting shall be inspected frequently to insure timely replacement before an unsafe amount of wear has occurred.

(3) Personal protective equipment. (i) Abrasive blasters working in enclosed spaces shall be protected by hoods and air fed respirators or by air helmets of a positive pressure type in accordance with the requirements of § 1915.152(a).

(ii) Abrasive blasters working in the open shall be protected as indicated in paragraph (c)(3)(i) of this section except that when synthetic abrasives containing less than one percent free silica are used jointly, filter type respirators approved jointly by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration for exposure to lead dusts may be used in accordance with § 1915.152(a) and (d).

(iii) Employees, other than blasters, including machine tenders and abrasive recovery men, working in areas where unsafe concentrations of abrasive materials and dusts are present shall be protected by eye and respiratory protective equipment in accordance with the requirements of §§ 1915.151(a) and (b) and 1915.152(a) and (d).

(iv) The blaster shall be protected against injury from exposure to the blast by appropriate protective clothing, including gloves.

(v) Since surges from drops in pressure in the hose line can be of sufficient proportions to throw the blaster off the staging, the blaster shall be protected by a safety belt when blasting is being done from elevations where adequate protection against falling cannot be provided by railings.

§ 1915.35—Painting

(a) Paints mixed with toxic vehicles or solvents. (1) When paints mixed with toxic vehicles or solvents are sprayed, the following conditions shall apply:

(i) In confined spaces. employees continuously exposed to such spraying shall be protected by air line respirators in accordance with the requirements of § 1915.152(a).

(ii) In tanks or compartments, employees continuously exposed to such spraying shall be protected by air line respirators in accordance with the requirements of § 1915.152(a). Where mechanical ventilation is provided, employees shall be protected by respirators in accordance with the requirements of §§ 1915.152(a) and (e).

(iii) In large and well ventilated areas, employees exposed to such spraying shall be protected by respirators in accordance with the requirements of §§1915.152(a) and (e).

(2) Where brush application of paints with toxic solvents is done in confined spaces, or other areas where lack of ventilation creates a hazard, employees shall be protected by filter respirators in accordance with the requirements of §§1915.152(a) and (c).

(3) When flammable paints or vehicles are used, precautions shall be taken in accordance with the requirements of § 1915.36.

(4) The metallic parts of air moving devices, including fans, blowers, and jet-type air movers, and all duct work shall be electrically bonded to the vessel structure.

(b) Paints and tank coatings dissolved in highly volatile, toxic and flammable solvents. Several organic coatings, adhesives, and resins are dissolved in highly toxic, flammable and explosive solvents with flash points below 80°F. Work involving such materials shall be done only when all of the following special precautions have been taken:

(1) Sufficient exhaust ventilation shall be provided to keep the concentration of solvent vapors below 10 percent of the lower explosive limit. Frequent tests shall be made by a competent person to ascertain the concentration.

(2) If the ventilation fails or if the concentration of solvent vapors rises above10 percent of the lower explosive limit, painting shall be stopped and the compartment shall be evacuated until the concentration again falls below 10 percent of the lower explosive limit. If the concentration does not fall when painting is stopped, additional ventilation to bring the concentration down to 10 percent of the lower explosive limit shall be provided.

(3) Ventilation shall be continued after the completion of painting until the space or compartment is gas free. The final determination as to whether the space or compartment is gas free shall be made after the ventilating equipment has been shut off for at least 10 minutes.

(4) Exhaust ducts shall discharge clear of working areas and away from sources of possible ignition. Periodic tests shall be made to ensure that the exhausted vapors are not accumulating in other areas within or around the vessel or dry dock.

(5) All motors and control equipment shall be of the explosion-proof type. Fans shall have nonferrous blades. Portable air ducts shall also be of nonferrous materials.

All motors and associated control equipment shall be properly maintained and grounded.

(6) Only non-sparking paint buckets, spray guns and tools shall be used. Metal parts of paint brushes and rollers shall be insulated. Staging shall be erected in a manner which ensures that it is non-sparking.

(7) Only explosion-proof lights, approved by the Underwriters' Laboratories for use in Class 1, Group D atmospheres, or approved as permissible by the Mine Safety and Health Administration or the U.S. Coast Guard, shall be used.

(8) A competent person shall inspect all power and lighting cables to ensure that the insulation is in excellent condition, free of all cracks and worn spots, that there are no connections within fifty (50) feet of the operation, that lines are not overloaded, and that they are suspended with sufficient slack to prevent undue stress or chafing.

(9) The face, eyes, head, hands, and all other exposed parts of the bodies of employees handling such highly volatile paints shall be protected. All footwear shall be non-sparking, such as rubbers, rubber boots or rubber

soled shoes without nails. Coveralls or other outer clothing shall be of cotton. Rubber, rather than plastic, gloves shall be used because of the danger of static sparks.

(10) No matches, lighted cigarettes, cigars, or pipes, and no cigarette lighters or ferrous articles shall be taken into the area where work is being done.

(11) All solvent drums taken into the compartment shall be placed on nonferrous surfaces and shall be grounded to the vessel. Metallic contact shall be maintained between containers and drums when materials are being transferred from one to another.

(12) Spray guns, paint pots. and metallic parts of connecting tubing shall be electrically bonded. and the bonded assembly shall be grounded to the vessel.

(13) All employees continuously in a compartment in which such painting is being performed, shall be protected by air line respirators in accordance with the requirements of § 1915.152(a) and by suitable protective clothing. Employees entering such compartments for a limited time shall be protected by filter cartridge type respirators in accordance with the requirements of §§ 1915.152(a) and (e).

(14) All employees doing exterior paint spraying with such paints shall be protected by suitable filter cartridge type respirators in accordance with the requirements of §§ 1915.152(a) and (e) and by suitable protective clothing.

§ 1915.36—Flammable Liquids

(a) In all cases when liquid solvents, paint and preservative removers, paints or vehicles, other than those covered by § 1915.35(b), are capable of producing a flammable atmosphere under the conditions of use, the following precautions shall be taken:

(1) Smoking, open flames, arcs and spark-producing equipment shall be prohibited in the area.

(2) Ventilation shall be provided in sufficient quantities to keep the concentration of vapors below 10 percent of their lower explosive limit. Frequent tests shall be made by a competent person to ascertain the concentration .

(3) Scrapings and rags soaked with these materials shall be kept in a covered metal container.

(4) Only explosion proof lights, approved by the Underwriters' Laboratories for use in Class 1, Group D atmospheres, or approved as permissible by the Mine Safety and Health Administration or the U.S. Coast Guard shall be used.

(5) A competent person shall inspect all power and lighting cables to ensure that the insulation is in excellent condition, free of all cracks and worn spots, that there are no connections within fifty (50) feet of the operation, that lines are not overloaded, and that they are suspended with sufficient slack to prevent undue stress or chafing .

(6) Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use.

Subpart D—Welding, Cutting, and Heating

§1915.51—Ventilation and Protection in Welding, Cutting, and Heating

(a) The provisions of this section shall apply to all ship repairing, shipbuilding, and shipbreaking operations; except that paragraph (e) of this section shall apply only to ship repairing and shipbuilding. Paragraph (g) of this section shall apply only to ship repairing.

(b) Mechanical ventilation requirements. (1) For purposes of this section, mechanical ventilation shall meet the following requirements:

(i) Mechanical ventilation shall consist of either general mechanical ventilation systems or local exhaust systems.

(ii) General mechanical ventilation shall be of sufficient capacity and so arranged as to produce the number of air changes necessary to maintain welding fumes and smoke within safe limits.

(iii) Local exhaust ventilation shall consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system shall be of sufficient capacity and so arranged as to remove fumes and smoke at the source and keep the

concentration of them in the breathing zone within safe limits.

(iv) Contaminated air exhausted from a working space shall be discharged into the open air or otherwise clear of the source of intake air.

(v) All air replacing that withdrawn shall be clean and respirable.

(vi) Oxygen shall not be used for ventilation purposes comfort cooling, blowing dust or dirt from clothing, or for cleaning the work area.

(c) Welding, cutting and heating in confined spaces.

(1) Except as provided in paragraphs (c)(3) and (d)(2) of this section either general mechanical or local exhaust ventilation meeting the requirements of paragraph (b) of this section shall be provided whenever welding, cutting or heating is performed in a confined space.

(2) The means of access shall be provided to a confined space and ventilation ducts to this space shall be arranged in accordance with §§ 1915.76(b) (1) and (2).

(3) When sufficient ventilation cannot be obtained without blocking the means of access, employees in the confined space shall be protected by air line respirators in accordance with the requirements of § 1915.152(a), and an employee on the outside of such a confined space shall be assigned to maintain communication with those working within it and to aid them in an emergency.

(d) Welding, cutting or heating of metals of toxic significance.

(1) Welding, cutting or heating in any enclosed spaces aboard the vessel involving the metals specified below shall be performed with either general mechanical or local exhaust ventilation meeting the requirements of paragraph (a) of this section:

(i) Zinc-bearing base or filler metals or metals coated with zinc-bearing materials.

(ii) Lead base metals.

(iii) Cadmium-bearing filler materials.

(iv) Chromium-bearing metals or metals coated with chromium-bearing materials.

(2) Welding, cutting or heating in any enclosed spaces aboard the vessel involving the metals specified below shall be performed with local exhaust ventilation in accordance with the requirements of paragraph (b) of this section or employees shall be protected by air line respirators in accordance with the requirements of § 1915.152(a):

(i) Metals containing lead, other than as an impurity, or metals coated with lead-bearing materials.

(ii) Cadmium-bearing or cadmium coated base metals.

(iii) Metals coated with mercury-bearing metals.

(iv) Beryllium-containing base or filler metals. Because of its high toxicity, work involving beryllium shall be done with both local exhaust ventilation and air line respirators.

(3) Employees performing such operations in the open air shall be protected by filter type respirators in accordance with the requirements of paragraphs (a) and (d)(2)(iv) of § 1915.152, except that employees performing such operations on beryllium-containing base or filler metals shall be protected by air line respirators in accordance with the requirements of § 1915.152(a).

(4) Other employees exposed to the same atmosphere as the welders or burners shall be protected in the same manner as the welder or burner.

(e) Inert-gas metal-arc welding. (1) Since the inert-gas metal-arc welding process involves the production of ultraviolet radiation of intensities of 5 to 30 times that produced during shielded metal-arc welding, the decomposition of chlorinated solvents by ultraviolet rays, and the liberation of toxic fumes and gases, employees shall not be permitted to engage in, or be exposed to the process until the following special precautions have been taken:

(i) The use of chlorinated solvents shall be kept at least 200 (60.9 meters) feet from the exposed arc, and surfaces prepared with chlorinated solvents shall be thoroughly dry before welding is permitted on such surfaces .

(ii) Helpers and other employees in the area not protected from the arc by screening as provided in § 1915.56(e) shall be protected by filter lenses meeting the requirements of §§ 1915.151 (a) and (c). When two or more welders are exposed to each other's arc, filter lens goggles of a suitable type meeting the requirements of §§ 1915.151 (a) and (c) shall be worn under welding helmets or hand shields to protect the welder against flashes and radiant energy when either the helmet is lifted or the shield is removed.

(iii) Welders and other employees who are exposed to radiation shall be suitably protected so that the skin is covered completely to prevent burns and other damage by ultraviolet rays. Welding helmets and hand shields shall be free of leaks and openings, and free of highly reflective surfaces.

(iv) When inert-gas metal-arc welding is being performed on stainless steel, the requirements of paragraph (d)(2) of this section shall be met to protect against dangerous concentrations of nitrogen dioxide.

(f) General welding, cutting, and heating. (1) Welding, cutting and heating not involving conditions or materials described in paragraphs (c), (d) or (e) of this section may normally be done without mechanical ventilation or respiratory protective equipment, but where, because of unusual physical or atmospheric conditions, an unsafe accumulation of contaminants exists, suitable mechanical ventilation or respiratory protective equipment shall be provided.

(2) Employees performing any type of welding, cutting or heating shall be protected by suitable eye protective equipment in accordance with the requirements of § 1915.151 (a) and (c).

(g) Residues and cargoes of metallic ores. (1) Residues and cargoes of metallic ores of toxic significance shall be removed from the area or protected from the heat before ship repair work which involves welding, cutting or heating is begun.

§ 1915.52—Fire Prevention[1]

(a) Paragraph (a) applies to ship repairing, shipbuilding and shipbreaking, and paragraph (b) applies to ship repairing and shipbuilding only.

[1]46 CFR 146.02-20 contains Coast Guard regulations pertaining lo welding and cutting while explosives and dangerous cargo are being handled .

(1) When practical, objects to be welded, cut or heated shall be moved to a designated safe location or, if the object to be welded, cut or heated cannot be readily moved, all movable fire hazards including residues of combustible bulk cargoes in the vicinity shall be taken to a safe place.

(2) If the object to be welded, cut or heated cannot be moved and if all the fire hazards including combustible cargoes cannot be removed, positive means shall be taken to confine the heat, sparks, and slag, and to protect the immovable fire hazards from them.

(3) When welding, cutting or heating is performed on tank shells, decks, overheads and bulkheads, since direct penetration of sparks or heat transfer may introduce a fire hazard to an adjacent compartment, the same precautions shall be taken on the opposite side as are taken on the side on which the welding is being performed.

(4) In order to eliminate the possibility of fire in confined spaces as a result of gas escaping through leaking or improperly closed torch valves, the gas supply to the torch shall be positively shut off at some point outside the confined space whenever the torch is not to be used or whenever the torch is left unattended for a substantial period of time, such as during the lunch hour. Overnight and at the change of shifts, the torch and hose shall be removed from the confined space. Open end fuel gas and oxygen hoses shall be immediately removed from confined spaces when they are disconnected from the torch or other gas consuming device.

(b) The provisions of this paragraph shall apply to ship repairing and shipbuilding only.

(1) No welding, cutting or heating shall be done where the application of flammable paints or the presence of other flammable compounds or of heavy dust concentrate creates a hazard.

(2) Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use. In addition, when hot work is being performed aboard a vessel and pressure is not available on the vessel’s fire system, an auxiliary supply of water shall be made available where practicable, consistent with avoiding freezing of the lines or hose.

(3) When the welding, cutting, or heating operation is such that normal fire prevention precautions are not sufficient, additional personnel shall be assigned to guard against fire while the actual welding, cutting, or heating operation is being performed and for a sufficient period of time after completion of the work to insure that no possibility of fire exists. Such personnel shall be instructed as to the specific anticipated fire hazards and how the fire fighting equipment provided is to be used.

(4) Vaporizing liquid extinguishers shall not be used in enclosed spaces.

(5) Except when the contents are being removed or transferred, drums, pails, and other containers which contain or have contained flammable liquids shall be kept closed. Empty containers shall be removed to a safe area apart from hot work operations, or open flames.

(c) In all cases, suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use. Personnel assigned to contain fires within controllable limits shall be instructed as to the specific anticipated fire hazards and how the fire fighting equipment provided is to be used. The provisions of this paragraph shall apply to shipbreaking only.

§1915.53—Welding, Cutting and Heating in Way of Preservative Coatings

(a) The provisions in this section shall apply to all ship repairing, shipbuilding and shipbreaking operations except for paragraphs (e) and (f) of this section which shall apply to ship repairing and shipbuilding and shall not apply to shipbreaking .

(b) Before welding, cutting or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made by a competent person to determine its flammability. Preservative coatings shall be considered to be highly flammable when scrapings burn with extreme rapidity.

(c) Precautions shall be taken to prevent ignition of highly flammable hardened preservative coatings. When coatings are determined to be highly flammable they shall be stripped from the area to be heated to prevent ignition or, where shipbreaking is involved, the coatings may be burned away under controlled conditions. A 1-1/2 inch (3.75 centimeters) or larger tire hose with fog nozzle, which has

been uncoiled and placed under pressure, shall be immediately available for instant use in the immediate vicinity, consistent with avoiding freezing of the hose.

(d) Protection against toxic preservative coatings. (1) In enclosed spaces, all surfaces covered wilh toxic preservatives shall be stripped of all toxic coatings for a distance of at least 4 inches (10 centimeters) from the area of heat application or the employees shall be protected by air line respirators meeting the requirements of § 1915.152(a).

(2) In the open air, employees shall be protected by a filter type respirator in accordance with the requirements of §§ 1915.152 (a) and (d).

(e) Before welding, cutting or heating is commenced in enclosed spaces on metals covered by soft and greasy preservatives, the following precautions shall be taken:

(1) A competent person shall test the atmosphere in the space to ensure that it does not contain explosive vapors, since there is a possibility that some soft and greasy preservatives may have flash points below temperatures which may be expected lo occur naturally. If such vapors are determined to be present, no hot work shall be commenced until such precautions have been taken as will ensure that the welding, cutting or heating can be performed in safety.

(2) The preservative coatings shall be removed for a sufficient distance from the area to be heated to ensure that the temperature of the unstripped metal will not be appreciably raised. Artificial cooling of the metal surrounding the heated area may be used to limit the size of the area required to be cleaned. The prohibition contained in § 1915.34(b)(2) shall apply.

(f) Immediately after welding, cutting or heating is commenced in enclosed spaces on metal covered by soft and greasy preservatives, and at frequent intervals thereafter, a competent person shall make tests to ensure that no flammable vapors are being produced by the coatings. If such vapors are determined to be present, the operation shall be stopped immediately and shall not be resumed until such additional precautions have been taken as are necessary to ensure that the operation can be resumed safely.

§1915.54—Welding, Cutting and Heating of Hollow Metal Containers and Structures Not Covered by §1915.12

The provisions of this section shall apply to ship repairing, shipbuilding or shipbreaking.

(a) Drums, containers, or hollow structures which have contained flammable substances shall, before welding, cutting, or heating is undertaken on them, either be filled with water or thoroughly cleaned of such substances and ventilated and tested.

(b) Before heat is applied to a drum, container, or hollow structure, a vent or opening shall be provided for the release of any built-up pressure during the application of heat.

(c) Before welding, cutting, heating or brazing is begun on structural voids such as skegs, bilge keels, fair waters, masts, booms, support stanchions, pipe stanchions or railings, a competent person shall inspect the object and, if necessary, test it for the presence of flammable liquids or vapors. If flammable liquids or vapors are present, the object shall be made safe.

(d) Objects such as those listed in paragraph (c) of this section shall also be inspected to determine whether water or other non-flammable liquids are present which, when heated, would build up excessive pressure. If such liquids are determined to be present, the object shall be vented, cooled, or otherwise made safe during the application of heat.

(e) Jacketed vessels shall be vented before and during welding, cutting or heating operations in order to release any pressure which may build up during the application of heat.

§1915.55—Gas Welding and Cutting

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Transporting, moving and storing compressed gas cylinders. (1) Valve protection caps shall be in place and secure. Oil shall not be used to lubricate protection caps.

(2) When cylinders are hoisted, they shall be secured on a cradle, slingboard or pallet. They shall not be hoisted by means of magnets or choker slings.

(3) Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck, or permitted to strike each other violently.

(4) When cylinders are transported by vehicle, they shall be secured in position.

(5) Valve protection caps shall not be used for lifting cylinders from one vertical position to another. Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen. Warm, not boiling, water shall be used to thaw cylinders loose.

(6) Unless cylinders are firmly secured on a special carrier intended for this purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved.

(7) A suitable cylinder truck, chain, or other steadying device shall be used to keep cylinders from being knocked over while in use.

(8) When work is finished, when cylinders are empty or when cylinders are moved at any time, the cylinder valves shall be closed.

(9) Acetylene cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.

(b) Placing cylinders. (1) Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag or flame will not reach them. When this is
impractical, fire resistant shields shall be provided.

(2) Cylinders shall be placed where they cannot become part of an electrical circuit. Electrodes shall not be struck against a cylinder to strike an arc.

(3) Fuel gas cylinders shall be placed with valve end up whenever they are in use. They shall not be placed in a location where they would be subject to open flame, hot metal, or other sources of artificial heat.

(4) Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces.

(c) Treatment of cylinders. (1) Cylinders, whether full or empty, shall not be used as rollers or supports.

(2) No person other than the gas supplier shall attempt to mix gases in a cylinder. No one except the owner of the cylinder or person authorized by him shall refill a cylinder. No one shall use a cylinder's contents for purposes other than those intended by the supplier. Only cylinders bearing Interstate Commerce Commission identification and inspection markings shall be used.

(3) No damaged or defective cylinder shall be used.

(d) Use of fuel gas. The employer shall thoroughly instruct employees in the safe use of fuel gas, as follows:

(1) Before connecting a regulator to a cylinder valve, the valve shall be opened slightly and closed immediately. (This action is generally termed "cracking" and is intended to clear the valve of dust or dirt that might otherwise enter the regulator.) The person cracking the valve shall stand to one side of the outlet, not in front of it. The valve of a fuel gas cylinder shall not be cracked where the gas would reach welding work, sparks, flame or other possible sources of ignition.

(2) The cylinder valve shall always be opened slowly to prevent damage to the regulator. To permit quick closing, valves on fuel gas cylinders shall not be opened more than 1-1/2 turns. When a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel gas flow can be shut off quickly in case of an emergency. In the case of manifolded or coupled cylinders, at least one such wrench shall always be available for immediate use. Nothing shall be placed on top of a fuel gas cylinder, when in use, which may damage the safety device or interfere with the quick closing of the valve.

(3) Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.

(4) Before a regulator is removed from a cylinder valve, the cylinder valve shall always be closed and the gas released from the regulator.

(5) If, when the valve on a fuel gas cylinder is opened, there is found to be a leak around the valve stem, the valve shall be closed and the gland nut tightened. If this action does not stop the leak, the use of the cylinder shall

be discontinued, and it shall be properly tagged and removed from the vessel. In the event that fuel gas should leak from the cylinder valve rather than from the valve stem and the gas cannot be shut off, the cylinder shall-be properly tagged and removed from the vessel. If a regulator attached to a cylinder valve will effectively stop a leak through the valve seat, the cylinder need not be removed from the vessel.

(6) If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the vessel.

(e) Fuel gas and oxygen manifolds. (1) Fuel gas and oxygen manifolds shall bear the name of the substance they contain in letters at least 1 inch (2.54 centimeters) high which shall be either painted on the manifold or on a sign permanently attached to it.

(2) Fuel gas and oxygen manifolds shall be placed in safe and accessible locations in the open air. They shall not be located within enclosed spaces.

(3) Manifold hose connections. including both ends of the supply hose that lead to the manifold, shall be such that the hose cannot be interchanged between fuel gas and oxygen manifolds and supply header connections. Adapters shall not be used to permit the interchange of hose. Hose connections shall be kept free of grease and oil.

(4) When not in use, manifold and header hose connections shall be capped.

(5) Nothing shall be placed on top of a manifold, when in use, which will damage the manifold or interfere with the quick closing of the valves.

(f) Hoses. (1) Fuel gas hose and oxygen hose shall be easily distinguishable from each other. The contrast may be made by different colors or by surface characteristics readily distinguishable by the sense of touch. Oxygen and fuel gas hoses shall not be interchangeable. A single hose having more than one gas passage, a wall failure of which would permit the flow of one gas into the other gas passage, shall not be used.

(2) When parallel sections of oxygen and fuel gas hose are taped together not more than 4 inches (10 centimeters) out of 8 inches (20 centimeters) shall be covered by tape.

(3) All hose carrying acetylene, oxygen, natural or manufactured fuel gas, or any gas or substance which may ignite or enter into combustion or be in any way harmful to

employees, shall be inspected at the beginning of each shift. Defective hose shall be removed from service.

(4) Hose which has been subjected to flashback or which shows evidence of severe wear or damage shall be tested to twice the normal pressure to which it is subject but in no case less than two hundred psi (1,379 kPa). Defective hose or hose in doubtful condition shall not be used.

(5) Hose couplings shall be of the type that cannot be unlocked or disconnected by means of a straight pull without rotary motion.

(6) Boxes used for the stowage of gas hose shall be ventilated .

(g) Torches. (1) Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills or other devices designed for such purpose.

(2) Torches shall be inspected at the beginning of each shift for leaking shutoff valves, hose couplings, and tip connections. Defective torches shall not be used.

(3) Torches shall be lighted by friction lighters or other approved devices, and not by matches or from hot work.

(h) Pressure regulators. Oxygen and fuel gas pressure regulators including their related gauges shall be in proper working order while in use.

§1915.56—Arc Welding And Cutting

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Manual electrode holders. (1) Only manual electrode holders which are specifically designed for arc welding and cutting and are of a capacity capable of safely handling the maximum rated current required by the electrodes shall be used.

(2) Any current carrying parts passing through the portion of the holder which the arc welder or cutter grips in his hand, and the outer surfaces of the jaws of the holder, shall be fully insulated against the maximum voltage encountered to ground.

(b) Welding cables and connectors. (1) All arc welding and cutting cables shall be of the completely insulated, flexible type, capable of handling the maximum current requirements

of the work in progress, taking into account the duty cycle under which the arc welder or cutter is working.

(2) Only cable free from repair or splices for a minimum distance of 10 feet (3 meters) from the cable end to which the electrode holder is connected shall be used, except that cables with standard insulated connectors or with splices whose insulating quality is equal to that of the cable are permitted.

(3) When it becomes necessary to connect or splice lengths of cable one to another, substantial insulated connectors of a capacity at least equivalent to that of the cable shall be used. If connections are effected by means of cable lugs, they shall be securely fastened together to give good electrical contact, and the exposed metal parts of the lugs shall be completely insulated.

(4) Cables in poor repair shall not be used. When a cable other than the cable lead referred to in paragraph (b)(2) of this section becomes worn to the extent of exposing bare conductors. the portion thus exposed shall be protected by means of rubber and friction tape or other equivalent insulation.

(c) Ground returns and machine grounding. (1) A ground return cable shall have a safe current carrying capacity equal to or exceeding the specified maximum output capacity of the arc welding or cutting unit which it services. When a single ground return cable services more than one unit, its safe current carrying capacity shall equal or exceed the total specified maximum output capacities of all the units which it services.

(2) Structures or pipe lines, except pipe lines containing gases of flammable liquids or conduits containing electrical circuits, may be used as part of the ground return circuit, provided that the pipe or structure has a current carrying capacity equal to that required by paragraph (c)(1) of this section.

(3) When a structure or pipe line is employed as a ground return circuit, it shall be determined that the required electrical contact exists at all joints. The generation of an arc, sparks or heat at any point shall cause rejection of the structure as a ground circuit.

(4) When a structure or pipe line is continuously employed as a ground return circuit, all joints shall be bonded, and periodic inspections shall be conducted to ensure that no condition of electrolysis or fire hazard exists by virtue of such use.

(5) The frames of all arc welding and cutting machines shall be grounded either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current. Grounding circuits, other than by means of the vessel's structure, shall be checked to ensure that the circuit between the ground and the grounded power conductor has resistance low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

(6) All ground connections shall be inspected to ensure that they are mechanically strong and electrically adequate for the required current.

(d) Operating instructions. Employers shall instruct employees in the safe means of arc welding and cutting as follows:

(1) When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected that they cannot make electrical contact with employees or conducting objects.

(2) Hot electrode holders shall not be dipped in water, since to do so may expose the arc welder or cutter to electric shock.

(3) When the arc welder or cutter has occasion to leave his work or to stop work for any appreciable length of time, or when the arc welding or cutting machine is to be moved, the power supply switch to the equipment shall be opened.

(4) Any faulty or defective equipment shall be reported to the supervisor.

(e) Shielding. Whenever practicable, all arc welding and cutting operations shall be shielded by noncombustible or flame-proof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.

§1915.57—Uses of Fissionable Material

The provisions of this section apply to ship repairing and shipbuilding only.

(a) In activities involving the use of and exposure to sources of ionizing radiation not only on conventionally powered but also on nuclear powered vessels, the applicable provisions of the Nuclear Regulatory Commission's Standards for Protection Against Radiation (10 CFR Part 20), relating to protection against occupational radiation exposure, shall apply.

(b) Any activity which involves the use of radioactive material, whether or not under license from the Nuclear Regulatory Commission, shall be performed by competent persons specially trained in the proper and safe operation of such equipment. In the case of materials used under Commission license, only persons actually licensed, or competent persons under direction and supervision of the licensee, shall perform such work.

Subpart E—Scaffolds, Ladders and Other Working Surfaces

§1915.71—Scaffolds or Staging

(a) Scope and application. The provisions of this section shall apply to all ship repairing, shipbuilding and shipbreaking operations except that paragraphs (b)(8) through (b)(10) and paragraphs (c) through (f) of this section shall only apply to ship repairing and shipbuilding operations and shall not apply to shipbreaking.

(b) General requirements. (1) All scaffolds and their supports, whether of lumber steel or other material, shall be capable of supporting the load they are designed to carry with a safety factor of not less than 4.

(2) All lumber used in the construction of scaffolds shall be spruce, fir, long leaf yellow pine, Oregon pine or wood of equal strength. The use of hemlock, short leaf yellow pine, or short fiber lumber is prohibited.

(3) Lumber dimensions as given in this subpart are nominal except where given in fractions of an inch.

(4) All lumber used in the construction of scaffolds shall be sound, straight-grained, free from cross grain, shakes and large, loose or dead knots. It shall also be free from dry rot, large checks, worm holes or other defects which impair its strength or durability.

(5) Scaffolds shall be maintained in a safe and secure condition. Any component of the scaffold which is broken, burned or otherwise defective shall be replaced.

(6) Barrels, boxes, cans, loose bricks, or other unstable objects shall not be used as working platforms or for the support of planking intended as scaffolds or working platforms .

(7) No scaffold shall be erected, moved, dismantled or altered except under the supervision of competent persons.

(8) No welding, burning, riveting or open flame work shall be performed on any staging suspended by means of fiber rope.

(9) Lifting bridles on working platforms suspended from cranes shall consist of four legs so attached that the stability of the platform is assured.

(10) Unless the crane hook has a safety latch or is moused, the lifting bridles on working platforms suspended from cranes shall be attached by shackles to the lower lifting block or other positive means shall be taken to prevent them from becoming accidentally disengaged from the crane hook.

(c) Independent pole wood scaffolds. (1) All pole uprights shall be set plumb. Poles shall rest on a foundation of sufficient size and strength to distribute the load and to prevent displacement.

(2) In light-duty scaffolds, not more than 24 feet (7.3 meters) in height, poles may be spliced by overlapping the ends not less than 4 feet (1.2 meters) and securely nailing them together. A substantial cleat shall be nailed to the lower section to form a support for the upper section except when bolted connections are used.

(3) All other poles to be spliced shall be squared at the ends of each splice, abutted, and rigidly fastened together by not less than two cleats securely nailed or bolted thereto. Each cleat shall overlap each pole end by at least 24 inches (60.9 centimeters) and shall have a width equal to the face of the pole to which it is attached. The combined cross sectional area of the cleats shall be not less than the cross sectional area of the pole.

(4) Ledgers shall extend over two consecutive pole spaces and shall overlap the poles at each end by not less than 4 inches (10 centimeters). They shall be left in position to brace the poles as the platform is raised with the progress of the work. Ledgers shall be level and shall be securely nailed or bolted to each pole and shall be placed against the inside face of each pole.

(5) All bearers shall be set with their greater dimension vertical and shall extend beyond the ledgers upon which they rest.

(6) Diagonal bracing shall be provided between the parallel poles, and cross bracing shall be provided

between the inner and outer poles or from the outer poles to the ground.

(7) Minimum dimensions and spacing of members shall be in accordance with Table E-l in § 1915.118.

(8) Platform planking shall be in accordance with the requirements of paragraph (i) of this section.

(9) Backrails and toeboards shall be in accordance with the requirements of paragraph (j) of this section.

(d) Independent pole metal scaffolds. (1) Metal scaffold members shall be maintained in good repair and free of corrosion.

(2) All vertical and horizontal members shall be fastened together with a coupler or locking device which will form a positive connection. The locking device shall be of a type which has no loose parts.

(3) Posts shall be kept plumb during erection and the scaffold shall be subsequently kept plumb and rigid by means of adequate bracing.

(4) Posts shall be fitted with bases supported on a firm foundation to distribute the load. When wooden sills are used, the bases shall be fastened thereto.

(5) Bearers shall be located at each set of posts, at each level, and at each intermediate level where working platforms are installed.

(6) Tubular bracing shall be applied both lengthwise and crosswise as required.

(7) Platform planking shall be in accordance with the requirements of paragraph (h) of this section.

(8) Backrails and toeboards shall be in accordance with the requirements of paragraph (j) of this section.

(e) Wood trestle and extension trestle ladders. (1) The use of trestle ladders, or extension sections or base sections of extension trestle ladders longer than 20 feet (6 meters) is prohibited. The total height of base and extension may, however, be more than 20 feet (6 meters).

(2) The minimum dimensions of the side rails of the trestle ladder, or the base sections of the extension trestle ladder, shall be as follows:

(i) Ladders up to and including those 16 feet (4.8 meters) long shall have side rails of not less than 1-5/16 X 2-3/4 inch (3.3 x 6.9 centimeters) lumber.

(ii) Ladders over 16 feet long (4.8 meters) and up to and including those 20 feet (6 meters) long shall have side rails of not less than 1-5/16 X 3 inch (3.3 x 7.6 centimeters) lumber.

(3) The side rails of the extension section of the extension trestle ladder shall be parallel and shall have minimum dimensions as follows:

(i) Ladders up to and including 12 feet (3.6 meters) long shall have side rails of not less than 1-5/16 X 2-1/4 inch (3.3 x 5.7 centimeters) lumber.

(ii) Ladders over 12 feet (3.6 meters) long and up to and including those 16 feet (4.8 meters) long shall have side rails of not less than 1-5/16 X 2-1/2 inch (3.3 x 6.3 centimeters) lumber.

(iii) Ladders over 16 feet (4.8 meters) long and up to and including those 20 feet (6 meters) long shall have side rails of not less than 1-5/16 X 2-1/2 inch (3.3 x 6.3 centimeters) lumber.

(4) Trestle ladders and base sections of extension trestle ladders shall be so spread that when in an open position the spread of the trestle at the bottom, inside to inside, shall be not less than 5-1/2 inches (13.9 centimeters) per foot (30 centimeters) of the length of the ladder.

(5) The width between the side rails at the bottom of the trestle ladder or of the base section of the extension trestle ladder shall be not less than 21 inches (53.3 centimeters) for all ladders and sections 6 feet (1.8 meters) or less in length. For longer lengths of ladder, the width shall be increased at least 1 inch (25 millimeters) for each additional foot (30 centimeters) of length. The width between the side rails of the extension section of the trestle ladder shall be not less than 12 inches (30 centimeters).

(6) In order to limit spreading, the top ends of the side rails of both the trestle ladder and of the base section of the extension trestle ladder shall be beveled, or of equivalent construction, and shall be provided with a metal hinge .

(7) A metal spreader or locking device to hold the front and back sections in an open position, and to hold the extension section securely in the elevated position, shall be a component of each trestle ladder or extension ladder.

(8) Rungs shall be parallel and level. On the trestle ladder, or on the base section of the extension trestle ladder, rungs shall be spaced not less than 8 inches (20 centimeters) nor more than 18 inches (45 centimeters) apart; on the extension section of the extension trestle ladder, rungs shall be spaced not less than 6 inches (15 centimeters) nor more than 12 inches (30 centimeters) apart.

(9) Platform planking shall be in accordance with the requirements of paragraph (i) of this section, except that the width of the platform planking shall not exceed the distance between the siderails.

(10) Backrails and toeboards shall be in accordance with the requirements of paragraph (j) of this section.

(f) Painters' suspended scaffolds. (1) The supporting hooks of swinging scaffolds shall be constructed to be equivalent in strength to mild steel or wrought iron, shall be forged with care, shall be not less than 7/8 inch (2.2 millimeters) in diameter, and shall be secured to a safe anchorage at all times.

(2) The ropes supporting a swinging scaffold shall be equivalent in strength to first-grade 3/4 inch (19 millimeters) diameter manila rope properly rigged into a set of standard 6 inch (15 centimeters) blocks consisting of at least one double and one single block.

(3) Manila and wire ropes shall be carefully examined before each operation and thereafter as frequently as may be necessary to ensure their safe condition.

(4) Each end of the scaffold platform shall be supported by a wrought iron or mild steel stirrup or hanger, which in turn is supported by the suspension ropes.

(5) Stirrups shall be constructed so as to be equivalent in strength to wrought iron 3/4 inch (19 millimeters) in diameter.

(6) The stirrups shall be formed with a horizontal bottom member to support the platform, shall be provided with means to support the guardrail and midrail and shall have a loop or eye at the top for securing the supporting hook on the block.

(7) Two or more swinging scaffolds shall not at any time be combined into one by bridging the distance between them with planks or any other form of platform.

(8) No more than two men shall be permitted to work at one time on a swinging scaffold built to the minimum specifications contained in this paragraph. Where heavier construction is used, the number of men permitted to work on the scaffold shall be determined by the size and the safe working load of the scaffold.

(9) Backrails and toeboards shall be in accordance with the requirements of paragraph (j) of this section.

(10) The swinging scaffold platform shall be one of the three types described in paragraphs (f) (11), (12), and (13) of this section.

(11) The ladder-type platform consists of boards upon a horizontal ladder-like structure, referred to herein as the ladder, the side rails of which are parallel. If this type of platform is used the following requirements shall be met.

(i) The width between the side rails shall be no more than 20 inches (50 centimeters).

(ii) The side rails of ladders in ladder-type platforms shall be equivalent in strength to a beam of clear straight-grained spruce of the dimensions contained in Table E-2 in § 1915.118.

(iii) The side rails shall be tied together with the tie rods. The tie rods shall be not less than 5/16 inch (7.9 millimeters) in diameter, located no more than 5 feet (1.5 meters) apart, pass through the rails, and be riveted up tight against washers at both ends.

(iv) The rungs shall be of straight-grained oak, ash, or hickory, not less than 1-1/8 inches (29 millimeters) diameter, with 7/8 inch (2.2 millimeters) tenons mortised into the side rails not less than 7/8 inch (2.2 millimeters) and shall be spaced no more than 18 inches (45 centimeters) on centers.

(v) Flooring strips shall be spaced no more than 5/8 inch (15 millimeters) apart except at the side rails, where 1 inch (25 millimeters) spacing is permissible.

(vi) Flooring strips shall be cleated on their undersides.

(12) The plank-type platform consists of planks supported on the stirrups or hangers. If this type of platform is used, the following requirements shall be met.

(i) The planks of plank-type platforms shall be of not less than 2 x 10 inch (5 x 25 centimeters) lumber.

(ii) The platform shall be no more than 24 inches (60 centimeters) in width.

(iii) The planks shall be tied together by cleats of not less than 1 x 6 inch (2.5 x 15 centimeters) lumber, nailed on their under sides at intervals of not more than 4 feet (1.2 meters).

(iv) The planks shall extend not less than 6 inches (15 centimeters) nor more than 18 inches (45 centimeters) beyond the supporting stirrups.

(v) A cleat shall be nailed across the platform on the underside at each end outside the stirrup to prevent the platform from slipping off the stirrup.

(vi) Stirrup supports shall be not more than 10 feet (3 meters) apart.

(13) The beam-type platform consists of longitudinal side stringers with cross beams set on edge and spaced not more than 4 feet (1.2 meters) apart on which longitudinal plat form planks are laid. If this type platform is used, the following requirements shall be met:

(i) The side stringers shall be of sound, straightgrained lumber, free from knots, and of not less than 2 x 6 inch (5 x 15 centimeters) lumber, set on edge.

(ii) The stringers shall be supported on the stirrups with a clear span between stirrups of not more than 16 feet (4.8 meters).

(iii) The stringers shall be bolted to the stirrups by U-bolts passing around the stirrups and bolted through the stringers with nuts drawn up tight on the Inside face.

(iv) The ends of the stringers shall extend beyond the stirrups not less than 6 inches (15 centimeters) nor more than 12 inches (30 centimeters) at each end of the platform.

(v) The platform shall be supported on cross beams of 2 x 6 inch (5 x 15 centimeters) lumber between the side stringers securely nailed thereto and spaced not more than 4 feet (1.2 meters) on centers.

(vi) The platform shall be not more than 24 inches (60 centimeters) wide.

(vii) The platform shall be formed of boards 7/8 inch (22.2 millimeters) in thickness by not less than 6 inches (15 centimeters) in width, nailed tightly together, and extending to the outside face of the stringers.

(viii) The ends of all platform boards shall rest on the top of the cross beams, shall be securely nailed and at no intermediate points in the length of the platform shall there be any cantilever ends.

(g) Horse scaffolds. (1) The minimum dimensions of lumber used in the construction of horses shall be in accordance with Table E-3 in § 1915.118.

(2) Horses constructed of materials other than lumber shall provide the strength, rigidity and security required of horses constructed of lumber.

(3) The lateral spread of the legs shall be equal to not less than one-third of the height of the horse.

(4) All horses shall be kept in good repair, and shall be properly secured when used in staging or in locations where they may be insecure.

(5) Platform planking shall be in accordance with the requirements of paragraph (i) of this section.

(6) Backrails and toeboards shall be in accordance with paragraph (j) of this section.

(h) Other types of scaffolds.

(1) Scaffolds of a type for which specifications are not contained in this section shall meet the general requirements of paragraphs (b), (i), and (j) of this section, shall be in accordance with recognized principles of design and shall be constructed in accordance with accepted standards covering such equipment.

(i) Scaffold or platform planking.

(1) Except as otherwise provided in paragraphs (f) (11) and (13) of this section, platform planking shall be of not less than 2 x 10 inch (5 centimeters x 25 centimeters) lumber. Platform planking shall be straight-grained and free from large or loose knots and may be either rough or dressed.

(2) Platforms of staging shall be not less then two 10 inch (25 centimeters) planks in width except in such cases as the structure of the vessel or the width of the trestle ladders make it impossible to provide such a width.

(3) Platform planking shall project beyond the supporting members at either end by at least 6 inches (15 centimeters) but in no case shall project more than 12 inches (30 centimeters) unless the planks are fastened to the supporting members.

(4) Table E-4 in § 1915.118 shall be used as a guide in determining safe loads for scaffold planks.

(j) Backrails and toeboards.

(1) Scaffolding, staging, runways, or working platforms which are supported or suspended more than 5 feet (1.5 meters) above a solid surface, or at any distance above the water shall be provided with a railing which has a top rail whose upper surface is from 42 to 45 inches (105 to 112 centimeters) above the upper surface of the staging, platform, or runway and a midrail located halfway between the upper rail and the staging, platform, or runway.

(2) Rails shall be of 2 x 4 inch (5 x 10 centimeters) lumber, flat bar or pipe. When used with rigid supports, taut wire or fiber rope of adequate strength may be used. If the distance between supports is more than 8 feet (2.4 meters), rails shall be equivalent in strength to 2 x 4 inch (5 x 10 centimeters) lumber. Rails shall be firmly secured. Where exposed to hot work or chemicals, fiber rope rails shall not be used.

(3) Rails may be omitted where the structure of the vessel prevents their use. When rails are omitted, employees working more than 5 feet above (1.5 meters) solid surfaces shall be protected by safety belts and life lines meeting the requirements of § 1915.154(b), and employees working over water shall be protected by buoyant work vests meeting the requirements of § 1915.151(a).

(4) Employees working from swinging scaffolds which are triced out of a vertical line below their supports or from scaffolds on paint floats subject to surging, shall be protected against falling toward the vessel by a railing or a safety belt and line attached to the backrail.

(5) When necessary, to prevent tools and materials from falling on men below, toeboards of not less than 1 x 4 inch (25 centimeters x 10 centimeters) lumber shall be provided.

(k) Access to staging.

(1) Access from below to staging more than 5 feet (1.5 meters) above a floor, deck or the ground shall consist of well secured stairways, cleated ramps, fixed or portable ladders meeting the applicable requirements of § 1915.72 or rigid type non-collapsible trestles with parallel and level rungs.

(2) Ramps and stairways shall be provided with 36-inch (91 centimeters) handrails with midrails.

(3) Ladders shall be so located or other means shall be taken so that it is not necessary for employees to step more than one foot from the ladder to any intermediate landing or platform.

(4) Ladders forming integral parts of prefabricated staging are deemed to meet the requirements of these regulations.

(5) Access from above to staging more than 3 feet (0.9 meters) below the point of access shall consist of a straight, portable ladder meeting the applicable requirements of § 1915.72 or a Jacob's ladder properly secured, meeting the requirements of § 1915.74(d).

§1915.72—Ladders

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) General requirements.

(1) The use of ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction is prohibited. When ladders with such defects are discovered, they shall be immediately withdrawn from service. Inspection of metal ladders shall include checking for corrosion of interiors of open end, hollow rungs.

(2) When sections of ladders are spliced, the ends shall be abutted, and no fewer than 2 cleats shall be securely nailed or bolted to each rail. The combined cross sectional area of the cleats shall be not less than the cross sectional area of the side rail. The dimensions of side rails for their total length shall be those specified in paragraphs (b) or (c) of this section.

(3) Portable ladders shall be lashed, blocked or otherwise secured to prevent their being displaced. The side rails of ladders used for access to any level shall extend not less than 36 inches (91 centimeters) above that level. When this is not practical, grab rails which will provide a secure grip for an employee moving to or from the point of access shall be installed.

(4) Portable metal ladders shall be of strength equivalent to that of wood ladders. Manufactured portable metal ladders provided by the employer shall be in accordance with the provisions of the American National Standards Institute Safety Code for Portable Metal Ladders, A14.2—1972.

(5) Portable metal ladders shall not be used near electrical conductors nor for electric arc welding operations.

(6) Manufactured portable wood ladders provided by the employer shall be in accordance with the provisions of the American National Standards Institute Safety Code for Portable Wood Ladders, A14—1975.

(b) Construction of portable wood cleated ladders up to 30 feet (9 meters) in length.

(1) Wood side rails shall be made from West Coast hemlock, Eastern spruce, Sitka spruce, or wood of equivalent strength. Material shall be seasoned, straight-grained wood, and free from shakes, checks, decay or other defects which will impair its strength. The use of low density woods is prohibited.

(2) Side rails shall be dressed on all sides and kept free of splinters.

(3) All knots shall be sound and hard. The use of material containing loose knots is prohibited. Knots shall not appear on the narrow face of the rail and, when in the side face, shall not be more than 1/2 inch (1.2 centimeters) in diameter or within 1/2 inch (1.2 centimeters) of the edge of the rail or nearer than 3 inches (7.6 centimeters) to a tread or rung.

(4) Pitch pockets not exceeding 1/8 inch (0.31 centimeters) in width, 2 inches (5 centimeters) in length and 1/2 inch (1.2 centimeters) in depth are permissible in wood side rails, provided that not more than one such pocket appears in each 4 feet (1.2 meters) of length.

(5) The width between side rails at the base shall be not less than 11-1/2 inches (29.2 centimeters) for ladders 10 feet (3 meters) or less in length.

For longer ladders this width shall be increased at least 1/4 inch (6 millimeters) for each additional 2 feet (0.6 meters) in length.

(6) Side rails shall be at least 1-5/8 x 3-5/8 inches (4 x 9 centimeters) in cross section.

(7) Cleats (meaning rungs rectangular in cross section with the wide dimension parallel to the rails) shall be of the material used for side rails, straight-grained and free from knots. Cleats shall be mortised into the edges of the side rails 1/2 inch (1.2 centimeters), or filler blocks shall be used on the rails between the cleats. The cleats shall be secured to each rail with three lOd common wire nails or fastened with through bolts or other fasteners of equivalent strength. Cleats shall be uniformly spaced not more than 12 inches (30 centimeters) apart.

(8) Cleats 20 inches (50 centimeters) or less in length shall be at least 25/32 x 3 inches (1.9 x 7.6 centimeters) in cross section. Cleats over 20 inches (50 centimeters) but not more than 30 inches (76 centimeters) in length shall be at least 25/32 x 3-3/4 inches (1.9 x 9.5 centimeters) in cross section.

(c) Construction of portable wood cleated ladders from 30 feet (9 meters) to 60 feet (18 meters) in length.

(1) Ladders from 30 feet (9 meters) to 60 feet (18 meters) in length shall be in accordance with the specifications of paragraph (b) of this section with the following exceptions:

(i) Rails shall be of not less than 2 x 6 inch (5 x 15 centimeters) lumber.

(ii) Cleats shall be of not less than 1 x 4 inch (2.5 x 10 centimeters) lumber.

(iii) Cleats shall be nailed to each rail with five lOd common wire nails or fastened with through bolts or other fastenings of equivalent strength.

§1915.73—Guarding of Deck Openings and Edges

(a) The provisions of this section shall apply to ship repairing and shipbuilding operations and shall not apply to shipbreaking .

(b) When employees are working in the vicinity of flush manholes and other small openings of comparable size in the deck and other working surfaces, such openings shall be suitably covered or guarded to a height of not less than 30 inches, (76 centimeters) except where the use of such guards is made impracticable by the work actually in progress.

(c) When employees are working around open hatches not protected by coamings to a height of 24 inches (60 centimeters) or around other large openings, the edge of the opening shall be guarded in the working area to height of 36 to 42 inches (91 to 106 centimeters), except where the use of such guards is made impracticable by the work actually in progress.

(d) When employees are exposed to unguarded edges of decks, platforms, flats, and similar flat surfaces, more than 5 feet (1.5 meters) above a solid surface, the edges shall be guarded by adequate guardrails meeting the requirements of § 1915.71(j)(1) and (2), unless the nature of the work in progress or the physical conditions prohibit the use or installation of such guardrails.

(e) When employees are working near the unguarded edges of decks of vessels afloat, they shall be protected by personal flotation devices, meeting the requirements of § l9l 5.l 54(a).

(f) Sections of bilges from which floor plates or gratings have been removed shall be guarded by guardrails except where they would interfere with work in progress. If these open sections are in a walkway at least two 10-inch (25 centimeters) planks placed side by side, or equivalent, shall be laid across the opening to provide a safe walking surface.

(g) Gratings, walkways, and catwalks, from which sections or ladders have been removed, shall be barricaded with adequate guardrails.

§ 1915.74—Access to Vessels

(a) Access to vessels afloat. The employer shall not permit employees to board or leave any vessel, except a barge or river towboat, until the following requirements have been met:

(1) Whenever practicable, a gangway of not less than 20 inches (50 centimeters) walking surface of adequate strength, maintained in safe repair and safely secured shall be used. If a gangway is not practicable, a substantial straight ladder, extending at least 36 inches (91 centimeters) above the upper landing surface and adequately secured against shifting or slipping shall be provided. When conditions are such that neither a gangway nor a straight ladder can be used, a Jacob's ladder meeting the requirements of paragraphs (d)(1) and (2) of this section may be used.

(2) Each side of such gangway, and the turntable if used, shall have a railing with a minimum height of approximately 33 inches (83.8 centimeters) measured perpendicularly from rail to walking surface at the stanchion, with a mid rail. Rails shall be of wood, pipe, chain, wire or rope and shall be kept taut at all times.

(3) Gangways on vessels inspected and certificated by the U.S. Coast Guard are deemed to meet the foregoing requirements, except in cases where the vessel's regular gangway is not being used.

(4) The gangway shall be kept properly trimmed at all times.

(5) When a fixed tread accommodations ladder is used, and the angle is low enough to require employees to walk on the edge of the treads, cleated duckboards shall be laid over and secured to the ladder.

(6) When the lower end of a gangway overhangs the water between the ship and the dock in such a manner that there is danger of employees falling between the ship and the dock, a net or other suitable protection shall be rigged at the foot of the gangway in such a manner as to prevent employees from falling from the end of the gangway.

(7) If the foot of the gangway is more than one foot (30 centimeters) away from the edge of the apron, the space between them shall be bridged by a firm walkway equipped with railings, with a minimum height of approximately 33 inches (83.8 centimeters) with midrails on both sides.

(8) Supporting bridles shall be kept clear so as to permit unobstructed passage for employees using the gangway.

(9) When the upper end of the means of access rests on or is flush with the top of the bulwark, substantial steps properly secured and equipped with at least one substantial handrail approximately 33 inches (83.8 centimeters) in height shall be provided between the top of the bulwark and the deck.

(10) Obstructions shall not be laid on or across the gangway.

(11) The means of access shall be adequately illuminated for its full length.

(12) Unless the construction of the vessel makes it impossible, the means of access shall be so located that drafts of cargo do not pass over it. In any event, loads shall not be passed over the means of access while employees are on it.

(b) Access to vessels in drydock or between vessels. Gangways meeting the requirements of paragraphs (a)(1), (2), (9), (10), (11) of this section shall be provided for access from wingwall to vessel or, when two or more vessels, other than barges or river towboats, are Iying abreast, from one vessel to another.

(c) Access to barges and river rowboats.

(1) Ramps for access of vehicles to or between barges shall be of adequate strength, provided with side boards, well maintained and properly secured.

(2) Unless employees can step safely to or from the wharf, float, barge, or river towboat, either a ramp in accordance with the requirements of subparagraph (1) of this paragraph or a safe walkway in accordance with the requirements of paragraph (a)(7) of this section shall be provided. When a walkway is impracticable, a substantial straight ladder, extending at least 36 inches (91 centimeters) above the upper landing surface and adequately secured against shifting or slipping, shall be provided. When conditions are such that neither a walkway nor a straight ladder can be used, a Jacob’s ladder in accordance with the requirements of paragraph (d) of this section may be used.

(3) The means of access shall be in accordance with the requirements of paragraphs (a) (9), (10), and (11) of this section.

(d) Jacob's ladders.

(1) Jacob's ladders shall be of the double rung or flat tread type. They shall be well maintained and properly secured.

(2) A Jacob's ladder shall either hang without slack from its lashings or be pulled up entirely.

§1915.75—Access to and Guarding of Dry Docks and Marine Railways

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) A gangway, ramp or permanent stairway of not less than 20 inches (50 centimeters) walking surface, of adequate strength, maintained in safe repair and securely fastened, shall be provided between a floating dry dock and the pier or bulkhead .

(b) Each side of such gangway, ramp or permanent stairway, including those which are used for access to wing walls from dry dock floors, shall have a railing with a mid rail. Such railings on gangways or ramps shall be approximately 42 inches (106 centimeters) in height; and railings on permanent stairways shall be not less than approximately 30 inches (76 centimeters) or more than approximately 34 inches (86 centimeters) in height. Rails shall be of wood, pipe, chain, wire, or rope, and shall be kept taut at all times.

(c) Railings meeting the requirements of paragraph (b) of this section shall be provided on the means of access to and from the floors of graving docks.

(d) Railings approximately 42 inches (106 centimeters) in height, with a mid rail, shall be provided on the edges of wing walls of floating dry docks and on edges of graving docks. Sections of the railings may be temporarily removed where necessary to permit line handling while a vessel is entering or leaving the dock.

(e) When employees are working on the floor of a floating dry dock where they are exposed to the hazard of falling into the water, the end of the dry dock shall be equipped with portable stanchions and 42 inch (106 centimeters) railings with a mid rail. When such a railing would be impracticable or ineffective, other effective means shall be provided to prevent men from falling into the water.

(**f**) Access to wing walls from floors of dry docks shall be by ramps, permanent stairways or ladders meeting the applicable requirements of § 1915.72.

(**g**) Catwalks on stiles of marine railways shall be no less than 20 inches (50 centimeters) wide and shall have on at least one side a guardrail and midrail meeting the requirements of § 1915.71(j)(1) and (2).

§1915.76—Access to Cargo Spaces and Confined Spaces

The provisions of this section apply to ship repairing, shipbuilding and shipbreaking except that paragraph (a)(4) of this section applies to ship repairing only.

(a) Cargo spaces.

(1) There shall be at least one safe and accessible ladder in any cargo space which employees must enter.

(2) When any fixed ladder is visibly unsafe, the employer shall prohibit its use by employees.

(3) Straight ladders of adequate strength and suitably secured against shifting or slipping shall be provided as necessary when fixed ladders in cargo spaces do not meet the requirements of paragraph (a)(1) of this section. When conditions are such that a straight ladder cannot be used, a Jacob's ladder meeting the requirements of § 1915.74(d) may be used.

(4) When cargo is stowed within 4 inches (10 centimeters) of the back of ladder rungs, the ladder shall be deemed "unsafe" for the purpose of this section.

(5) Fixed ladders or straight ladders provided for access to cargo spaces shall not be used at the same time that cargo drafts, equipment, materials, scrap or other loads are entering or leaving the hold. Before using these ladders to enter or leave the hold, the employee shall be required to inform the winchman or crane signalman of his intention.

(b) Confined spaces

(1) More than one means of access shall be provided to a confined space in which employees are working and in which the work may generate a hazardous atmosphere in the space except where the structure or arrangement of the vessel makes this provision impractical.

(2) When the ventilation ducts required by these regulations must pass through these means of access, the ducts shall be of such a type and so arranged as to permit free passage of an employee through at least two of these means of access.

§ 1915.77—Working Surfaces

(a) Paragraphs (b) through (d) of this section shall apply to ship repairing, shipbuilding operations and shall not apply to shipbreaking. Paragraph (e) of this section shall apply to shipbuilding, ship repairing and shipbreaking operations.

(b) When firebox floors present tripping hazards of exposed tubing or of missing or removed refractory, sufficient planking to afford safe footing shall be laid while work is being carried on within the boiler.

(c) When employees are working aloft, or elsewhere at elevations more than 5 feet (1.5 meters) above a solid surface, either scaffolds or a sloping ladder, meeting the requirements of this subpart, shall be used to afford safe footing, or the employees shall be protected by safety belts and lifelines meeting the requirements of § 1915.154(b). Employees visually restricted by blasting hoods, welding helmets, and burning goggles shall work from scaffolds, not from ladders, except for the initial and final welding or burning operation to start or complete a job, such as the erection and dismantling of hung scaffolding, or other similar, nonrepetitive jobs of brief duration.

(d) For work performed in restricted quarters, such as behind boilers and in between congested machinery units and piping, work platforms at least 20 inches (50 centimeters) wide meeting the requirements of §1915.71(i)(1) shall be used. Backrails may be omitted if bulkheading, boilers, machinery units, or piping afford proper protection against falling.

(e) When employees are boarding, leaving, or working from small boats or floats, they shall be protected by personal flotation devices meeting the requirements of § 1915.154

Subpart F—General Working Conditions

§1915.91—Housekeeping

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking except that paragraphs (c) and (e) of this section do not apply to shipbreaking.

(a) Good housekeeping conditions shall be maintained at all times. Adequate aisles and passageways shall be maintained in all work areas. All staging platforms, ramps, stairways, walkways, aisles, and passageways on vessels or drydocks shall be kept clear of all tools, materials, and equipment except that which is in use, and all debris such as welding rod tips, bolts, nuts, and similar material. Hoses and electric conductors shall be elevated over or placed under the walkway or working surfaces or covered by adequate crossover planks.

(b) All working areas on or immediately surrounding vessels and drydocks, graving docks, or marine railways shall be kept reasonably free of debris, and construction material shall be so piled as not to present a hazard to employees.

(c) Slippery conditions on walkways or working surfaces shall be eliminated as they occur.

(d) Free access shall be maintained at all times to all exits and to all fire-alarm boxes or fire-extinguishing equipment.

(e) All oils, paints thinners, solvents, waste, rags, or other flammable substances shall be kept in fire resistant covered containers when not in use.

§1915.92—Illumination

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) All means of access and walkways leading to working areas as well as the working areas themselves shall be adequately illuminated.

(b) Temporary lights shall meet the following requirements:

(1) Temporary lights shall be equipped with guards to prevent accidental contact with the bulb, except that guards are not required when the construction of the reflector is such that the bulb is deeply recessed.

(2) Temporary lights shall be equipped with heavy duty electric cords with connections and insulation maintained in safe condition. Temporary lights shall not be suspended by their electric cords unless cords and lights are designed for this means of suspension. Splices which have insulation equal to that of the cable are permitted.

(3) Cords shall be kept clear of working spaces and walkways or other locations in which they are readily exposed to damage.

(c) Exposed non-current-carrying metal parts of temporary lights furnished by the employer shall be grounded either through a third wire in the cable containing the circuit conductors or through a separate wire which is grounded at the source of the current. Grounding shall be in accordance with the requirements of § 1915.132 (b).

(d) Where temporary lighting from sources outside the vessel is the only means of illumination, portable emergency lighting equipment shall be available to provide illumination for safe movement of employees.

(e) Employees shall not be permitted to enter dark spaces without a suitable portable light. The use of matches and open flame lights is prohibited. In non gas-free spaces, portable lights shall meet the requirements of § 1915.13.

(f) Temporary lighting stringers or streamers shall be so arranged as to avoid overloading of branch circuits. Each branch circuit shall be equipped with overcurrent protection of capacity not exceeding the rated current carrying capacity of the cord used.

§1915.93—Utilities

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking except that paragraph (c) of this section applies to ship repairing and shipbuilding only.

(a) Steam supply and hoses.

(1) Prior to supplying a vessel with steam from a source outside the vessel, the employer shall ascertain from responsible vessel's representatives, having knowledge of the condition of the plant, the safe working pressure of the vessel's steam system. The employer shall install a pressure gauge and a relief valve of proper size and capacity at the point where the temporary steam hose joins the vessel's steam piping system or systems. The relief valve shall be set and capable of relieving at a pressure not exceeding the safe working pressure of the vessel's system in its present condition, and there shall be no means of isolating the relief valve from the system which it protects. The pressure gauge and relief valve shall be located so as to be visible and readily accessible.

(2) Steam hose and fittings shall have a safety factor of not less than 5.

(3) When a steam hose is hung in a bight or bights, the weight shall be relieved by appropriate lines. The hose shall be protected against chafing.

(4) Steam hose shall be protected from damage and hose and temporary piping shall be so shielded where passing through normal work areas as to prevent accidental contact by employees.

(b) Electric power.

(1) When the vessel is supplied with electric power from a source outside the vessel, the following precautions shall be taken prior to energizing the vessel's circuits:

(i) If in dry dock, the vessel shall be adequately grounded .

(ii) The employer shall ascertain from responsible vessel's representatives, having knowledge of the condition of the vessel's electrical system, that all circuits to be energized are in a safe condition.

(iii) All circuits to be energized shall be equipped with overcurrent protection of capacity not exceeding the rated current carrying capacity of the cord used.

(c) Infrared electrical heal lamps.

(1) All infrared electrical heat lamps shall be equipped with guards that surround the lamps with the exception of the face, to minimize accidental contact with the lamps .

§1915.94—Work In Confined or Isolated Spaces

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking. When any work is performed in a confined space, except as provided in § 1915.51(c)(3), or when an employee is working alone in an isolated location, frequent checks shall be made to ensure the safety of the employees.

§1915.95—Work On or In the Vicinity of Radar and Radio

The provisions of this section shall apply to ship repairing and shipbuilding.

(a) No employees other than radar or radio repairmen shall be permitted to work on masts, king posts or other aloft areas unless the radar and radio are secured or otherwise

made incapable of radiation. In either event, the radio and radar shall be appropriately tagged.

(b) Testing of radar or radio shall not be done until the employer can schedule such tests at a time when no work is in progress aloft or personnel can be cleared from the danger area according to minimum safe distances established for and based on the type, model, and power of the equipment.

§1915.96—Work In or On Lifeboats

The provisions of this section shall apply to ship repairing, shipbuilding, and shipbreaking except that paragraph (b) of this section applies to ship repairing and shipbuilding only.

(a) Before employees are permitted to work in or on a lifeboat, either stowed or in a suspended position, the employer shall ensure that the boat is secured independently of the releasing gear to prevent the boat from falling due to accidental tripping of the releasing gear and movement of the davits or capsizing of a boat in chocks .

(b) Employees shall not be permitted to remain in boats while the boats are being hoisted into final stowed position.

(c) Employees shall not be permitted to work on the outboard side of lifeboats stowed on their chocks unless the boats are secured by gripes or otherwise secured to prevent them from swinging outboard.

§1915.97—Health and Sanitation

The provisions of this section shall apply to ship repairing, shipbuilding, and shipbreaking except where indicated otherwise.

(a) The employer shall provide all necessary controls, and the employees shall be protected by suitable personal protective equipment against the hazards identified under § 1915.99 of this part and those hazards for which specific precautions are required in Subparts B, C, and D of this part.

(b) The employer shall provide adequate washing facilities for employees engaged in the application of paints or coatings or in other operations where contaminants can, by ingestion or absorption, be detrimental to the health of the employees. The employer shall encourage good personal hygiene practices by informing the employees of the need for removing surface contaminants by thorough washing of hands and face prior to eating or smoking.

(c) The employer shall not permit employees to eat or smoke in areas undergoing surface preparation or preservation or where shipbreaking operations produce atmospheric contaminants.

(d) The employer shall not permit employees engaged in ship repair work on a vessel to work in the immediate vicinity of uncovered garbage and shall ensure that employees working beneath or on the outboard side of a vessel are not subject to contamination by drainage or waste from overboard discharges.

(e) No minor under 18 years of age shall be employed in shipbreaking or related employments.

§1915.98—First Aid

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Unless a first aid room and a qualified attendant are close at hand and prepared to render first aid to employees on behalf of the employer, the employer shall furnish a first aid kit for each vessel on which work is being performed except that when work is being performed on more than one small vessel at one pier, only one kit shall be required. The kit, when required, shall be kept close to the vessel and at least one employee, close at hand, shall be qualified to administer first aid to the injured.

(b) The first aid kit shall consist of a weatherproof container with individual sealed packages for each type of item: The contents of such kit shall contain a sufficient quantity of at least the following types of item:

Gauze roller bandages, 1 inch (2.5 centimeters) and 2 inch (5 centimeters). Gauze compress bandages, 4 inch (10 centimeters). Adhesive bandages, 1 inch (2.5 centimeters). Triangular bandage, 40 inch (100 centimeters). Ammonia inhalants and ampules. Antiseptic applicators or swabs. Burn dressing. Eye dressing. Wire or thin board splints. Forceps and tourniquet.

(c) The contents of the first aid kit shall be checked before being sent out on each job and at least weekly on each job to ensure that the expended items are replaced.

(d) There shall be available lor each vessel on which 10 or more employees are working one Stokes basket stretcher. or equivalent, permanently equipped with bridles for attaching to the hoisting gear, except that no more than

two stretchers are required on each job location. A blanket or other liner suitable for transferring the patient to and from the stretcher shall be provided. Stretchers shall be kept close to the vessels. This paragraph does not apply where ambulance services which are available are known to carry such stretchers.

1915.100—Retention of DOT markings, placards, and labels

(a) Any employer who receives a package of hazardous material which is required to be marked, labeled or placarded in accordance with the U.S. Department of Transportation's Hazardous Materials Regulations (49 CFR parts 171 through 180) shall retain those markings, labels, and placards on the package until the packaging is sufficiently cleaned of residue and purged of vapors to remove any potential hazards.

(b) Any employer who receives a freight container, rail freight car, motor vehicle, or transport vehicle that is required to be marked or placarded in accordance with the Hazardous Materials Regulations shall retain those markings and placards on the freight container, rail freight car, motor vehicle or transport vehicle until the hazardous materials which require the marking or placarding are sufficiently removed to prevent any potential hazards.

(c) Markings, placards, and labels shall be maintained in a manner that ensures that they are readily visible.

(d) For non-bulk packages which will not be reshipped, the provisions of this section are met if a label or other acceptable marking is affixed in accordance with the Hazard Communication Standard (29 CFR 1910.1200).

(e) For the purposes of this section, the term "hazardous material" and any other terms not defined in this section have the same definition as in the Hazardous Materials Regulations (49 CFR parts 171 through 180).

Subpart G—Gear and Equipment for Rigging and Materials Handling

§ 1915.111—Inspection

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) All gear and equipment provided by the employer for rigging and materials handling shall be inspected before

each shift and when necessary at intervals during its use to ensure that it is safe. Defective gear shall be removed and repaired or replaced before further use.

(b) The safe working load of gear as specified in §§ 1915.112 and 1915.113 shall not be exceeded.

§1915.112—Ropes, Chains and Slings

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Manila rope and manila rope slings.

(1) Table G-l in § 1915.118 shall be used to determine the safe working load of various sizes of manila rope and manila rope slings at various angles, except that higher safe working loads are permissible when recommended by the manufacturer for specific, identifiable products, provided that a safety factor of not less than 5 is maintained.

(b) Wire rope and wire rope slings.

(1) Tables G-2 through G-5 in § 1915.118 shall be used to determine the safe working loads of various sizes and classifications of improved plow steel wire rope and wire rope slings with various types of terminals. For sizes, classifications and grades are included in these tables. The safe working load recommended by the manufacturer for specific, identifiable products shall be followed, provided that a safety factor of not less than 5 is maintained .

(2) Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

(3) Where U-bolt wire rope clips are used to form eyes, Table G-6 in § 1915.118 shall be used to determine the number and spacing of clips. The U-bolt shall be applied so that the “U” section is in contact with the dead end of the rope.

(4) Wire rope shall not be secured by knots.

(c) Chains and chain slings.

(1) Tables G-7 and G-8 in § 1915.118 shall be used to determine the working load limit of various sizes of wrought iron and alloy steel chains and chain slings, except that higher safe working loads are permissible

when recommended by the manufacturer for specific, identifiable products.

(2) All sling chains, including end fastenings, shall be given a visual inspection before being used on the job. A thorough inspection of all chains in use shall be made every 3 months. Each chain shall bear an indication of the month in which it was thoroughly inspected. The thorough inspection shall include inspection for wear, defective welds, deformation and increase in length or stretch .

(3) Interlink wear, not accompanied by stretch in excess of 5 percent, shall be noted and the chain removed from service when maximum allowable wear at any point of link, as indicated in Table G-9 in § 1915.118 has been reached .

(4) Chain slings shall be removed from service when, due to stretch, the increase in length of a measured section exceeds 5 percent; when a link is bent, twisted or otherwise damaged; or when raised scarfs or defective welds appear.

(5) All repairs to chains shall be made under qualified supervision. Links or portions of the chain found to be defective as described in paragraph (c)(4) of this section shall be replaced by links having proper dimensions and made of material similar to that of the chain. Before repaired chains are returned to service, they shall be proof tested to the proof test load recommended by the manufacturer.

(6) Wrought iron chains in constant use shall be annealed or normalized at intervals not exceeding 6 months when recommended by the manufacturer. The chain manufacturer shall be consulted for recommended procedures for annealing or normalizing. Alloy chains shall never be annealed.

§ 1915.113—Shackles and Hooks

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Shackles.

(1) Table G-10 in § 1915.118 shall be used to determine the safe working loads of various sizes of shackles. except that higher safe working loads are permissible when recommended by the manufacturer for specific,

identifiable products, provided that a safety factor of not less than 5 is maintained.

(b) Hooks.

(1) The manufacturers' recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall be tested to twice the intended safe working load before they are initially put into use. The employer shall maintain and keep readily available a certification record which includes the date of such tests, the signature of the person who performed the test and an identifier for the hook which was tested.

(2) Loads shall be applied to the throat of the hook since loading the point overstresses and bends or springs the hook.

(3) Hooks shall be inspected periodically to see that they have not been bent by overloading. Bent or sprung hooks shall not be used.

§1915.114—Chain Falls and Pull-Lifts

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Chain falls and pull-lifts shall be clearly marked to show the capacity and the capacity shall not be exceeded.

(b) Chain falls shall be regularly inspected to ensure that they are safe, with particular attention being given to the lift chain, pinion, sheaves, and hooks for distortion and wear. Pull-lifts shall be regularly inspected to ensure that they are safe, with particular attention being given to the ratchet, pawl, chain, and hooks for distortion and wear.

(c) Straps, shackles, and the beam or overhead structure to which a chain fall or pull-lift is secured shall be of adequate strength to support the weight of load plus gear. The upper hook shall be moused or otherwise secured against coming free of its support.

(d) Scaffolding shall not be used as a point of attachment for lifting devices such as tackles, chain falls, and pull-lifts unless the scaffolding is specifically designed for that purpose.

§1915.115—Hoisting and Hauling Equipment

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Derrick and crane certification:

(1) Derricks and cranes which are part of, or regularly placed aboard barges, other vessels, or on wingwalls of floating drydocks, and are used to transfer materials or equipment from or to a vessel or drydock, shall be tested and certificated in accordance with the standards provided in Part 1919 of this title by persons accredited for the purpose.

(b) The moving parts of hoisting and hauling equipment shall be guarded.

(c) Mobile crawler for truck cranes used on a vessel:

(1) The maximum manufacturer's rated safe working loads for the various working radii of the boom and the maximum and minimum radii at which the boom may be safely used with and without outriggers shall be conspicuously posted near the controls and shall be visible to the operator. A radius indicator shall be provided.

(2) The posted safe working loads of mobile crawler or truck cranes under the conditions of use shall not be exceeded.

(d) Accessible areas within the swing radius of the outermost part of the body of a revolving derrick or crane whether permanently or temporarily mounted, shall be guarded in such a manner as to prevent an employee from being in such a position as to be struck by the crane or caught between the crane and fixed parts of the vessel or of the crane itself.

(e) Marine railways.

(1) The cradle or carriage on the marine railway shall be positively blocked or secured when in the hauled position to prevent it from being accidentally released.

§1915.116—Use of Gear

(a) The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking except that paragraphs (c) and (d) of this section shall apply to ship repairing and shipbuilding only.

(b) Loads shall be safely rigged before being hoisted.

(c) Plates shall be handled on and off hulls by means of shackles whenever possible. Clips or pads of ample size shall be welded to the plate to receive the shackle pins when there are no holes in the plate. When it is not possible to make holes in or to weld pads to the plate, alligator tongs, grab clamps or screw clamps may be used. In such cases special precautions shall be taken to keep employees from under such lifts.

(d) Tag lines shall be provided on loads likely to swing or to need guidance.

(e) When slings are secured to eye-bolts, the slings shall be so arranged, using spreaders if necessary, that the pull is within 20 degrees of the axis of the bolt.

(f) Slings shall be padded by means of wood blocks or other suitable material where they pass over sharp edges or corners of loads so as to prevent cutting or kinking.

(g) Skips shall be rigged to be handled by not less than 3 legged bridles, and all legs shall always be used. When open end skips are used, means shall be taken to prevent the contents from falling.

(h) Loose ends of idle legs of slings in use shall be hung on the hook.

(i) Employees shall not be permitted to ride the hook or the load.

(j) Loads (tools, equipment or other materials) shall not be swung or suspended over the heads of employees.

(k) Pieces of equipment or structure susceptible to falling or dislodgement shall be secured or removed as early as possible .

(l) An individual who is familiar with the signal code in use shall be assigned to act as a signalman when the hoist operator cannot see the load being handled. Communications shall be made by means of clear and distinct visual or auditory signals except that verbal signals shall not be permitted.

(m) Pallets, when used, shall be of such material and construction and so maintained as to safely support and carry the loads being handled on them.

(n) A section of hatch through which materials or equipment are being raised, lowered moved, or otherwise shifted manually or by a crane winch, hoist, or derrick, shall be completely opened. The beam or pontoon left in place adjacent to an opening shall be sufficiently lashed, locked or otherwise secured to prevent it from being unshipped so that it cannot be displaced by accident.

(o) Hatches shall not be open or closed while employees are in the square of the hatch below.

(p) Before loads or empty lifting gear are raised, lowered, or swung, clear and sufficient advance warning shall be given to employees in the vicinity of such operations.

(q) At no time shall an employee be permitted to place himself in a hazardous position between a swinging load and a fixed object.

§1915.117—Qualifications of Operators

Paragraphs (a) and (d) of this section shall apply to ship repairing and shipbuilding only. Paragraphs (b) and (c) of this section shall apply to ship repairing, shipbuilding, and shipbreaking.

(a) When ship's gear is used to hoist materials aboard, a competent person shall determine that the gear is properly rigged, that it is in safe condition. and that it will not be overloaded by the size and weight of the lift.

(b) Only those employees who understand the signs, notices, and operating instructions, and are familiar with the signal code in use, shall be permitted to operate a crane, winch, or other power operated hoisting apparatus.

(c) No employee known to have defective uncorrected eyesight or hearing, or to be suffering from heart disease, epilepsy, or similar ailments which may suddenly incapacitate him, shall be permitted to operate a crane, winch or other power operated hoisting apparatus.

(d) No minor under 18 years of age shall be employed in occupations involving the operation of any power-driven hoisting apparatus or assisting in such operations by work such as hooking on, loading slings, rigging gear, etc.

§ 1915.118—Tables

The provisions of this section apply to ship repairing, shipbuilding and shipbreaking.

Table E-1.—Dimensions and Spacing of Wood Independent-Pole Scaffold Members

Structural members	Light duty (UP to 25 pounds per square foot)—Height in feet			Heavy duty (25 to 75 pounds per square foot)—Height in feet		
	24 or less	24–40	40–60	24 or less	24–40	40–60
Poles or uprights (in inches)	2 x 4	3 x 4 or	4 x 4	3 x 4	4 x 4	4 x 6
	2 x 6					
Bearers (in inches)	2 x 6	2 x 6	2 x 6	2 x 8	2 x 8	2 x 10
Ledgers (in inches)	2 x 6	2 x 6	2 x 6	2 x 8	2 x 8	2 x 8
Stringers (not supporting bearers) (in inches)	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6
Braces (in inches)	1 x 4	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6
Pole spacing—longitudinally (in feet)	7 1/2	7 1/2	7 1/2	7	7	7
Pole spacing—transversely (in feet)	6 1/2 min	7 1/2 min	8 1/2 min	6 1/2	10	10
Ledger spacing—vertically (in feet)	7	7	7	4 1/2	4 1/2	4 1/2

Table E-2.—Specifications for Side Rails of Ladders

Length (in feet)	Cross section (in inches)	
	At ends	At center
15	$1^{7}/_{8}$ x $2^{3}/_{4}$	$1^{7}/_{8}$ x $3^{3}/_{4}$
16	$1^{7}/_{8}$ x $2^{3}/_{4}$	$1^{7}/_{8}$ x $3^{3}/_{4}$
18	$1^{7}/_{8}$ x 3	$1^{7}/_{8}$ x 4
20	$1^{7}/_{8}$ x 3	$1^{7}/_{8}$ x 4
24	$1^{7}/_{8}$ x 3	$1^{7}/_{8}$ x $4^{1}/_{2}$

Table E-3.—Specifications for the Construction of Horses

Structural members	Height in feet		
	Up to 10	10 to 16	16 to 20
	inches	*inches*	*inches*
Legs	2 x 4	3 x 4	4 x 6
Bearers or headers	2 x 6	2 x 8	4 x 6
Crossbraces	2 x 4 or 1 x 8	2 x 4	2 x 6
Longitudinal braces	2 x 4	2 x 6	2 x 6

Table E-4.—Safe Center Loads for Scaffold Plank of 1,100 Pounds Fibre Stress

Span in feet	Lumber dimensions in inches									
	A	B	A	B	A	B	A	B	A	B
	2 x 10	$1^{5}/_{8}$ x $9^{1}/_{2}$	2 x 12	$1^{5}/_{8}$ x $11^{1}/_{2}$	3 x 8	$2^{5}/_{8}$ x $7^{1}/_{2}$	3 x 10	$2^{5}/_{8}$ x $9^{1}/_{2}$	3 x 12	$2^{5}/_{8}$ x $11^{1}/_{2}$
6	256		309		526		667		807	
8	192		232		395		500		605	
10	153		186		316		400		484	
12	128		155		263		333		404	
14	110		133		225		286		346	
16			116		197		250		303	

(A)—Rough lumber.
(B)—Dressed lumber.

Table G-1.—Manila Rope
[In pounds or tons of 2,000 pounds]

Circumferences	Diameter in inches	Single leg	60° bridle	45° bridle	30° bridle
		lbs.	lbs.	lbs.	lbs.
3/4	1/4	120	204	170	120
1	5/16	200	346	282	200
1 1/8	3/8	270	467	380	270
1 1/4	7/16	350	605	493	350
1 3/8	1 15/32	450	775	635	450
1 1/2	1/2	530	915	798	530
1 3/4	9/16	690	1190	973	690
2	5/8	880	1520	1240	880
2 1/4	3/4	1080	1870	1520	1080
2 1/2	1 13/16	1300	2250	1830	1300
2 3/4	7/8	1540	2660	2170	1540
3	1	1800	3120	2540	1800
		Tons	Tons	Tons	Tons
3 1/4	1 1/16	1.0	1.7	1.4	1.0
3 1/2	1 1/8	1.2	2.1	1.7	1.2
3 3/4	1 1/4	1.35	2.3	1.9	1.35
4	1 5/16	1.5	2.6	2.1	1.5
4 1/2	1 1/2	1.8	3.1	2.5	1.8
5	1 5/8	2.25	3.9	3.2	2.25
5 1/2	1 3/4	2.6	4.5	3.7	2.6
6	2	3.1	5.4	4.4	3.1
6 1/2	2 1/8	3.6	6.2	5.1	3.6

Table G-2.—Rated Capacities for Improved Plow Steel, Independent Wire Rope Core, Wire Rope and Wire Rope Slings
[In tons of 2,000 pounds]

Rope diameter	Single leg					
	Vertical			Choker		
	A	B	C	A	B	C
	6 x 19 Classification					
1/4"	.59	.56	.53	.44	.42	.40
3/8"	1.3	1.2	1.1	.98	.93	.86
1/2"	2.3	2.2	2.0	1.7	1.6	1.5
5/8"	3.6	3.4	3.0	2.7	2.5	2.2
3/4"	5.1	4.9	4.2	3.8	3.6	3.1
7/8"	6.9	6.6	5.5	5.2	4.9	4.1
1"	9.0	8.5	7.2	6.7	6.4	5.4
1 1/8"	11	10	9.0	8.5	7.8	6.8
	6 x 37 Classification					
1 1/4"	13	12	10	9.9	9.2	7.9
1 3/8"	16	15	13	12	11	9.6
1 1/2"	19	17	15	14	13	11
1 3/4"	26	24	20	19	18	15
2"	33	30	26	25	23	20
2 1/4"	41	38	33	31	29	25

(A)—Socket or Swaged Terminal attachment.
(B)—Mechanical Sleeve attachment.
(C)—Hand Tucked Splice attachment.

Table G-3.—Rated Capacities for Improved Plow Steel, Independent Wire Rope Core, Wire Rope Slings
[In tons of 2,000 pounds]

Rope diameter	Two-leg bridle or basket hitch											
	Vertical			60° Bridle			45° Bridle			30° Bridle		
	A	B	C	A	B	C	A	B	C	A	B	C
	6 x 19 Classification											
1/4"	1.2	1.1	1.0	1.0	.97	.92	.83	.79	.75	.59	.56	.53
3/8"	2.6	2.5	2.3	2.3	2.1	2.0	1.8	1.8	1.6	1.3	1.2	1.1
1/2"	4.6	4.4	3.9	4.0	3.8	3.4	3.2	3.1	2.8	2.3	2.2	2.0
5/8"	7.2	6.8	6.0	6.2	5.9	5.2	5.1	4.8	4.2	3.6	3.4	3.0
3/4"	10	9.7	8.4	8.9	8.4	7.3	7.2	6.9	5.9	5.1	4.9	4.2
7/8"	14	13	11	12	11	9.6	9.8	9.3	7.8	6.9	6.6	5.5
1"	18	17	14	15	15	12	13	12	10	9.0	8.5	7.2
1 1/8"	23	21	18	19	18	16	16	15	13	11	10	9.0
	6 x 37 Classification											
1 1/4"	26	24	21	23	21	18	19	17	15	13	12	10
1 3/8"	32	29	25	28	25	22	22	21	18	16	15	13
1 1/2"	38	35	30	33	30	26	27	25	21	19	17	15
1 3/4"	51	47	41	44	41	35	36	33	29	26	24	20
2"	66	64	53	57	53	46	47	43	37	33	30	26
2 1/4"	83	76	66	72	66	57	58	54	47	41	38	33

(A)—Socket or Swaged Terminal Attachment.
(B)—Mechanical Sleeve Attachment.
(C)—Hand Tucked Splice Attachment.

Table G-5.—Rated Capacities for Improved Plow Steel, Fiber Core, Wire Rope Slings
[In tons of 2,000 pounds]

Rope diameter	Two-leg bridle or basket hitch											
	Vertical			60° Bridle			45° Bridle			30° Bridle		
	A	B	C	A	B	C	A	B	C	A	B	C
	6 x 19 Classification											
1/4"	1.1	1.0	.99	.95	.88	.85	.77	.72	.70	.55	.51	.49
3/8"	2.4	2.2	2.1	2.1	1.9	1.8	1.7	1.6	1.5	1.2	1.1	1.1
1/2"	4.3	3.9	3.7	3.7	3.4	3.2	3.0	2.8	2.6	2.1	2.0	1.8
5/8"	6.7	6.2	5.6	5.8	5.3	4.8	4.7	4.4	4.0	3.3	3.1	2.8
3/4"	9.5	8.8	7.8	8.2	7.6	6.8	6.7	6.2	5.5	4.8	4.4	3.9
7/8"	13	12	10	11	10	8.9	9.1	8.4	7.3	6.4	5.9	5.1
1"	17	15	13	14	13	11	12	11	9.4	8.4	7.7	6.7
1 1/8"	21	19	17	18	16	14	15	13	12	10	9.5	8.4
	6 x 37 Classification											
1 1/4"	25	22	20	21	19	17	17	16	14	12	11	9.8
1 3/8"	30	27	24	26	23	20	21	19	17	15	13	12
1 1/2"	35	32	28	30	27	24	25	22	20	17	16	14
1 3/4"	48	43	38	41	37	33	34	30	27	24	21	19
2"	62	55	49	53	48	43	43	39	35	31	28	25

(A)—Socket or Swaged Terminal Attachment.
(B)—Mechanical Sleeve Attachment.
(C)—Hand Tucked Splice Attachment.

Table G-4.—Rated Capacities for Improved Plow Steel, Fiber Core, Wire Rope and Wire Rope Slings
[In tons of 2,000 pounds]

Rope diameter	Single leg					
	Vertical			Choker		
	A	B	C	A	B	C
	6 x 19 Classification					
1/4"	.55	.51	.49	.41	.38	.37
3/8"	1.2	1.1	1.1	.91	.85	.80
1/2"	2.1	2.0	1.8	1.6	1.5	1.4
5/8"	3.3	3.1	2.8	2.5	2.3	2.1
3/4"	4.8	4.4	3.9	3.6	3.3	2.9
7/8"	6.4	5.9	5.1	4.8	4.5	3.9
1"	8.4	7.7	6.7	6.3	5.8	5.0
1 1/8"	10	9.5	8.4	7.9	7.1	6.3
	6 x 37 Classification					
1 1/4"	12	11	9.8	9.2	8.3	7.4
1 3/8"	15	13	12	11	10	8.9
1 1/2"	17	16	14	13	12	10
1 3/4"	24	21	19	18	16	14
2"	31	28	25	23	21	18

(A)—Socket or Swaged Terminal attachment.
(B)—Mechanical Sleeve attachment.
(C)—Hand Tucked Splice attachment.

Table G-6.—Number and Spacing of U-Bolt Wire Rope Clips

Improved plow steel, rope diameter, inches	Number of clips		Minimum spacing, inches
	Drop forged	Other material	
([1])			
1/2	3	4	3
5/8	3	4	3 3/4
3/4	4	5	4 1/2
7/8	4	5	5 1/4
1	4	6	6
1 1/8	5	6	6 3/4
1 1/4	5	7	7 1/2
1 3/8	6	7	8 1/4
1 1/2	6	8	9

[1]Three clips shall be used on wire size less than 1/2-inch diameter.

Table G-7.—Wrought Iron Chain [In pounds or tons of 2,000 pounds]

Nominal size chain stock	Single leg	60° bridle	45° bridle	30° bridle
1/4"[1]	1060	1835	1500	1060
5/16"[1]	1655	2865	2340	1655
3/8"[1]	2835	2.1	3370	2385
7/16"[1]	3250	2.8	2.3	3250
1/2"	2.1	3.7	3.0	2.1
9/16"[1]	2.7	4.6	3.8	2.7
5/8"	3.3	5.7	4.7	3.3
3/4"	4.8	8.3	6.7	4.8
7/8"	6.5	11.2	9.2	6.5
1"	8.5	14.7	12.0	8.5
1 1/8"	10.0	17.3	14.2	10.0
1 1/4"	12.4	21.4	17.5	12.4
1 3/8"	15.0	25.9	21.1	15.0
1 1/2"	17.8	30.8	25.2	17.8
1 5/8"	20.9	36.2	29.5	20.9
1 3/4"	24.2	42.0	34.3	24.2
1 7/8"	27.6	47.9	39.1	27.6
2"	31.6	54.8	44.8	31.6

[1]These sizes of wrought iron chain are no longer manufactured in the United States.

Table G-8.—Alloy Steel Chain
[In tons of 2,000 pounds]

Nominal size chain stock	Single leg	60° bridle	45° bridle	30° bridle
1/4"	1.62	2.82	2.27	1.62
3/8"	3.30	5.70	4.65	3.30
1/2"	5.62	9.75	7.90	5.62
5/8"	8.25	14.25	11.65	8.25
3/4"	11.5	19.9	16.2	11.5
7/8"	14.3	24.9	20.3	14.3
1"	19.3	33.5	27.3	19.8
1 1/8"	22.2	38.5	31.5	22.2
1 1/4"	28.7	49.7	40.5	28.7
1 3/8	33.5	58.0	47.0	33.5
1 1/2"	39.7	68.5	56.0	39.7
1 5/8"	42.5	73.5	59.5	42.5
1 3/4"	47.0	81.5	62.0	47.0

Table G-9.—Maximum Allowable Wear at Any Point of Link

Chain size in inches	Maximum allowable wear in fraction of inches
1/4 (9/32)	3/64
3/8	5/64
1/2	7/64
5/8	9/64
3/4	5/32
7/8	11/64
1	3/16
1 1/8	7/32
1 1/4	1/4
1 3/8	9/32
1 1/2	5/16
1 3/4	11/32

Table G-10.—Safe Working Loads for Shackles
[In tons of 2,000 pounds]

Material size (inches)	Pin diameter (inches)	Safe working load
1/2	5/8	1.4
5/8	3/4	2.2
3/4	7/8	3.2
7/8	1	4.3
1	1 1/8	5.6
1 1/8	1 1/4	6.7
1 1/4	1 3/8	8.2
1 3/4	1 1/2	10.0
1 1/2	1 5/8	11.9
1 3/4	2	16.2
2	1/4	21.2

Table I-1.—Filter Lenses for Protection Against Radiant Energy

Operation	Shade No.
Soldering	2.
Torch Brazing	3 or 4.
Light cutting, up to 1 inch	3 or 4.
Medium cutting, 1-6 inches	4 or 5.
Heavy cutting, over 6 inches	5 or 6.
Light gas welding, up to 1/8 inch	4 or 5.
Medium gas welding, 1/8-1/2 inch	5 or 6.
Heavy gas welding, over 1/2 inch	6 or 8.
Shielded Metal-Arc Welding	
1/16 to 5/32-inch electrodes	10.
Inert-gas Metal-Arc Welding (Non-ferrous)	
1/16- to 5/32-inch electrodes	11.
Shielded Metal-Arc Welding:	
3/16- to 1/4-inch electrodes	12.
5/16- and 3/8-inch electrodes	14.

Subpart H—Tools and Related Equipment

§1915.131—General Precautions

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Hand lines, slings, tackles of adequate strength, or carriers such as tool bags with shoulder straps shall be provided and used to handle tools, materials, and equipment so that employees will have their hands free when using ship's ladders and access ladders. The use of hose or electric cords for this purpose is prohibited.

(b) When air tools of the reciprocating type are not in use, the dies and tools shall be removed.

(c) All portable, power-driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work the lower guard shall automatically and instantly return to the covering position.

(d) The moving parts of machinery on drydock shall be guarded.

(e) Before use, pneumatic tools shall be secured to the extension hose or whip by some positive means to prevent the tool from becoming accidentally disconnected from the whip.

(f) The moving parts of drive mechanisms, such as gearing and belting on large portable tools, shall be adequately guarded.

(g) Headers, manifolds and widely spaced hose connections on compressed air lines shall bear the word "air" in letters at least 1 inch (25 millimeters) high, which shall be painted either on the manifold or separate hose connections, or on signs permanently attached to the manifolds or connections. Grouped air connections may be marked in one location.

(h) Before use, compressed air hose shall be examined. Visibly damaged and unsafe hose shall not be used.

§1915.132—Portable Electric Tools

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking except that paragraph (e) of this section applies to ship repairing only.

(a) The frames of portable electric tools and appliances, except double insulated tools approved by Underwriters' Laboratories, shall be grounded either through a third wire in the cable containing the circuit conductors or through a separate wire which is grounded at the source of the current.

(b) Grounding circuits, other than by means of the structure of the vessel on which the tool is being used, shall be checked to ensure that the circuit between the ground and the grounded power conductor has resistance which is low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

(c) Portable electric tools which are held in the hand shall be equipped with switches of a type which must be manually held in the closed position.

(d) Worn or frayed electric cables shall not be used.

(e) The employer shall notify the officer in charge of the vessel before using electric power tools operated with the vessel's current.

§1915.133—Hand Tools

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Employers shall not issue or permit the use of unsafe hand tools.

(b) Wrenches, including crescent, pipe, end and socket wrenches, shall not be used when jaws are sprung to the point that slippage occurs.

(c) Impact tools, such as drift pins, wedges, and chisels shall be kept free of mushroomed heads.

(d) The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

§1915.134—Abrasive Wheels

This section shall apply to ship repairing, shipbuilding, and shipbreaking.

(a) Floors and and bench mounted abrasive wheels used for external grinding shall be provided with safety guards (protection hoods). The maximum angular exposure of the grinding wheel periphery and sides shall be not more than 90 degrees, except that when work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 125 degrees. In either case the exposure shall begin not more than 65 degrees above the horizontal plane of the spindle. Safety guards shall be strong enough to withstand the effect of a bursting wheel.

(b) Floor and bench mounted grinders shall be provided with work rests which are rigidly supported and readily adjustable. Such work rests shall be kept a distance not to exceed 1/8 inch (3 millimeters) from the surface of the wheel.

(c) Cup type wheels used for external grinding shall be protected by either a revolving cup guard or a band type guard in accordance with the provisions of the United States of America Standard Safety Code for the Use, Care, and Protection of Abrasive Wheels, B7.1. All other portable abrasive wheels used for external grinding shall be provided with safety guards (protection hoods) meeting the requirements of paragraph (e) of this section, except as follows:

(1) When the work location makes it impossible, in which case a wheel equipped with safety flanges as described in paragraph (f) of this section shall be used.

(2) When wheels 2 inches (5 centimeters) or less in diameter which are securely mounted on the end of a steel mandrel are used.

(d) Portable abrasive wheels used for internal grinding shall be provided with safety flanges (protection flanges) meeting the requirements of paragraph (f) of this section, except as follows:

(1) When wheels 2 inches (5 centimeters) or less in diameter which are securely mounted on the end of a steel mandrel are used.

(2) If the wheel is entirely within the work being ground while in use.

(e) When safety guards are required, they shall be so mounted as to maintain proper alignment with the wheel, and the guard and its fastenings shall be of sufficient strength to retain fragments of the wheel in case of accidental breakage. The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 180 degrees.

(f) When safety flanges are required they shall be used only with wheels designed to fit the flanges. Only safety flanges of a type and design and properly assembled so as to insure that the pieces of the wheel will be retained in case of accidental breakage shall be used.

(g) All abrasive wheels shall be closely inspected and ring tested before mounting to ensure that they are free from cracks or defects.

(h) Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place.

(i) The power supply shall be sufficient to maintain the rated spindle speed under all conditions of normal grinding. The rated maximum speed of the wheel shall not be exceeded.

(j) All employees using abrasive wheels shall be protected by eye protection equipment in accordance with the requirements of §§ 1915.151(a) and (b), except when adequate eye protection is afforded by eye shields which are permanently attached to the bench or floor stand.

§1915.135—Powder Actuated Fastening Tools

(a) The section shall apply to ship repairing and shipbuilding only.

(b) General precautions.

(1) Powder actuated fastening tools shall be tested each day before loading to ensure that the safety devices are in proper working condition. Any tool found not to be in proper working order shall be immediately removed from service until repairs are made.

(2) Powder actuated fastening tools shall not be used in an explosive or flammable atmosphere.

(3) All tools shall be used with the type of shield or muzzle guard appropriate for a particular use.

(4) Fasteners shall not be driven into very hard or brittle materials such as cast iron, glazed tile, surface hardened steel, glass block, live rock, face brick or hollow title.

(5) Fasteners shall not be driven into soft materials unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the opposite side.

(6) Unless a special guard, fixture or jig is used, fasteners shall not be driven directly into materials such as brick or concrete within 3 inches (7.6 centimeters) of the unsupported edge or corner, or into steel surfaces within 1/2 inch (12.7 millimeters) of the unsupported edge or corner. When fastening other material, such as 2 x 4 inch (5 x 10 centimeters) lumber to a concrete surface, fasteners of greater than $^{7}/_{32}$ inch (5.4 millimeters) shank diameter shall not be used and fasteners shall not be driven within 2 inches (5 centimeters) of the unsupported edge or corner of the work surface.

(7) Fasteners shall not be driven through existing holes unless a positive guide is used to secure accurate alignment

(8) No attempt shall be made to drive a fastener into a spalled area caused by an unsatisfactory fastening.

(9) Employees using powder actuated fastening tools shall be protected by eye protection equipment in accordance with the requirements of §§ 1915.151(a) and (b).

(c) Instruction of operators. Before employees are permitted to use powder actuated tools, they shall have been thoroughly instructed by a competent person with respect to the requirements of paragraph (b) of this section and the safe use of such tools as follows:

(1) Before using a tool, the operator shall inspect it to determine that it is clean, that all moving parts operate freely and that the barrel is free from obstructions.

(2) When a tool develops a defect during use, the operator shall immediately cease to use it and shall notify his supervisor.

(3) Tools shall not be loaded until just prior to the intended firing time and the tool shall not be left unattended while loaded.

(4) The tool, whether loaded or empty, shall not be pointed at any person, and hands shall be kept clear of the open barrel end.

(5) In case of a misfire, the operator shall hold the tool in the operating position for at least 15 seconds and shall continue to hold the muzzle against the work surface during disassembly or opening of the tool and removal of the powder load.

(6) Neither tools nor powder charges shall be left unattended in places where they would be available to unauthorized persons.

§1915.136—Internal Combustion Engines, Other Than Ship's Equipment

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) When internal combustion engines furnished by the employer are used in a fixed position below decks, for such purposes as driving pumps, generators, and blowers, the exhaust shall be led to the open air, clear of any ventilation intakes and openings through which it might enter the vessel.

(b) All exhaust line joints and connections shall be checked for tightness immediately upon starting the engine, and any leaks shall be corrected at once.

(c) When internal combustion engines on vehicles, such as forklifts and mobile cranes, or on portable equipment such as fans, generators, and pumps exhaust into the atmosphere below decks, the competent person shall make tests of the carbon monoxide content of the atmosphere as frequently as conditions require to ensure that dangerous concentrations do not develop. Employees shall be removed from the compartment involved when the carbon monoxide concentration exceeds 50 parts per million (0.005%). The employer shall use blowers sufficient in size and number and so arranged as to maintain the concentration below this allowable limit before work is resumed.

Subpart I —Personal Protective Equipment

1915.151 - Scope, Application, and Definitions

(a) Scope and application

This subpart applies to all work in shipyard employment regardless of geographic location.

(b) Definitions

"Anchorage" means a secure point of attachment for lifelines, lanyards, or deceleration devices.

"Body belt" means a strap with means for both securing it about the waist and attaching it to a lanyard, lifeline, or deceleration device.

"Body harness" means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, shoulders, chest and pelvis with means for attaching it to other components of a personal fall arrest system.

"Connector" means a device which is used to couple (connect) parts of a personal fall arrest system or parts of a positioning device system together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or D-ring sewn into a body belt or body harness or a snaphook spliced or sewn to a lanyard or self-retracting lanyard).

"Deceleration device" means any mechanism, such as a rope grab, ripstitch lanyard, specially woven lanyard, tearing or deforming lanyard, or automatic self-retracting lifeline/lanyard, which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

"Deceleration distance" means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

"Equivalent" means alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the method or item specified in the standard.

"Free fall" means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

"Free fall distance" means the vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before the device operates and fall arrest forces occur.

"Lanyard" means a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

"Lifeline" means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

"Lower levels" means those areas or surfaces to which an employee can fall. Such areas or surfaces include but are not limited to ground levels, floors, ramps, tanks, materials, water, excavations, pits, vessels, structures, or portions thereof.

"Personal fall arrest system" means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, body belt or body harness and may include a lanyard, a deceleration device, a lifeline, or a suitable combination of these. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

"Positioning device system" means a body belt or body harness system rigged to allow an employee to be supported at an elevated vertical surface, such as a wall or window, and to be able to work with both hands free while leaning.

"Qualified person" means a person who by possession of a recognized degree or certificate of professional standing, or who, by extensive knowledge, training, and experience,

has successfully demonstrated the ability to solve or resolve problems related to the subject matter and work.

"Restraint (tether) line" means a line from an anchorage, or between anchorages, to which the employee is secured in such a way as to prevent the employee from walking or falling off an elevated work surface. Note: A restraint line is not necessarily designed to withstand forces resulting from a fall.

"Rope grab" means a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking or both.

1915.152 - General Requirements

(a) Provision and use of equipment

The employer shall provide and shall ensure that each affected employee uses the appropriate personal protective equipment (PPE) for the eyes, face, head, extremities, torso, and respiratory system, including protective clothing, protective shields, protective barriers, personal fall protection equipment, and life saving equipment, meeting the applicable provisions of this subpart, wherever employees are exposed to work activity hazards that require the use of PPE.

(b) Hazard assessment and equipment

The employer shall assess the work activity to determine whether there are hazards present, or likely to be present, which necessitate the employee's use of PPE. If such hazards are present, or likely to be present, the employer shall:

(1) Select the type of PPE that will protect the affected employee from the hazards identified in the occupational hazard assessment;

(2) Communicate selection decisions to affected employees;

(3) Select PPE that properly fits each affected employee; and

(4) Verify that the required occupational hazard assessment has been performed through a document that contains the following information: occupation, the date(s) of the hazard

assessment, and the name of the person performing the hazard assessment.

Note 1 to paragraph (b): A hazard assessment conducted according to the trade or occupation of affected employees will be considered to comply with paragraph (b) of this section, if the assessment addresses any PPE-related hazards to which employees are exposed in the course of their work activities.

Note 2 to paragraph (b): Non-mandatory Appendix A to this subpart contains examples of procedures that will comply with the requirement for an occupational hazard assessment.

(c) Defective and damaged equipment

Defective or damaged PPE shall not be used.

(d) Reissued equipment

The employer shall ensure that all unsanitary PPE, including that which has been used by employees, be cleaned and disinfected before it is reissued.

(e) Training

(1) The employer shall provide training to each employee who is required, by this section, to use PPE (exception: training in the use of personal fall arrest systems and positioning device systems training is covered in Sections 1915.159 and 1915.160). Each employee shall be trained to understand at least the following:

(i) When PPE is necessary;

(ii) What PPE is necessary;

(iii) How to properly don, doff, adjust, and wear PPE;

(iv) The limitations of the PPE; and,

(v) The proper care, maintenance, useful life and disposal of the PPE.

(2) The employer shall ensure that each effected employee demonstrates the ability to use PPE properly before being allowed to perform work requiring the use of PPE.

(3) The employer shall retrain any employee who does not understand or display the skills required by paragraph

(e)(2) of this section. Circumstances where retraining is required include, but are not limited to, situations where:

(i) Changes in occupation or work render previous training obsolete; or

(ii) Changes in the types of PPE to be used render previous training obsolete; or

(iii) Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

(4) The employer shall verify that each affected employee has received the required training through a document that contains the following information: name of each employee trained, the date(s) of training, and type of training the employee received.

1915.153 - Eye and Face Protection

(a) General requirements

(1) The employer shall ensure that each affected employee uses appropriate eye or face protection where there are exposures to eye or face hazards caused by flying particles, molten metal, liquid chemicals, acid or caustic liquids, chemical gases or vapors, or injurious light radiation.

(2) The employer shall ensure that each affected employee uses eye or face protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g., a clip-on or slide-on side shield) meeting the pertinent requirements of this section are acceptable.

(3) The employer shall ensure that each affected employee who wears prescription lenses while engaged in operations that involve eye hazards wears eye protection that incorporates the prescription in its design, unless the employee is protected by eye protection that can be worn over prescription lenses without disturbing the proper position of either the PPE or the prescription lenses.

(4) The employer shall ensure that each affected employee uses equipment with filter lenses that have a shade number that provides appropriate protection from injurious light radiation. Table I-1 is a listing of appropriate shade numbers for various operations. If filter lenses are used in goggles worn under a helmet which has a lens, the shade number of the lens in the helmet may be reduced so that the shade numbers of the two lenses will equal the value as shown in Table I-1, Sec. 1915.153.

Table I-1.— Filter Lenses for Protection Against Radiant Energy

Operations	Electrode size 1/32 in.	Arc current	Minimum protective shade
Shielded metal arc welding	Less than 3	Less than	7
	3-5	60	8
	5-8	60-160	10
	More than 8	160-250	11
		250-550	
Gas metal arc welding and flux cored arc welding.		Less than.	7
		60	10
		60-160	10
		160-250	10
		250-500	
Gas Tungsten arc welding		Less than	8
		50	8
		50-150	10
		150-500.	
Air carbon	(Light)	Less than	10
Arc cutting	(Heavy)	500	11
		500-1000	
Plasma arc welding		Less than	6
		20	8
		20-	10
		100	11
		100-	
		400	
		400-	
		800.	
Plasma arc cutting	light)**	Less than 300	8
	medium)**	300-400	9
	heavy)**	400-800.	10
Torch brazing			3
Torch soldering			2
Carbon Arc welding			14

** These values apply where the actual arc is clearly seen. Lighter filters may be used when the arc is hidden by the workpiece.

Filter Lenses for Protection Against Radiant Energy

Operations	Plate thickness in.	Plate thickness mm	Minimum* protective shade
Gas welding:			
Light	Under 1/8	Under 3.2	4
Medium.	1/8 to 1/2.	3.2 to 12.7	5
Heavy.	Over 1/2.	Over 12.7	6
Oxygen cutting:			
Light	Under 1	Under 25	3
Medium	1 to 6.	25 to 150	4
Heavy	Over 6	Over 15	5

* As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

(b) Criteria for protective eye and face devices

(1) Protective eye and face devices purchased after May 20, 1982, shall comply with the American National Standards Institute, ANSI Z87.1-1989, "Practice for Occupational and Educational Eye and Face Protection," which is incorporated by reference as specified in Sec. 1915.5, or shall be demonstrated by the employer to be equally effective.

(2) Eye and face protective devices purchased before May 20, 1982, shall comply with "American National Standard Practice for Occupational and Educational Eye and Face Protection, Z87.1-1979," which is incorporated by reference as specified in Sec. 1915.5, or shall be demonstrated by the employer to be equally effective.

1915.154 - Respiratory Protection

Note: Respiratory protection for shipyard employment is covered by 29 CFR 1910.134.

1915.155 - Head Protection

(a) Use. (1) The employer shall ensure that each affected employee wears a protective helmet when working in areas where there is a potential for injury to the head from falling objects.

(2) The employer shall ensure that each affected employee wears a protective helmet designed to reduce electrical shock hazards where there is potential for electric shock or burns due to contact with exposed electrical conductors which could contact the head.

(b) Criteria for protective helmets

(1) Protective helmets purchased after August 22, 1996 shall comply with ANSI Z89.l-1986, "Personnel Protection — Protective Headwear for Industrial Workers-Requirements," which is incorporated by reference, as specified in Sec. 1915.5, or shall be demonstrated by the employer to be equally effective.

(2) Protective helmets purchased before August 22, 1996 shall comply with the "American National Standard Safety Requirements for Industrial Head Protection, Z89.1-1969," which is incorporated by reference as specified in 1915.5, or shall be demonstrated by the employer to be equally effective.

1915.156 - Foot Protection

(a) Use

The employer shall ensure that each affected employee wears protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects or objects piercing the sole.

(b) Criteria for protective footwear

(1) Protective footwear purchased after August 22, 1996 shall comply with ANSI Z41-1991, "American National Standard for Personal Protection-Protective Footwear," which is incorporated by reference, as specified in Sec. 1915.5, or shall be demonstrated by the employer to be equally as effective.

(2) Protective footwear purchased before August 22, 1996 shall comply with the "American National Standard for Personal Protection-Protective Footwear Z41-1983," which is incorporated by reference, as specified in Sec. 1915.5, or shall be demonstrated by the employer to be equally effective.

1915.157 - Hand and Body Protection

(a) Use

The employer shall ensure that each affected employee uses appropriate hand protection and other protective clothing where there is exposure to hazards such as skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, harmful temperature extremes, and sharp objects.

(b) Hot work operations

The employer shall ensure that no employee wears clothing impregnated or covered in full or in part with flammable or combustible materials (such as grease or oil) while engaged in hot work operations or working near an ignition source.

(c) Electrical protective devices

The employer shall ensure that each affected employee wears protective electrical insulating gloves and sleeves or other electrical protective equipment, if that employee is exposed to electrical shock hazards while working on electrical equipment.

1915.158 - Lifesaving Equipment

(a) Personal flotation devices

(1) Personal flotation devices (PFD) (life preservers, life jackets and work vests) worn by each affected employee shall be any United States Coast Guard (USCG) approved and marked Type I PFD, Type II PFD, or Type III PFD; or PFDs shall be a USCG approved Type V PFD which is marked for use as a work vest, for commercial use, or for use on vessels. USCG approval is pursuant to 46 CFR part 160, subpart Q, Coast Guard Lifesaving Equipment Specifications.

(2) Prior to each use, personal flotation devices shall be inspected for dry rot, chemical damage, or other defects which may affect their strength and buoyancy. Defective personal flotation devices shall not be used.

(b) Ring life buoys and ladders

(1) When work is being performed on a floating vessel 200 feet (61 meters) or more in length, at least three 30-inch (0.76 meters) U.S. Coast Guard approved ring life buoys with lines attached shall be located in readily visible and

accessible places. Ring life buoys shall be located one forward, one aft, and one at the access to the gangway.

(2) On floating vessels under 200 feet (61 meters) in length, at least one 30-inch (0.76 meters) U.S. Coast Guard approved ring life buoy with line attached shall be located at the gangway.

(3) At least one 30-inch (0.76 meters) U. S. Coast Guard approved ring life buoy with a line attached shall be located on each staging alongside of a floating vessel on which work is being performed.

(4) At least 90 feet (27 meters) of line shall be attached to each ring life buoy.

(5) There shall be at least one portable or permanent ladder in the vicinity of each floating vessel on which work is being performed. The ladder shall be of sufficient length to assist employees to reach safety in the event they fall into the water.

1915.159 - Personal Fall Arrest Systems (PFAS)

The criteria of this section apply to PFAS and their use. Effective January 1, 1998, body belts and non-locking snaphooks are not acceptable as part of a personal fall arrest system.

(a) Criteria for connectors and anchorages

(1) Connectors shall be made of drop forged, pressed, or formed steel or shall be made of materials with equivalent strength.

(2) Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to the interfacing parts of the system.

(3) D-rings and snaphooks shall be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 Kn).

(4) D-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 Kn) without cracking, breaking, or being permanently deformed.

(5) Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook caused by depression of the snaphook keeper by the connected member, or shall be of a locking type that is designed and used to

prevent disengagement of the snap-hook by contact of the snaphook keeper by the connected member.

(6) Snaphooks, unless of a locking type designed and used to prevent disengagement from the following connections, shall not be engaged:

(i) directly to webbing, rope or wire rope;

(ii) to each other;

(iii) to a D-ring to which another snaphook or other connector is attached;

(iv) to a horizontal lifeline; or

(v) to any object that is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

(7) On suspended scaffolds or similar work platforms with horizontal lifelines that may become vertical lifelines, the devices used for connection to the horizontal lifeline shall be capable of locking in any direction on the lifeline.

(8) Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms.

(9) Anchorages shall be capable of supporting at least 5,000 pounds (22.2 Kn) per employee attached, or shall be designed, installed, and used as follows:

(i) as part of a complete personal fall arrest system which maintains a safety factor of at least two; and

(ii) under the direction and supervision of a qualified person.

(b) Criteria for lifelines, lanyards, and personal fall arrest systems

(1) When vertical lifelines are used, each employee shall be provided with a separate lifeline.

(2) Vertical lifelines and lanyards shall have a minimum tensile strength of 5,000 pounds (22.2 Kn).

(3) Self-retracting lifelines and lanyards that automatically limit free fall distances to 2 feet (0.61 meters) or less shall be capable of sustaining a minimum tensile load of 3000 pounds (13.3 Kn) applied to a self-retracting lifeline or lanyard with the lifeline or lanyard in the fully extended position.

(4) Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet (0.61 meters) or less, ripstitch lanyards and tearing and deforming lanyards shall be capable of sustaining a minimum static tensile load of 5,000 pounds (22.2 Kn) applied to the device when they are in the fully extended position.

(5) Horizontal lifelines shall be designed, installed, and used under the supervision of a qualified person, and shall only be used as part of a complete personal fall arrest system that maintains a safety factor of at least 2.

(6) Effective November 20, 1996, personal fall arrest systems shall:

(i) limit the maximum arresting force on a falling employee to 900 pounds (4 Kn) when used with a body belt;

(ii) limit the maximum arresting force on a falling employee to 1,800 pounds (8 Kn) when used with a body harness;

(iii) bring a falling employee to a complete stop and limit the maximum deceleration distance an employee travels to 3.5 feet (1.07 meters), and

(iv) have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.8 meters), or the free fall distance permitted by the system, whichever is less;

Note to paragraph (b)(6) of this section: A personal fall arrest system which meets the criteria and protocols contained in Appendix B, is considered to comply with paragraph (b)(6). If the combined tool and body weight is 310 pounds (140 kg) or more, systems that meet the criteria and protocols contained in Appendix B will be deemed to comply with the provisions of paragraphs (b)(6) only if they are modified appropriately to provide protection for the extra weight of the employee and tools.

(7) Personal fall arrest systems shall be rigged such that an employee can neither free fall more than 6 feet (1.8 meters) nor contact any lower level.

(c) Criteria for selection, use and care of systems and system components

(1) Lanyards shall be attached to employees using personal fall arrest systems, as follows:

(i) The attachment point of a body harness shall be located in the center of the wearer's back near the shoulder level, or above the wearer's head. If the free fall distance is limited to less than 20 inches, (50.8 centimeters) the attachment point may be located in the chest position; and

(ii) The attachment point of a body belt shall be located in the center of the wearer's back.

(2) Ropes and straps (webbing) used in lanyards, lifelines and strength components of body belts and body harnesses shall be made from synthetic fibers or wire rope.

(3) Ropes, belts, harnesses, and lanyards shall be compatible with their hardware.

(4) Lifelines and lanyards shall be protected against cuts, abrasions, burns from hot work operations and deterioration by acids, solvents, and other chemicals.

(5) Personal fall arrest systems shall be inspected prior to each use for mildew, wear, damage, and other deterioration. Defective components shall be removed from service.

(6) Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a qualified person to be undamaged and suitable for reuse.

(7) The employer shall provide for prompt rescue of employees in the event of a fall or shall ensure that employees are able to rescue themselves.

(8) Body belts shall be at least one and five eighths inches (4.1 centimeters) wide.

(9) Personal fall arrest systems and components shall be used only for employee fall protection and not to hoist materials.

(d) Training

Before using personal fall arrest equipment, each affected employee shall be trained to understand the application limits of the equipment and proper hook-up, anchoring, and tie-off techniques. Affected employees shall also be trained so that they can demonstrate the proper use, inspection, and storage of their equipment.

1915.160 - Positioning Device Systems

Positioning device systems and their use shall conform to the following provisions:

(a) Criteria for connectors and anchorages

(1) Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.

(2) Connecting assemblies shall have a minimum tensile strength of 5,000 pounds (22.2 Kn).

(3) Positioning device systems shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall.

(4) Snaphooks, unless each is of a locking type designed and used to prevent disengagement, shall not be connected to each other. As of January 1, 1998, only locking type snaphooks shall be used in positioning device systems.

(b) Criteria for positioning device systems

(1) Restraint (tether) lines shall have a minimum breaking strength of 3,000 pounds (13.3 Kn).

(2) The following system performance criteria for positioning device systems are effective November 20, 1996:

(i) A window cleaner's positioning system shall be capable of withstanding without failure a drop test consisting of a 6 foot (1.83 meters) drop of a 250 pound (113 kilograms) weight. The system shall limit the initial arresting force to not more than 2,000 pounds (8.89 Kn), with a duration not to exceed 2 milliseconds. The system shall limit any subsequent arresting forces imposed on the falling employee to not more than 1,000 pounds (4.45 Kn);

(ii) All other positioning device systems shall be capable of withstanding without failure a drop test consisting of a 4-foot (1.2 meters) drop of a 250-pound (113 kilograms) weight.

Note to paragraph (b)(2) of this section: Positioning device systems which comply with the provisions of Section 2 of Non-mandatory Appendix B to this subpart shall be deemed to meet the requirements of this paragraph (b)(2).

(c) Criteria for the use and care of positioning device systems

(1) Positioning device systems shall be inspected before each use for mildew, wear, damage, and other deterioration. Defective components shall be removed from service.

(2) A positioning device system or component subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection, unless inspected and determined by a qualified person to be undamaged and suitable for reuse.

(d) Training

Before using a positioning device system, employees shall be trained in the application limits, proper hook-up, anchoring and tie-off techniques, methods of use, inspection, and storage of positioning device systems.

1915 SUBPART I APPENDIX A - GUIDELINES FOR HAZARD ASSESSMENT, PERSONAL PROTECTIVE EQUIPMENT (PPE) SELECTION, AND PPE TRAINING PROGRAM (NON- MANDATORY)

Note: The appendix applicable to shipyard employment under this section is identical to 29 CFR 1910, Subpart I.

1915 SUBPART I APPENDIX B - GENERAL TESTING CONDITIONS AND ADDITIONAL GUIDELINES FOR PERSONAL FALL PROTECTION SYSTEMS (NON-MANDATORY)

Note: The appendix applicable to shipyard employment under this section is identical to 29 CFR 1910, Subpart I.

Subpart J—Ship's Machinery and Piping Systems

§1915.161—Scope and Application

The standards contained in this subpart shall apply to ship repairing and shipbuilding and shall not apply to shipbreaking.

§1915.162—Ships' Boilers

(a) Before work is performed in the fire, steam, or water spaces of a boiler where employees may be subject to injury from the direct escape of a high temperature medium such as steam, or water, oil, or other medium at a high temperature entering from an interconnecting system, the employer shall insure that the following steps are taken:

(1) The isolation and shutoff valves connecting the dead boiler with the live system or systems shall be secured, blanked, and tagged indicating that employees are working in the boiler. This tag shall not be removed nor the valves unblanked until it is determined that this may be done without creating a hazard to the employees working in the boiler, or until the work in the boiler is completed. Where valves are welded instead of bolted at least two isolation and shutoff valves connecting the dead boiler with the live system or systems shall be secured, locked, and tagged.

(2) Drain connections to atmosphere on all of the dead interconnecting systems shall be opened for visual observation of drainage.

(3) A warning sign calling attention to the fact that employees are working in the boilers shall be hung in a conspicuous location in the engine room. This sign shall not be removed until it is determined that the work is completed and all employees are out of the boilers.

§1915.163—Ships' Piping Systems

(a) Before work is performed on a valve, fitting, or section of piping in a piping system where employees may be subject to injury from the direct escape of steam, or water oil, or other medium at a high temperature, the employer shall insure that the following steps are taken:

(1) The isolation and shutoff valves connecting the dead system with the life system or systems shall be secured blanked, and tagged indicating that employees are

working on the systems. This tag shall not be removed nor the valves unblanked until it is determined that this may be done without creating a hazard to the employees working on the system, or until the work on the system is completed. Where valves are welded instead of bolted at least two isolation and shutoff valves connecting the dead system with the live system or systems shall be secured, locked, and tagged.

(2) Drain connections to atmosphere on all of the dead interconnecting systems shall be opened for visual observation of drainage.

§1915.164—Ships' Propulsion Machinery

(a) Before work is performed on the main engine, reduction gear, or connecting accessories, the employer shall ensure that the following steps are taken:

(1) The jacking gear shall be engaged to prevent the main engine from turning over. A sign shall be posted at the throttle indicating that the jacking gear is engaged. This sign shall not be removed until the jacking gear can be safely disengaged.

(2) If the jacking gear is steam driven, the stop valves to the jacking gear shall be secured, locked, and tagged indicating that employees are working on the main engine.

(3) If the jacking gear is electrically driven, the circuit controlling the jacking gear shall be deenergized by tripping the circuit breaker, opening the switch or removing the fuse, whichever is appropriate. The breaker, switch, or fuse location shall be tagged indicating that employees are working on the main engine.

(b) Before the jacking engine is operated, the following precautions shall be taken:

(1) A check shall be made to ensure that all employees, equipment, and tools are clear of the engine, reduction gear, and its connecting accessories.

(2) A check shall be made to ensure that all employees, equipment and tools are free of the propeller.

(c) Before work is started on or in the immediate vicinity of the propeller, a warning sign calling attention to the fact that employees are working in that area shall be hung in a conspicuous location in the engine room. This sign shall not be removed until it is determined that the work is completed and all employees are free of the propeller.

(d) Before the main engine is turned over (e.g., when warming up before departure or testing after an overhaul) a check shall be made to ensure that all employees, equipment, and tools are free of the propeller.

§1915.165—Ships' Deck Machinery

(a) Before work is performed on the anchor windlass or any of its attached accessories, the employer shall ensure that the following steps are taken:

(1) The devil claws shall be made fast to the anchor chains.

(2) The riding pawls shall be in the engaged position.

(3) In the absence of devil claws and riding pawls, the anchor chains shall be secured to a suitable fixed structure of the vessel.

Subpart K—Portable, Unfired Pressure Vessels, Drums and Containers, Other Than Ship's Equipment

§ 1915.171—Scope and Application of Subpart

The standards contained in this subpart shall apply to ship repairing and shipbuilding and shall not apply to shipbreaking.

§1915.172—Portable Air Receivers and Other Unfired Pressure Vessels

(a) Portable, unfired pressure vessels, built after the effective date of this regulation, shall be marked and reported indicating that they have been designed and constructed to meet the standards of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XIII, Rules for Construction of Unfired Pressure Vessels, 1963. They shall be subjected to a hydrostatic pressure test of one and one-half times the working pressure of the vessels.

(b) Portable, unfired pressure vessels, not built to the code requirements of paragraph (a) of this section, and built prior to the effective date of this regulation, shall be examined quarterly by a competent person. They shall be subjected yearly to a hydrostatic pressure test of one and one-half times the working pressure of the vessels.

(c) The relief valves on the portable, unfired pressure vessels in paragraphs (a) and (b) of this section shall be set to the safe

working pressure of the vessels, or set to the lowest safe working pressure of the systems, whichever is lower.

(d) A certification record of such examinations and tests made in compliance with the requirements of paragraphs (a) and (b) of this section shall be maintained. The certification record shall include the date of examinations and tests, the signature of the person who performed the examinations or tests and the serial number, or other identifier, of the equipment examined and tested.

§1915.173—Drums and Containers

(a) Shipping drums and containers shall not be pressurized to remove their contents.

(b) A temporarily assembled pressurized piping system conveying hazardous liquids or gases shall be provided with a relief valve and bypass to prevent rupture of the system and the escape of such hazardous liquids or gases.

(c) Pressure vessels, drums and containers containing toxic or flammable liquids or gases shall not be stored or used where they are subject to open flame, hot metal, or other sources of artificial heat.

(d) Unless pressure vessels, drums and containers of 30 gallon capacity (115 liters) or over containing flammable or toxic liquids or gases are placed in an out-of-the-way area where they will not be subject to physical injury from an outside source, barriers or guards shall be erected to protect them from such physical injury.

(e) Containers of 55 gallons (211.5 liters) or more capacity containing flammable or toxic liquid shall be surrounded by dikes or pans which enclose a volume equal to at least 35 percent of the total volume of the containers.

(f) Fire extinguishers adequate in number and suitable for the hazard shall be provided. These extinguishers shall be located in the immediate area where pressure vessels, drums, and containers containing flammable liquids or gases are stored or in use. Such extinguishers shall be ready for use at all times.

Subpart L—Electrical Machinery

§1915.181—Electrical Circuits and Distribution Boards

(a) The provisions of this section shall apply to ship repairing and shlpbuilding and shall not apply to shipbreaking.

(b) Before an employee is permitted to work on an electrical circuit, except when the circuit must remain energized for testing and adjusting, the circuit shall be deenergized and checked at the point at which the work is to be done to insure that it is actually deenergized. When testing or adjusting an energized circuit a rubber mat, duck board, or other suitable insulation shall be used underfoot where an insulated deck does not exist.

(c) Deenergizing the circuit shall be accomplished by opening the circuit breaker, opening the switch, or removing the fuse, whichever method is appropriate. The circuit breaker, switch, or fuse location shall be tagged to indicate that an employee is working on the circuit. Such tags shall not be removed nor the circuit energized until it is definitely determined that the work on the circuit has been completed.

(d) When work is performed immediately adjacent to an open-front energized board or in back of an energized board, the board shall be covered or some other equally safe means shall be used to prevent contact with any of the energized parts.

Subpart Z — Toxic and Hazardous Substances

1915.1000 - Air Contaminants

Wherever this section applies, an employee's exposure to any substance listed in Table Z-Shipyards of this section shall be limited in accordance with the requirements of the following paragraphs of this section.

(a)(1) "Substances with limits preceded by "C" - "Ceiling Values."
An employee's exposure to any substance in Table Z-Shipyards, the exposure limit of which is preceded by a "C," shall at no time exceed the exposure limit given for that substance. If instantaneous monitoring is not feasible, then the ceiling shall be assessed as a 15-minute time weighted average exposure which shall not be exceeded at any time over a working day.

(a)(2) "Other Substances" - "8-hour Time Weighted Averages."

An employee's exposure to any substance in Table Z-Shipyards , the exposure limit of which is not preceded by a "C," shall not exceed the 8-hour Time Weighted Average given for that substance in any 8-hour work shift of a 40-hour work week.

See standard located in 1915. 1000 for footnotes and computation formulae.

Table Z-Shipyards

Substance	CAS No (d)	Skin ppm (a)	mg/m(3)(h)	Designation
Abate; see Temephos				
Acetaldehyde	75-07-0	200	360	
Acetic acid	64-19-7	10	25	
Acetic anhydride	108-24-7	5	20	
Acetone	67-64-1	1000	2400	
Acetonitrile	75-05-8	40	70	
2-Acetylaminofluorene; see	1915.1014	53-96-3		
Acetylene	74-86-2 E			
Acetylene dichloride; see				
Acetylene tetrabromide	79-27-6	1	14	
Acrolein	107-02-8	0.1	0.25	
Acrylamide	79-06-1	0.3		X
Acrylonitrile; see	1915.1045	107-13-1		
Aldrin	309-00-2	0.25		X
Allyl alcohol	107-18-6	2	5	X
Allylchloride	107-05-1	1	3	
Allylglycidylether (AGE)	106-92-3	(C)10	(C)45	
Allylpropyl disulfide	2179-59-1	2	12	
alpha-Alumina	1344-28-1			
Total dust	15			
Respirable fraction	5			
Aluminum (as Al) Metal	7429-90-5			
Total dust	15			
Respirable fraction	5			
Alundum; see alpha-Alumina				
4-Aminodiphenyl; see	1915.1011	92-67-1		
2-Aminoethanol; see Ethanolamine				
2-Aminopyridine	504-29-0	0.5	2	
Ammonia	7664-41-7	50	35	
Ammoniumsulfamate	7773-06-0			
Total dust			15	
Respirablefraction			5	
n-Amyl acetate	628-63-7	100	525	
sec-Amylacetate	626-38-0	125	650	
Aniline and homologs	62-53-3	5	19	X
Anisidine (o-,p-isomers)	29191-52-4	0.5		X
Antimony and compounds (as Sb)	7440-36-0	0.5		
ANTU (alpha Naphthylthiourea)	86-88-4	0.3		
Argon	7440-37-1	E		
Arsenic inorganic compounds (as As); see	1915.1018	7440-38-2		
Arsenic, organic compounds (as As)	7440-38-2	0.5		
Arsine	7784-42-1	0.05	0.2	
Asbestos; see	1915.1001			

Table Z-Shipyards (cont'd.)

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Azinphos-methyl	86-50-0	0.2		X
Barium, soluble compounds (as Ba)	7440-39-3	0.5		
Barium sulfate	7727-43-7			
Total dust		15		
Respirable fraction		5		
Benomyl	17804-35-2			
Total dust		15		
Respirable fraction		5		
Benzene(g); See 1915.1028	71-43-2			
Benzidine; See	1915.1010	92-87-5		
p-Benzoquinone; see Quinone				
Benzo(a)pyrene; see Coaltar pitch volatiles				
Benzoyl peroxide	94-36-0	5		
Benzyl chloride	100-44-7	15		
Beryllium and beryllium compounds (as Be)	7440-41-7	0.002		
Biphenyl; see Diphenyl				
Bismuth telluride, Undoped	1304-82-1			
Total dust		15		
Respirable fraction		5		
Bisphenol A; see Diglycidylether				
Boronoxide	1303-86-2			
Total dust		15		
Boron tribromide	10294-33-4	1	10	
Boron trifluoride	7637-07-2	(C)1	(C)3	
Bromine	7726-95-6	0.1	0.7	
Bromine pentafluoride	7789-30-2	0.1	0.7	
Bromoform	75-25-2	0.5	5	X
Butadiene (1,3-Butadiene); See 29 CFR 1910.1051; 29 CFR 1910.19(1)	106-99-0 ppm	1 STEL	ppm/5	
Butanethiol; see Butyl mercaptan				
2-Butanone (Methylethylketone)	78-93-3	200	590	
2-Butoxyethanol	111-76-2	50	240	X
n-Butyl-acetate	123-86-4	150	710	
sec-Butylacetate	105-46-4	200	950	
tert-Butyl-acetate	540-88-5	200	950	
n-Butylalcohol	71-36-3	100	300	
sec-Butyl alcohol	78-92-2	150	450	
tert-Butyl alcohol	75-65-0	100	300	
Butylamine	109-73-9	(C)5	(C)15	X
tert-Butylchromate (as CrO(3))	1189-85-1	(C)0.1		X
n-Butylglycidylether (BGE)	2426-08-6	50	270	
Butyl mercaptan	109-79-5	0.5		1.5

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
p-tert-Butyltoluene	98-51-1	10	60	
Cadmium dust fume (as Cd); see	1915.1027	7440-43-9		
Calcium Carbonate	1317-65-3			
Total dust		15		
Respirable fraction		5		
Calcium hydroxide	1305-62-0			
Total dust		15		
Respirable fraction		5		
Calcium oxide	1305-78-8	5		
Calcium silicate	1344-95-2			
Total dust		15		
Respirable fraction	5			
Calcium sulfate	7778-18-9			
Total dust		15		
Respirable fraction		5		
Camphor, synthetic	76-22-2	2		
Carbaryl (Sevin)	63-25-2	5		
Carbon black	1333-86-4	3.5		
Carbon dioxide	124-38-9	5000	9000	
Carbon isulfide	75-15-0	20	60	X
Carbon monoxide	630-08-0	50	55	
Carbon tetrachloride	56-23-5	10	65	X
Cellulose	9004-34-6			
Total dust	15			
Respirable fraction	5			
Chlordane	57-74-9	0.5		X
Chlorinated camphene	8001-35-2	0.5		X
Chlorinated diphenyl oxide	55720-99-5	0.5		
Chlorine	7782-50-5	1	3	
Chlorine trifluoride	7790-91-2	(C)0.1	(C)0.4	
Chloroacetaldehyde	107-20-0	(C)1	(C)3	
a-Chloroacetophenone (Phenacyl chloride)	532-27-4	0.05	0.3	
Chlorobenzene	108-90-7	75	350	
o-Chlorobenzylidene malononitrile	2698-41-1	0.05	0.4	
Chlorobromomethane	74-97-5	200	1050	
2-Chloro-1,3-butadiene; see beta-Chloroprene				
Chlorodiphenyl (42% Chlorine)(PCB)	53469-21-9	1		X
Chlorodiphenyl (54% Chlorine)(PCB)	11097-69-1	0.5		X
1-Chloro-2, 3-epoxypropane; see Epichlorohydrin				
2-Chloroethanol; see Ethylene chlorohydrin				
Chloroethylene; see Vinyl chloride				
Chloroform (Trichloromethane)	67-66-3	50	240	
bis(Chloromethyl) ether; see	1915.1008	542-88-1		
Chloromethyl methyl ether; see	1915.1006	107-30-2		

Table Z-Shipyards (cont'd.)

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
1-Chloro-1-nitropropane	600-25-9	20	100	
Chloropicrin	76-06-2	0.1	0.7	
beta-Chloroprene	126-99-8	25	90	X
2-Chloro-6 (trichloromethyl) pyridine	1929-82-4			
Total dust		15		
Respirable fraction		5		
Chromic acid and chromates (as CrO(3))				
Varies with compound			0.1	
Chromium (II) compounds (asCr)	7440-47-3	0.5		
Chromium (III) compounds (asCr)	7440-47-3	0.5		
Chromium metal and insol salts (as Cr)	7440-47-3	1		
Chrysene; see Coaltar pitch volatiles				
Clopidol	2971-90-6			
Total dust		15		
Respirable fraction		5		
Coal tar pitch volatiles (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene	65966-93-2	0.2		
Cobalt metal, dust, and fume (as Co)	7440-48-4	0.1		
Copper	7440-50-8			
Fume (as Cu)		0.1		
Dusts and mists (as Cu)		1		
Corundum; see Emery				
Cotton dust (raw)		1		
Crag herbicide (Sesone)	136-78-7			
Total dust		15		
Respirable fraction		5		
Cresol, all isomers	1319-77-3	5	22	X
Crotonaldehyde	123-73-9	2	6	
	4170-30-3			
Cumene	98-82-8	50	245	X
Cyanides (as CN) Varies with Compound		5		
Cyanogen	460-19-5	10		
Cyclohexane	110-82-7	300	1050	
Cyclohexanol	108-93-0	50	200	
Cyclohexanone	108-94-1	50	200	
Cyclohexene	110-83-8	300	1015	
Cyclonite	121-82-4	1.5	X	
Cyclopentadiene	542-92-7	75	200	
2,4-D (Dichlorophen-oxyacetic acid)	94-75-7	10		
Decaborane	17702-41-9	0.05	0.3	X
Demeton (Systox)	8065-48-3	0.1	X	

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone)	123-42-2	50	240	
1,2-Diaminoethane; see Ethylenediamine				
Diazomethane	334-88-3	0.2	0.4	
Diborane	19287-45-7	0.1	0.1	
1,2-Dibromo-3-chloropropane (CBCP); see	1915.1044	96-12-8		
1,2-Dibromoethane; see Ethylene dibromide				
Dibutyl phosphate	107-66-4	1	5	
Dibutyl phthalate	84-74-2	5		
Dichloroacetylene	7572-29-4	(C)0.1	(C)0.4	
o-Dichlorobenzene	95-50-1	(C)50	(C)300	
p-Dichlorobenzene	106-46-7	75	450	
3,3'-Dichlorobenzidine; see	1915.1007	91-94-1		
Dichlorodifluoromethane	75-71-8	1000	4950	
1,3-Dichloro-5,5-dimethyl hydantoin	118-52-5		0.2	
Dichlorodiphenyltrichloroethane (DDT)	50-29-3	1		X
1,1-Dichloroethane	75-34-3	100	400	
1,2-Dichloroethane; see Ethylene dichloride				
1,2-Dichloroethylene	540-59-0	200	790	
Dichloroethylether	111-44-4	(C)15	(C)90	X
Dichloromethane; see Methylene chloride				
Dichloromonofluoromethane	75-43-4	1000	4200	
1,1-Dichloro-1-nitroethane	594-72-9	(C)10	(C)60	
1,2-Dichloropropane; see Propylene dichloride				
Dichlorotetrafluoroethane	76-14-2	1000	7000	
Dichlorvos (DDVP)	62-73-7	1		X
Dicyclopentadienyl iron	102-54-5			
Total dust		15		
Respirable fraction		5		
Dieldrin	60-57-1	0.25	X	
Diethylamine	109-89-7	25	75	
2-Diethylaminoethanol	100-37-8	10	50	
Diethylene triamine	111-40-0	(C)10	(C)42	X
Diethylether; see Ethylether				
Difluorodibromomethane	75-61-6	100	860	
Diglycidylether (DGE)	2238-07-5	(C)0.5	(C)2.8	
Dihydroxybenzene; see Hydroquinone				
Diisobutylketone	108-83-8	50	290	
Diisopropylamine	108-18-9	5	20	X

Table Z-Shipyards (cont'd.)

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
4-Dimethylaminoazo-benzene; see	1915.1015	60-11-7		
Dimethoxymethane; see Methylal				
Dimethyl acetamide	127-19-5	10	35	X
Dimethylamine	124-40-3	10	18	
Dimethylaminobenzene; see Xylidine				
Dimethylaniline (N,N-Dimethylaniline)	121-69-7	5	25	X
Dimethylbenzene; see Xylene				
Dimethyl-1,2-dibromo-2, 2-dichloroethyl phosphate	300-76-5	3		
Dimethylformamide	68-12-2	10	30	X
2,6-Dimethyl-4-heptanone; see Diisobutylketone				
1,1-Dimethylhydrazine	57-14-7	0.5	1	X
Dimethylphthalate	131-11-3	5		
Dimethyl sulfate	77-78-3	1	5	X
Dinitrobenzene (allisomers)			1	X
(ortho)	528-29-0			
(meta)	99-65-0			
(para)	100-25-4			
Dinitro-o-cresol	534-52-1	0.2		X
Dinitrotoluene	25321-14-6	1.5		X
Dioxane (Diethylene dioxide)	123-91-1	100	360	X
Diphenyl (Biphenyl)	92-52-4	0.2	1	
Diphenylamine	122-39-4	10		
Diphenylmethane diisocyanate; see Methylene bisphenyl isocyanate				
Dipropyleneglycol methylether	34590-94-8	100	600	X
Di-secoctyl phthalate (Di-(2-ethylhexyl) phthalate)	117-81-7	5		
Emery	12415-34-8			
Total	dust	15		
Respirable	fraction	5		
Endosulfan	115-29-7	0.1		X
Endrin	72-20-8	0.1		X
Epichlorohydrin	106-89-8	5	19	X
EPN	2104-64-5	0.5		X
1,2-Epoxypropane; see Propylene -propanol; see Glycidol				
Ethane	74-84-0	E		
Ethanethiol; see Ethyl mercaptan				
Ethanolamine	141-43-5	3	6	
2-Ethoxyethanol (Cellosolve)	110-80-5	200	740	X

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
2-Ethoxyethyl acetate (Cellosolve acetate)	111-15-9	100	540	X
Ethyl acetate	141-78-6	400	1400	
Ethyl acrylate	140-88-5	25	100	X
Ethyl alcohol (Ethanol)	64-17-5	1000	1900	
Ethylamine	75-04-7	10	18	
Ethylamylketone (5-Methyl-3-heptanone)	541-85-5	25	130	
Ethyl benzene	100-41-4	100	435	
Ethyl bromide	74-96-4	200	890	
Ethylbutylketone (3-Heptanone)	106-35-4	50	230	
Ethyl chloride	75-00-3	1000	2600	
Ethylether	60-29-7	400	1200	
Ethyl formate	109-94-4	100	300	
Ethyl mercaptan	75-08-1	0.5	1	
Ethyl silicate	78-10-4	100	850	
Ethylene	74-85-1	E		
Ethylene chlorohydrin	107-07-3	5	16	X
Ethylenediamine	107-15-3	10	25	
Ethylene dibromide	106-93-4	(C)25	(C)190	X
Ethylene dichloride (1,2-Dichloroethane)	107-06-2	50	200	
Ethylene glycol dinitrate	628-96-6	(C)0.2	(C)1	X
Ethylene glycol methyl acetate; see Methyl cellosolve acetate				
Ethyleneimine; see	1915.1012	151-56-4		
Ethylene oxide; see	1915.1047	75-21-8		
Ethylidene chloride; see 1,1-Dichlorethane				
N-Ethylmorpholine	100-74-3	20	94	X
Ferbam	14484-64-1			
Total dust		15		
Ferrovanadium dust	12604-58-9	1		
Fibrous Glass				
Total dust		15		
Respirable fraction		5		
Fluorides (as F) Varies with compound		2.5		
Fluorine	7782-41-4	0.1	0.2	
Fluorotrichloromethane (Trichloro-fluoromethane)	75-69-4	1000	5600	
Formaldehyde; see	1915.1048	50-00-0		
Formic acid	64-18-6	5	9	
Furfural	98-01-1	5	20	X
Furfuryl alcohol	98-00-0	50	200	
Gasoline	8006-61-9	A(3)		
Glycerin (mist)	56-81-5			
Total dust	15			
Respirable fraction	5			
Glycidol	556-52-5	50	150	
Glycolmonoethyl ether;				

Table Z-Shipyards (cont'd.)

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
see 2-Ethoxyethanol				
Graphite, natural respirable dust	7782-42-5	(2)	(2)	(2)
Graphite, synthetic				
Total dust		15		
Respirable Fraction		5		
Guthion; see Azinphos methyl				
Gypsum	13397-24-5			
Total dust		15		
Respirable fraction		5		
Hafnium	7440-58-6	0.5		
Helium	7440-59-7		E	
Heptachlor	76-44-8	0.5		X
Heptane (n-Heptane)	142-82-5	500	2000	
Hexachloroethane	67-72-1	1	10	X
Hexachloronaphthalene	1335-87-1	0.2		X
n-Hexane	110-54-3	500	1800	
2-Hexanone (Methyl n-butylketone)	591-78-6	100	410	
Hexone (Methyl isobutylketone)	108-10-1	100	410	
sec-Hexyl acetate	108-84-9	50	300	
Hydrazine	302-01-2	1	1.3	X
Hydrogen	1333-74-0	E		
Hydrogen bromide	10035-10-6	3	10	
Hydrogen chloride	7647-01-0	(C)5	(C)7	
Hydrogen cyanide	74-90-8	10	11	X
Hydrogen fluoride (asF)	7664-39-3	3	2	
Hydrogen peroxide	7722-84-1	1	1.4	
Hydrogen selenide (as Se)	7783-07-5	0.05		
Hydrogen sulfide	7783-06-4	10	15	
Hydroquinone	123-31-9	2		
Indene	95-13-6	10	45	
Indium and compounds (as in)	7440-74-6	0.1		
Iodine	7553-56-2	(C)0.1	(C)1	
Iron oxide fume	1309-37-1	10		
Iron salts (soluble) (as Fe) Varies with compound	1			
Isomyl acetate	123-92-2	100	525	
Isomyl alcohol (primary and secondary)	123-51-3	100	360	
Isobutyl acetate	110-19-0	150	700	
Isobutyl alcohol	78-83-1	100	300	
Isophorone	78-59-1	25	140	
Isopropyl acetate	108-21-4	250	950	
Isopropyl alcohol	67-63-0	400	980	
Isopropylamine	75-31-0	5	12	
Isopropyl ether	108-20-3	500	2100	
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240	
Kaolin	1332-58-7			
Total dust		15		
Respirable fraction		5		

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Ketene 463-51-4		0.5	0.9	
Lead inorganic (as Pb); see	1915.1025	7439-92-1		
Limestone	1317-65-3			
Total dust		15		
Respirable fraction		5		
Lindane	58-89-9	0.5		X
Lithium hydride	7580-67-8	0.025		
L.P.G (Liquified petroleum gas)	68476-85-7	1000	1800	
Magnesite	546-93-0			
Total dust		15		
Respirable fraction		5		
Magnesium oxide fume	1309-48-4			
Total Particulate		15		
Malathion	121-75-5			
Total dust		15		X
Maleic anhydride	108-31-6	0.25		
Manganese compounds (as Mn)	7439-96-5	(C)5		
Manganese fume (as Mn)	7439-96-5	(C)5		
Marble	1317-65-3			
Total dust		1	5	
Respirable fraction		5		
Mercury (aryl and inorganic)(as Hg)	7439-97-6	0.1		X
Mercury (organo) alkyl compounds (as Hg)	7439-97-6	0.01		X
Mercury vapor) (as Hg)	7439-97-6	0.1		X
Mesityl oxide	141-79-7	25	100	
Methane	74-82-8	E		
Methanethiol; see Methyl mercaptan				
Methoxychlor	72-43-5			
Total dust	15			
2-Methoxyethanol; (Methylcellosolve)	109-86-4	25	80	X
2-Methoxyethyl acetate (Methylcellosolve acetate)	110-49-6	25	120	X
Methyl acetate	79-20-9	200	610	
Methyl acetylene (Propyne)	74-99-7	1000	1650	
Methyl acetylene propadiene mixture (MAPP)		1000	1800	
Methyl acrylate	96-33-3	10	35	X
Methylal (Dimethoxy-methane)	109-87-5	1000	3100	
Methyl alcohol	67-56-1	200	260	
Methylamine	74-89-5	10	12	
Methylamyl alcohol; see Methyl Isobutyl carbinol				
Methyl n-amylketone	110-43-0	100	465	
Methyl bromide	74-83-9	(C)20	(C)80	X
Methylbutylketone; see 2-Hexanone				

Table Z-Shipyards (cont'd.)

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Methylcellosolve; see 2-Methoxyethanol				
Methylcellosolve acetate; see 2-Methoxyethyl acetate				
Methyl chloride	74-87-3	100	210	
Methyl chloroform (1,1,1-Trichloro-ethane)	71-55-6	350	1900	
Methylcyclohexane	108-87-2	500	2000	
Methylcyclohexanol	25639-42-3	100	470	
o-Methylcyclohexanone	583-60-8	100	460	X
Methylene chloride: see	1910.1052			
Methylethylketone (MEK); see 2-Butanone				
Methyl ormate	107-31-3	100	250	
Methylhydrazine (Monomethyl hydrazine)	60-34-4	(C)0.2	(C)0.35	X
Methyl iodide	74-88-4	5	28	X
Methyl isoamylketone	110-12-3	100	475	
Methylisobutyl carbinol	108-11-2	25	100	X
Methyl isobutylketone; see Hexone				
Methyl isocyanate	624-83-9	0.02	0.05	X
Methylmercaptan	74-93-1	0.5	1	
Methylmethacrylate	80-62-6	100	410	100
Methylpropylketone; see 2-Pentanone				
Methylsilicate	681-84-5	5	30	
alpha-Methylstyrene	98-83-9	(C)100	(C)480	
Methylenebisphenyl isocyanate (MDI)	101-68-8	(C)0.02	(C)0.2	
Mica; see Silicates				
Mineral wool				
Total dust		15		
Respirable dust		5		
Molybdenum (as Mo)	7439-98-7			
Soluble compounds		5		
Insoluble Compounds				
Total dust		15		
Monomethylaniline	100-61-8	2	9	X
Monomethylhydrazine; see Methylhydrazine				
Morpholine	110-91-8	20	70	X
Naphtha (Coal tar)	8030-30-6	100	400	
Naphthalene	91-20-3	10	50	
alpha-Naphthylamine; see	1915.1004	134-32-7		
beta-Naphthylamine; see	1915.1009	91-59-8		
Neon	7440-01-9	E		
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	
Nickel, metal and insoluble compounds (as Ni)	7440-02-0	1		

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Nickel, soluble compounds (as Ni)	7440-02-0	1		
Nicotine	54-11-5	0.5		X
Nitric acid	7697-37-2	2	5	
Nitric oxide	10102-43-9	25	30	
p-Nitroaniline	100-01-6	1	6	X
Nitrobenzene	98-95-3	1	5	X
p-Nitrochlorobenzene	100-00-5	1		X
4-Nitrodiphenyl; see	1915.1003	92-93-3		
Nitroethane	79-24-3	100	310	
Nitrogen	7727-37-9	E		
Nitrogen dioxide	10102-44-0	(C)5	(C)9	
Nitrogen trifluoride	7783-54-2	10	29	
Nitroglycerin	55-63-0	(C)0.2	(C)2	X
Nitromethane	75-52-5	100	250	
1-Nitropropane	108-03-2	25	90	
2-Nitropropane	79-46-9	25	90	
N-Nitrosodimethylamine; see	1915.1016	62-79-9		
Nitrotoluene (allisomers)	5	30		X
o-isomer	88-72-2			
m-isomer	99-08-1			
p-isomer	99-99-0			
Nitrotrichloromethane; see Chloropicrin				
Nitrous oxide	10024-97-2	E		
Octachloronaphthalene	2234-13-1	0.1		X
Octane	111-65-9	400	1900	
Oil mist, mineral	8012-95-1	5		
Osmium tetroxide (as Os)	20816-12-0	0.002		
Oxalic acid	144-62-7	1		
Oxygen difluoride	7783-41-7	0.05	0.1	
Ozone	10028-15-6	0.1	0.2	
Paraquat, respirable dust	4685-14-7 1910-42-5 2074-50-2	0.5		X
Parathion	56-38-2	0.1		
Particulates not otherwise regulated Total dust organic and inorganic		15		
PCB; see Chlorodiphenyl (42% and 54% chlorine)				
Pentaborane	19624-22-7	0.005	0.01	
Pentachloronaphthalene	1321-64-8	0.5		X
Pentachlorophenol	87-86-5	0.5		X
Pentaerythritol	115-77-5			
Total dust	15			
Respirable fraction	5			
Pentane	109-66-0	500	1500	
2-Pentanone (Methyl propyl ketone)	107-87-9	200	700	
Perchloroethylene (Tetrachloroethylene)	127-18-4	100	670	

Table Z-Shipyards (cont'd.)

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Perchloromethyl mercaptan	594-42-3	0.1	0.8	
Perchloryl fluoride	7616-94-6	3	13.5	
Perlite	93763-70-3			
Total dust		15		
Respirable fraction		5		
Petroleum distillates (Naphtha)(Rubber Solvent) A(3)				
Phenol	108-95-2	5	19	X
p-Phenylene diamine	106-50-3	0.1		X
Phenyl ether, vapor	101-84-8	1	7	
Phenyl ether-biphenyl mixture, vapor		1	7	
Phenylethylene; see Styrene				
Phenyl glycidyl ether (PGE)	122-60-1	10	60	
Phenylhydrazine	100-63-0	5	22	X
Phosdrin (Mevinphos)	7786-34-7	0.1		X
Phosgene (Carbonyl chloride)	75-44-5	0.1	0.4	
Phosphine	7803-51-2	0.3	0.4	
Phosphoric acid	7664-38-2	1		
Phosphorus (yellow)	7723-14-0	0.1		
Phosphorus pentachloride	10026-13-8	1		
Phosphorus pentasulfide	1314-80-3	1		
Phosphorus trichloride	7719-12-2	0.5	3	
Phthalic anhydride	85-44-9	2	12	
Picloram	1918-02-1			
Total dust		15		
Respirable fraction		5		
Picric acid	88-89-1	0.1		
Piperazine dihydrochloride	142-64-3			X
Pindone (2-Pivalyl-1, 3-indandione)	83-26-1	0.1		
Plaster of paris	26499-65-0			
Total dust		15		
Respirable fraction		5		
Platinum (as Pt) Metal	7440-06-4			
Soluble Salts	0.002			
Polytetrafluoroethylene decomposition products A(2)				
Portland cement	65997-15-1			
Total dust		15	10	
Respirable fraction		5		
Propargyl alcohol	107-19-7	1		X
beta-Propriolactone; see	1915.1013	57-57-8		
Propionic acid	79-09-4			
n-Propyl acetate	109-60-4	200	840	
n-Propyl alcohol	71-23-8	200	500	
n-Propyl nitrate	627-13-4	25	110	
Propylene dichloride	78-87-5	75	350	
Propyleneimine	75-55-8	2	5	X

Substance	CAS No (d)	Skin ppm (a)	mg/m(3)(h)	Designation
Propylene oxide	75-56-9	100	240	
Propyne; see Methyl acetylene				
Pyrethrum	8003-34-7	5		
Pyridine	110-86-1	5	15	
Quinone	106-51-4	0.1	0.4	
RDX: see Cyclonite				
Rhodium (as Rh), metal fume and insoluble compounds	7440-16-6	0.1		
Rhodium (as Rh), soluble compounds	7440-16-6	0.001		
Ronnel	299-84-3	10		
Rotenone	83-79-4	5		
Rouge				
Total dust		15		
Respirable fraction	5			
Selenium compounds (as Se)	7782-49-2	0.2		
Selenium hexafluoride (as Se)	7783-79-1	0.05	0.4	
Silica, amorphous, precipitated angel	112926-00-8	(2)	(2)	(2)
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica	61790-53-2	(2)	(2)	(2)
Silica, crystalline cristobalite, respirable dust	14464-46-1	(2)	(2)	(2)
Silica, crystalline quartz, respirable dust	14808-60-7	(2)	(2)	(2)
Silica, crystalline tripoli (as quartz), respirable dust	1317-95-9	(2)	(2)	(2)
Silica, crystalline tridymite, respirable dust	15468-32-3	(2)	(2)	(2)
Silica, fused, respirable dust	60676-86-0	(2)	(2)	(2)
Silicates (less than 1% crystalline silica)				
Mica (respirable dust)	12001-26-2	(2)	(2)	(2)
Soapstone, total dust	(2)	(2)	(2)	
Soapstone, respirable dust	(2)	(2)	(2)	
Talc (containing asbestos)	(3)	(3)	(3)	
Talc (containing no asbestos), respirable dust	14807-96-6	(2)	(2)	(2)
Tremolite	(3)	(3)	(3)	
Silicon	7440-21-3			
Total dust	15			
Respirable fraction	5			
Silicon carbide	409-21-2			
Total dust	15			

Table Z-Shipyards (cont'd.)

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Respirable fraction		5		
Silver, metal and soluble compounds (as Ag)	7440-22-4	0.01		
Soapstone; see Silicates				
Sodium fluoroacetate	62-74-8	0.05		X
Sodium hydroxide	1310-73-2	2		
Starch	9005-25-8			
Total dust		15		
Respirable fraction		5		
Stibine	7803-52-3	0.1	0.5	
Stoddard solvent	8052-41-3	200	1150	
Strychnine	57-24-9	0.15		
Styrene	100-42-5	100	420	50
Sucrose	57-50-1			
Total dust		15		
Respirable fraction		5		
Sulfur dioxide	7446-09-5	5	13	
Sulfur hexafluoride	2551-62-4	1000	6000	
Sulfuric acid	7664-93-9	1		
Sulfur monochloride	10025-67-9	1	6	
Sulfur pentafluoride	5714-22-7	0.025	0.25	
Sulfuryl fluoride	2699-79-8	5	20	
Systox; see Demeton				
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	93-76-5	10		
Talc; see Silicates				
Tantalum, metal and oxide dust	7440-25-7	5		
TEDP (Sulfotep)	3689-24-5	0.2		X
Teflon decomposition products A2				
Tellurium and compounds (as Te)	13494-80-9	0.1		
Tellurium hexafluoride (as Te)	7783-80-4	0.02	0.2	
Temephos	3383-96-8			
Total dust		15		
Respirable fraction		5		
TEPP (Tetraethyl pyrophosphaate)	107-49-3	0.05		X
Terphenylis	26140-60-3	(C)1	(C)9	
1,1,1,2-Tetrachloro-2, 2-difluoroethane	76-11-9	500	4170	
1,1,2,2-Tetrachloro-1, 2-difluoroethane	76-12-0	500	4170	
1,1,2,2-Tetrachloroethane	79-34-5	5	35	X
Tetrachoroethylene; see Perchloroethylene				
Tetrachloromethane; see Carbon tetrachloride				
Tetrachloronaphthalene	1335-88-2	2	X	
Tetraethyl lead (as Pb)	78-00-2	0.1	X	
Tetrahydrofuran	109-99-9	200	590	
Tetramethyl lead, (as Pb)	75-74-1	0.15		X

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Tetramethyl succinonitrile	3333-52-6	0.5	3	X
Tetranitromethane	509-14-8	1	8	
Tetryl (2,4,6-Trinitrophenylmethylnitramine)	479-45-8	1.5		X
Thallium, soluble compounds (as Tl)	7440-28-0	0.1		X
4,4'-Thiobis(6-tert, Butyl-m-cresol)	96-69-5			
Total dust		15		
Respirable fraction		5		
Thiram	137-26-8	5		
Tin, inorganic compounds (except oxides) (as Sn)	7440-31-5	2		
Tin, organic compounds (as Sn)	7440-31-5	0.1		
Tin oxide (as Sn)	21651-19-4			
Total dust		15		
Respirable fraction		5		
Titanium dioxide	13463-67-7			
Total dust	15			
Toluene	108-88-3	200	750	100
Toluene-2, 4-diisocyanate (TDI)	584-84-9	(C)0.02	(C)0.14	
o-Toluidine	95-53-4	5	22	X
Toxaphene; see Chlorinated camphene				
Tremolite; see Silicates				
Tributyl phosphate	126-73-8	5		
1,1,1-Trichloroethane; see Methylchloroform				
1,1,2-Trichloroethane	79-00-5	10	45	X
Trichloroethylene	79-01-6	100	535	
Trichloromethane; see Chloroform				
Trichloronaphthalene	1321-65-9	5		X
1,2,3-Trichloropropane	96-18-4	50	300	
1,1,2-Trichloro-1,2, 2-trifluoroethane	76-13-1	1000	7600	
Triethylamine	121-44-8	25	100	
Trifluorobromomethane	75-63-8	1000	6100	
Trimethyl benzene	25551-13-7	25	120	
2,4,6-Trinitrophenyl; see Picric acid				
2,4,6-Trinitrophenylmethyl nitramine; see Tetryl				
2,4,6-Trinitrotoluene (TNT)	118-96-7	1.5		X
Triorthocresyl phosphate	78-30-8	0.1		
Triphenyl phosphate	115-86-6	3		
Tungsten (as W)	7440-33-7			
Insoluble compounds		5		
Soluble compounds			1	

Table Z-Shipyards (cont'd.)

Substance	CAS No (d)	ppm (a)	mg/m(3)(h)	Skin Designation
Turpentine	8006-64-2	100	560	
Uranium (as U)	7440-61-1			
Soluble compounds	0.2			
Insoluble compounds	0.2			
Vanadium	1314-62-1			
Respirable dust (as V(2)O(5))	(C)0.5			
Fume (as V(2)O(5))	(C)0.1			
Vegetable oil mist				
Total dust	15			
Respirable fraction	5			
Vinyl benzene; see Styrene				
Vinyl chloride; see	1915.1017	75-01-4		
Vinyl cyanide; see Acrylonitrile				
Vinyl toluene	25013-15-4	100	480	
Warfarin	81-81-2	0.1		
Xylenes (o-, m-, p-isomers)	1330-20-7	100	435	
Xylidine	1300-73-8	5	25	X
Yttrium	7440-65-5	1		
Zinc chloride fume	7646-85-7	1		
Zinc oxide fume	1314-13-2	5		
Zinc oxide	1314-13-2			
Total dust		15		
Respirable fraction		5		
Zinc stearate	557-05-1			
Total dust		15		
Respirable fraction		5		
Zirconium compounds (as Zr)	7440-67-7	5		

MINERAL	DUSTS
Substance	mppcf(j)
SILICA: Crystalline Quartz Threshold limit calculated from the formula	
percent	250(k) SiO(2)+5
Cristobalite	
Amorphous, including natural diatomaceous earth	20
SILICATES (less than 1 percent crystalline silica)	
Mica	20
Portland cement	50
Soapstone	20
Talc (non-asbestiform)	20
Talc (fibrous), use asbestos limit	
Graphite (natural)	15

Inert or Nuisance Particulates:(m) 50 (or 5 mg/m(3) whichever is the smaller) of total dustless than 1 percent SiO(2)Conversion factors mppcf x 35.3 = million particles per cubic meter = particles per c.c

1915.1001 - Asbestos

(a) Scope and application

This section regulates asbestos exposure in all shipyard employment work as defined in 29 CFR 1915, including but not limited to the following:

(1) Demolition or salvage of structures, vessels, and vessel sections where asbestos is present;

(2) Removal or encapsulation of materials containing asbestos;

(3) Construction, alteration, repair, maintenance, or renovation of vessels, vessel sections, structures, substrates, or portions thereof, that contain asbestos;

(4) Installation of products containing asbestos;
(5) Asbestos spill/emergency cleanup; and

(6) 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.

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

(b) Definitions

"Aggressive" method means removal or disturbance of building/vessel materials by sanding, abrading, grinding, or other method that breaks, crumbles, or otherwise 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/vessel owner" is the legal entity, including a lessee, which exercises control over management and record keeping functions relating to a building, facility, and/or vessel 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.

"Class I asbestos work" means activities involving the removal of thermal system insulation or surfacing ACM/ PACM.

"Class II asbestos work" means activities involving the removal of ACM which is neither TSI or surfacing ACM. 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" see "Qualified person"

"Critical barrier" means one or more layers of plastic sealed over all openings into a work area or any other 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 or vessel 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 5 feet (1.5 meters) 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 not more than a 5 feet (1.5 meters) x 5 feet (1.5 meters) impervious plastic bag-like enclosure affixed around an 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 paragraph (g)(6)(ii),” 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 paragraph (g)(6) of this section.

“Negative Initial Exposure Assessment” means a demonstration by the employer, which complies with the criteria in paragraph (f)(2)(iii) 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, vessels, and vessel sections constructed no later than 1980. The designation of a material as "PACM" may be rebutted pursuant to paragraph (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).

"Qualified person" means, in addition to the definition in 29 CFR 1926.32(f), 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, as specified in 29 CFR 1926.32(f); in addition, for Class I and Class II work who is specially trained in a training course which meet the criteria of EPA's Model Creditation 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).

"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 can reasonably be expected to exceed the permissible exposure limit. Requirements for regulated areas are set out in paragraph (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 vessel, vessel section, structure, or portion thereof.

"Repair" means overhauling, rebuilding, reconstructing, or reconditioning of vessels, vessel sections, 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 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 paragraph (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 shipyard 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 "qualified person" as defined by paragraph (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 paragraphs (e)(2), (3), (4) and (5) of this section.

(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 paragraph (k)(7) of this section.

(3) Access. Access to regulated areas shall be limited to authorized persons and to persons authorized by the Act or regulations issued pursuant thereto.

(4) Respirators. All persons entering a regulated area where employees are required pursuant to paragraph (h)(1) of this section to wear respirators shall be supplied with a respirator selected in accordance with paragraph (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) Qualified Persons. The employer shall ensure that all asbestos work performed within regulated areas is supervised by a qualified person, as defined in paragraph (b) of this section. The duties of the
qualified person are set out in paragraph (o) of this section.

(f) Exposure assessments and monitoring

(1) General monitoring criteria

(i) 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.

(ii) 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.

(iii) 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

(i) Each employer who has a workplace or work operation covered by this
standard shall ensure that a “qualified 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.

(ii) Basis of Initial Exposure Assessment: Unless a negative exposure assessment has been made pursuant to paragraph (f)(2)(iii) of this section, the initial exposure assessment shall, if feasible, be based on monitoring conducted pursuant to paragraph (f)(1)(iii) 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 paragraph (f)(2)(iii) of this section, the employer shall presume that employees are exposed in excess of the TWA and excursion limit.

(iii) Negative Initial 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;

(A) 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

(B) 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

(C) 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

(i) 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 paragraph (f)(2)(iii) of this section, has made a negative exposure assessment for the entire operation.

(ii) 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.

(iii) 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 paragraph. However, employees performing Class I work using a control method which is not listed in paragraph (g)(4)(i), (ii), or (iii) 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

(i) If the periodic monitoring required by paragraph (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.

(ii) Additional monitoring. Notwithstanding the provisions of paragraph (f)(2), (3), and (4) of this section, the employer shall institute the exposure

monitoring required under paragraph (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

(i) The employer shall notify affected employees of the monitoring results that represent that employee's exposure as soon as possible following receipt of monitoring results.

(ii) 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.

(6) Observation of monitoring

(i) 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.

(ii) 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:

(i) Vacuum cleaners equipped with HEPA filters to collect all debris and dust containing ACM and

PACM, except as provided in paragraph (g)(8)(ii) of this section in the case of roofing material;

(ii) 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 paragraph (g)(8)(ii) of this section;

(iii) 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 paragraph (g)(8)(ii) of this section apply.

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

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

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

(iii) 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;

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

(v) 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 paragraph (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 paragraph (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:

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

(ii) 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;

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

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

(4) Class I Requirements

In addition to the provisions of paragraphs (g)(1) and (2) of this section, the following engineering controls and work practices and procedures shall be used:

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

(ii) For all Class I jobs involving the removal of more than 25 feet (7.6 meters) or 10 square feet (3 square meters) of TSI or surfacing ACM or PACM; for all other Class I jobs, where the employer cannot produce a negative exposure assessment pursuant to paragraph (f)(2)(iii) of this section, or where employees are working in areas adjacent to the regulated area, while the Class I work is being performed, the employer shall use one of the following methods to ensure that airborne asbestos does not migrate from the regulated area:

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

(B) 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 paragraph (g)(4)(ii) is satisfied when the specific control methods in paragraph (g)(5) of this section are used.

(iii) 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;

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

(v) 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.

(vi) For all Class I jobs where the employer cannot produce a negative exposure assessment or where exposure monitoring shows the PELs are 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 Systems for Class I Work

In addition, Class I asbestos work may be performed using one or more of the following control methods pursuant to the limitations stated below:

(i) Negative Pressure Enclosure (NPE) systems: NPE systems shall 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.

(A) Specifications

(1) The negative pressure enclosure (NPE) may be of any configuration,

(2) At least 4 air changes per hour shall be maintained in the NPE,

(3) 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,

(4) The NPE shall be kept under negative pressure throughout the period of its use, and

(5) Air movement shall be directed away from employees performing asbestos work within the enclosure, and toward a HEPA filtration or a collection device.

(B) Work Practices

(1) 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.

(2) Electrical circuits in the enclosure shall be deactivated, unless equipped with ground-fault circuit interrupters.

(ii) 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.

(A) Specifications

(1) Glovebags shall be made of 6 mil thick plastic and shall be seamless at the bottom.

(2) Glovebags used on elbows and other connections must be designed for that purpose and used without modifications.

(B) Work Practices

(1) Each glovebag shall be installed so that it completely covers the circumference of pipe or other structure where the work is to be done.

(2) Glovebags shall be smoke-tested for leaks and any leaks sealed prior to use.

(3) Glovebags may be used only once and may not be moved.

(4) Glovebags shall not be used on surfaces whose temperature exceeds 150 deg. F.

(5) Prior to disposal, glovebags shall be collapsed by removing air within them using a HEPA vacuum.

(6) 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.

(7) 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.

(8) Sliding valve or other device shall separate waste bag from hose to ensure no exposure when waste bag is disconnected.

(9) At least two persons shall perform Class I glovebag removal operations.

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

(A) Specifications: In addition to specifications for glove bag systems above, negative pressure glove bag systems shall attach HEPA vacuum system or other device to bag to prevent collapse during removal.

(B) Work Practices

(1) The employer shall comply with the work practices for glove bag systems in paragraph (g)(5)(ii)(B)(4) of this section,

(2) 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.

(3) 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.

(iv) 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:

(A) Specifications

(1) 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.

(2) A negative pressure generator shall be used to create negative pressure in the system.

(3) An air filtration unit shall be attached to the box.

(4) The box shall be fitted with gloved apertures.

(5) An aperture at the base of the box shall serve as a bagging outlet for waste ACM and water.

(6) A back-up generator shall be present on site.

(7) Waste bags shall consist of 6 mil thick plastic double-bagged before they are filled or plastic thicker than 6 mil.

(B) Work practices

(1) At least two persons shall perform the removal.

(2) The box shall be smoke-tested for leaks and any leaks sealed prior to each use.

(3) 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.

(4) A HEPA filtration system shall be used to maintain pressure barrier in box.

(v) 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.

(A) Specifications

(1) Piping from which insulation will be removed shall be surrounded on 3 sides by rigid framing.

(2) A 360 degree water spray, delivered through nozzles supplied by a high pressure separate water line, shall be formed around the piping.

(3) The spray shall collide to form a fine aerosol which provides a liquid barrier between workers and the ACM and PACM.

(B) Work Practices

(1) The system shall be run for at least 10 minutes before removal begins.

(2) All removal shall take place within the barrier.

(3) 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.

(4) After removal, the ACM and PACM shall be bagged while still inside the water barrier.

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

(A) Specifications

(1) The fabricated or job-made enclosure shall be constructed of 6 mil plastic or equivalent;

(2) The enclosure shall be placed under negative pressure by means of a HEPA filtered vacuum or similar ventilation unit.

(B) Work practices

(1) Before use, the mini-enclosure shall be inspected for leaks and smoke-tested to detect breaches, and any breaches sealed.

(2) Before reuse, the interior shall be completely washed with amended water and HEPA-vacuumed.

(3) 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 paragraph (g)(5) of this section, or which modifies a control method referenced in paragraph (g)(5) of this section, if the following provisions are complied with:

(i) 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;

(ii) A certified industrial hygienist or licensed professional engineer who is also qualified as a project designer as defined in paragraph (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 paragraph (g)(4)(ii)(B) of this section.

(A) Where the TSI or surfacing material to be removed is 25 linear feet (7.6 meters) or 10 square feet (3 square meters) or less, the evaluation required in paragraph (g)(6) of this section may be performed by a "qualified person", and may omit consideration of perimeter or clearance monitoring otherwise required.

(B) The evaluation of employee exposure required in paragraph (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.

(iii) Before work which involves the removal of more than 25 linear feet (7.6 meters) or 10 square feet (3 square meters) of TSI or surfacing ACM/PACM is begun using an alternative method which has been the subject of a paragraph (g)(6) of this section

required evaluation and certification, the employer shall send a copy of such evaluation and certification to the national office of OSHA, Office of Technical Support, Room N3653, 200 Constitution Avenue, NW, Washington, DC 20210. The submission shall not constitute approval by OSHA.

(7) Work Practices and Engineering Controls for Class II work surfaces beneath all removal activity.

(i) All Class II work shall be supervised by a qualified person as defined in paragraph (b) of this section.

(ii) For all indoor Class II jobs, where the employer has not produced a negative exposure assessment pursuant to paragraph (f)(2)(iii) 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.

(A) Critical barriers shall be placed over all openings to the regulated area; or,

(B) 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 paragraph (g)(4)(ii)(B) of this section.

(iv) All Class II asbestos work shall be performed using the work practices and requirements set out above in paragraph (g)(3)(i) through (g)(1)(iii) 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 paragraph. 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.

(i) For removing vinyl and asphalt flooring/deck materials which contain ACM or for which in

buildings constructed not later than 1980, the employer has not verified the absence of ACM pursuant to paragraph (g)(8)(i)(I), the employer shall ensure that employees comply with the following work practices and that employees are trained in these practices pursuant to paragraph (k)(9) of this section:

(A) Flooring/deck materials or its backing shall not be sanded;

(B) Vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) shall be used to clean floors;

(C) 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;

(D) All scraping of residual adhesive and/or backing shall be performed using wet methods;

(E) Dry sweeping is prohibited;

(F) Mechanical chipping is prohibited unless performed in a negative pressure enclosure which meets the requirements of paragraph (g)(5)(i) of this section;

(G) Tiles shall be removed intact, unless the employer demonstrates that intact removal is not possible;

(H) When tiles are heated and can be removed intact, wetting may be omitted;

(I) Resilient flooring/deck material in buildings/vessels constructed no later than 1980, 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.

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

(A) Roofing material shall be removed in an intact state to the extent feasible;

(B) Wet methods shall be used to remove roofing materials that are not intact, or that will be rendered intact during removal, unless such wet methods are not feasible or will create safety hazards;

(C) Cutting machines shall be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety;

(D) 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;

(E) 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.

(1) 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.

(2) 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.

(F) Upon being lowered, unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.

(G) Roof level heating and ventilation air intake sources shall be isolated or the ventilation system shall be shut down.

(H) Notwithstanding any other provision of this section, removal or repair of sections of intact roofing less than 25 square feet (7.6 square meters) in area does not require use of wet methods or HEPA vacuuming as long as manual methods which do not render the material non-intact 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 (7.6 square meters), the employer shall include all removal and repair work performed on the same roof on the same day.

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

(A) 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;

(B) Each panel or shingle shall be sprayed with amended water prior to removal;

(C) 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;

(D) Nails shall be cut with flat, sharp instruments.

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

(A) If a gasket is visibly deteriorated and unlikely to be removed intact, removal shall be undertaken within a glovebag as described in paragraph (g)(5)(ii) of this section;

(C) The gasket shall be immediately placed in a disposable container;

(D) Any scraping to remove residue must be performed wet.

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

(A) The material shall be thoroughly wetted with amended water prior to and during its removal;

(B) The material shall be removed in an intact state unless the employer demonstrates that intact removal is not possible;

(C) 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.

(D) 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.

(vi) Alternative Work Practices and Controls

Instead of the work practices and controls listed in paragraphs (g)(8)(i) through (v) of this section, the employer may use different or modified engineering and work practice controls if the following provisions are complied with:

(A) 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;

(B) A qualified 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 theexposure to employees performing the asbestos work and to bystander employees.

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

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

(iii) 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 paragraph (g)(5) of this section or another isolation method.

(iv) Where the employer does not demonstrate by a negative exposure assessment performed in compliance with paragraph (f)(2)(iii) of this section that the PELs will not be exceeded, or where monitoring results show exceedances of a PEL, the employer shall contain the area using impermeable dropcloths and plastic barriers or their equivalent, or shall isolate the operation using mini-enclosure or glove bag systems pursuant to paragraph (g)(5) of this section.

(v) Employees performing Class III jobs which involve the disturbance of TSI or surfacing ACM or PACM or where the employer does not demonstrate by a "negative exposure assessment" in compliance with paragraph (f)(2)(iii) of this section that the PELs will not be exceeded or where monitoring results show exceedances of the PEL, shall wear respirators which are selected, used and fitted pursuant to provisions of paragraph (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 paragraph (k)(9) of this section. In addition, all Class IV jobs shall be conducted in conformity with the requirements set out in paragraph (g)(1) of this section, mandating wet methods, HEPA vacuums, and prompt clean up of debris containing ACM or PACM.

(i) 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 paragraph (h) of this section.

(ii) Employers of employees cleaning up waste and debris in an area where friable TSI or surfacing ACM/PACM is accessible, shall assume that such waste and debris contain asbestos.

(11) Specific compliance methods for brake and clutch repair.

(i) Engineering controls and work practices for brake and clutch repair and service. During automotive brake and clutch inspection, disassembly, repair and assembly operations, the employer shall institute engineering controls and work practices to reduce employee exposure to materials containing asbestos using a negative pressure enclosure/HEPA vacuum system method or low pressure/wet cleaning method, which meets the detailed requirements set out in Appendix L to this section. The employer may also comply using an equivalent method which follows written procedures which the employer demonstrates can achieve results equivalent to Method A. For facilities in which no more than 5 pair of brakes or 5 clutches are inspected, disassembled, repaired, or assembled per week, the method set for in paragraph [D] of Appendix L to this section may be used.

(ii) The employer may also comply by using an equivalent method which follows written procedures, which the employer demonstrates can achieve equivalent exposure reductions as do the two "preferred methods." Such demonstration must include monitoring data conducted under workplace conditions closely resembling the process, type of asbestos containing materials, control method, work practices and environmental conditions which the equivalent method will be used, or objective data, which document that under all reasonably foreseeable conditions of brake and clutch repair applications, the method results in exposures which are equivalent to the methods set out in Appendix L to this section.

(12) 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 paragraph (g)(12) 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 paragraph (g)(12), or if during the course

of the job the material does not remain intact, the provisions of paragraph (g)(8) of this section apply instead of this paragraph (g)(12).

(i) Before work begins and as needed during the job, a qualified 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.

(ii) All employees performing work covered by this paragraph (g)(12) shall be trained in a training program that meets the requirements of paragraph (k)(9)(viii) of this section.

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

(iv) Material that has been removed from a room 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.

(v) Where roofing products which have been labeled as containing asbestos pursuant to paragraph (k)(8) of this section are installed on non-residential roofs during operations covered by this paragraph (g)(12), the employer shall notify the building owner of the presence and location of such materials no later than the end of the job.

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

(h) Respiratory protection

(1) General. The employer shall provide respirators, and ensure that they are used, where required by this section. Respirators shall be used in the following circumstances:

(i) During all Class I asbestos jobs;

(ii) During all Class II work where the ACM is not

removed in a substantially intact state;

(iii) During all Class II and III work which is not performed using wet methods, provided, however, that respirators need not be worn during removal of ACM from sloped roofs when a negative exposure assessment has been made and the ACM is removed in an intact state;

(iv) During all Class II and III asbestos jobs where the employer does not produce a "negative exposure assessment;"

(v) During all Class III jobs where TSI or surfacing ACM or PACM is being disturbed;

(vi) During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators;

(vii) During all work covered by this section where employees are exposed above the TWA or excursion limit;

(viii) In emergencies.

(2) Respirator selection

(i) Where respirators are used, the employer shall select and provide, at no cost to the employee, the appropriate respirator as specified in Table 1, or in paragraph (h)(2)(iii) of this section, and shall ensure that the employee uses the respirator provided.

(ii) The employer shall select respirators from among those jointly approved as being acceptable for protection by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR Part 11.

(iii) (A) The employer shall provide a tight fitting powered, air-purifying respirator in lieu of any negative-pressure respirator specified in Table 1 whenever:

(1) an employee chooses to use this type of respirator; and

(2) this respirator will provide adequate protection to the employee.

(B) The employer shall inform any employee required to

wear a respirator under this paragraph that the employer may require the employer to provide a powered, air-purifying respirator in lieu of a negative pressure respirator.

(iv) In addition to the above selection criterion, the employer shall rovide a half-mask air purifying respirator, other than a disposable respirator, equipped with high efficiency filters whenever the employee performs the following activities: Class II and III asbestos jobs where the employer does not produce a negative exposure assessment; and Class III jobs where TSI or surfacing ACM or PACM is being disturbed.

(v) In addition to the selection criteria in paragraph (h)(2)(i), through (iv), the employer shall provide a tight-fitting powered air purifying respirator equipped with high efficiency filters or 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 for all employees within the regulated area where Class I work is being performed for which a negative exposure assessment has not been produced and, the exposure assessment indicates the exposure level will not exceed 1 f/cc as an 8-hour time weighted average. A full facepiece supplied air respirator operated in the pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus shall be provided under such conditions, if the exposure assessment indicates exposure levels above 1 f/cc as an 8-hour time weighted average.

(3) Respirator program.

(i) Where respiratory protection is used, the employer shall institute a respirator program in accordance with 29 CFR 1910.154(b), (d), (e) and (f).

(ii) The employer shall permit each employee who uses a filter respirator to change the filter elements whenever an increase in breathing resistance is detected and shall maintain an adequate supply of filter elements for this purpose.

(iii) Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

(iv) No employee shall be assigned tasks requiring the

Table 1. — Respiratory Protection for Asbestos Fibers

Airborne concentration of asbestos or conditions of	Required respirator use
Not in excess of 1 f/cc	Half-mask air purifying respirator
(10 X PEL), or other than a disposable respirator, otherwise as required equipped with high efficiency filters. independent of exposure pursuant to paragraph	
(h)(2)(iv) of this section. Not in excess of 5 f/cc	
(50 X PEL).....	Full facepiece air-purifying respirator equipped with high efficiency filters.
Not in excess of 10 f/cc	
(100 X PEL).....	Any powered air-purifying respirator equipped with high efficiency filters or any supplied air respirator operated in continuous flow mode.
Not in excess of 100 f/cc	
(1,000 X PEL).....	Full facepiece supplied air respirator operated in pressure demand mode.
Greater than 100 f/cc	
(1,000 X PEL) or unknown concentration.....	Full facepiece supplied air respirator operated in pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus.

Note: a. Respirators assigned for high environmental concentrations may be used at lower concentrations, or when required respirator use is independent of concentration.
b. A high efficiency filter means a filter that is at least 99.97 percent efficient against mono-dispersed particles of 0.3 micrometers in diameter or larger.

use of respirators if, based on his or her most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or of other employees will be impaired by the use of a respirator. Such employees shall be assigned to another job or given the opportunity to transfer to a different position, the duties of which he or she is able to perform with the same employer, in the same geographical area, and with the same seniority, status, and rate of pay and other job benefits he or she had just prior to such transfer, if such a different position is available.

(4) Respirator fit testing.

(i) The employer shall ensure that the respirator issued to the employee exhibits the least possible facepiece leakage and that the respirator is fitted properly.

(ii) Employers shall perform either quantitative or qualitative face fit tests at the time of initial fitting and at least every 6 months thereafter for each employee wearing a negative-pressure respirator. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, or of full-facepiece air purifying respirators where they are worn at levels at which half-facepiece air purifying respirators are permitted. Qualitative and quantitative fit tests shall be conducted in accordance with Appendix C to this section. The tests shall be used to select facepieces that provide the required protection as prescribed in Table 1, in paragraph (h)(2)(i) of this section.

(i) Protective clothing

(1) General.

The employer shall provide and 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 paragraph (c) of this section, or for which a required negative exposure assessment is not produced, or for any employee performing Class I operations which involve the removal of over 25 linear feet (7.6 meters) or 10 square feet (3 square meters)of TSI or surfacing ACM or PACM.

(2) Laundering.

(i) 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 paragraph (c) of this section.

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

(4) Inspection of protective clothing.

(i) worn by employees at least once per workshift for rips or tears that may occur during performance of work.

(ii) 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 feet (7.6 meters) or 10 square feet (3 square meter) of TSI or surfacing ACM and PACM.

(i) Decontamination areas: For all Class I jobs involving over 25 linear feet (7.6 meters) or 10 square feet (3 square meters) of TSI or surfacing ACM or PACM, 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.

(A) Equipment room. The equipment room shall be

supplied with impermeable, labeled bags and containers for the containment and disposal of contaminated protective equipment.

(B) Shower area. Shower facilities shall be provided which comply with 29 CFR 1910.141(d)(3), 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, or when the work involving asbestos exposure takes place on board a ship, the employers shall ensure that employees:

(1) 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

(2) 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.

(C) 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, or when the work takes place aboard a ship, 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.

(ii) Contamination area entry procedures. The employer shall ensure that employees:

(A) Enter the decontamination area through the clean room;

(B) Remove and deposit street clothing within a locker provided for their use;

(C) Put on protective clothing and respiratory protection before leaving the clean room; and

(D) Before entering the regulated area, the employer shall

ensure that employees pass through the equipment room.

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

(A) Before leaving the regulated area, employees shall remove all gross contamination and debris from their protective clothing;

(B) Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers;

(C) Employees shall not remove their respirators in the equipment room;

(D) Employees shall shower prior to entering the clean room; and

(E) After showering, employees shall enter the clean room before changing into street clothes.

(iv) 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 feet (7.6 meters) or 10 square feet (3 square meters) of TSI or surfacing 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.

(i) 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 an impermeable drop cloth on the floor/deck or horizontal working surface.

(ii) 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).

(iii) Work clothing must be cleaned with a HEPA

vacuum before it is removed.

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

(v) 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 practices 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 paragraph (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) This section applies to the communication of information concerning asbestos hazards in shipyard employment activities to facilitate compliance with this standard. Most asbestos-related shipyard activities involve previously installed building materials. Building/vessel 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/Vessel Material: Employers and building/vessel owners shall identify TSI and sprayed or troweled on surfacing materials as asbestos-containing unless the employer, by complying with paragraph (k)(5) of this section determines that the material is not asbestos-containing. Asphalt or vinyl flooring/decking material installed in buildings or vessels no later than 1980 must also be considered as asbestos containing unless the employer/owner, pursuant to paragraph (g)(8)(i)(I) of this section determines it is not asbestos containing. If the employer or building/vessel owner has actual knowledge or should have known, through the exercise of due diligence, that materials other than TSI and sprayed-on or troweled-on surfacing materials are asbestos-containing, they 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 paragraph (d) of this standard.

(2) Duties of building/vessel and facility owners

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

(ii) Building/vessel and/or facility owners shall notify the following persons of the presence, location and quantity of ACM or PACM, at work sites in their buildings/facilities/vessels. 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.

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

(B) Employees of the owner who will work in or adjacent to areas containing such material:

(C) On multi-employer worksites, all employers of employees who will be performing work within or adjacent to areas containing such materials;

(D) Tenants who will occupy areas containing such materials.

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

(i) 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 paragraph (k)(1) of this section.

(ii) 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 at the work site and the precautions to be taken to insure that airborne asbestos is confined to the area.

(A) Owners of the building/vessel or facility;

(B) Employees who will perform such work and employers of employees who work and/or will be working in adjacent areas;

(iii) Within 10 days of the completion of such work, the employer whose employees have performed work subject to this standard, shall inform the building/vessel or 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 former regulated area and final monitoring results, if any.

(4) In addition to the above requirements, all employers who discover ACM and/or PACM on a work site 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.

(i) At any time, an employer and/or building/vessel owner may demonstrate, for purposes of this standard, that PACM does not contain asbestos. Building/vessel 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 paragraph (k)(5)(ii) 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 paragraph (n) of this section.

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

(A) Having a completed inspection conducted pursuant to the requirements of AHERA (40 CFR Part 763, Subpart E) which demonstrates that the material is not ACM; or

(B) 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.

(iii) The employer and/or building/vessel 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 ACM and/or PACM, the building/vessel 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.

(i) 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 paragraph (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.

(ii)(A) The warning signs required by paragraph (k)(7) of this section shall bear the following information:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

(B) 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:

RESPIRATORS AND PROTECTION CLOTHING
ARE REQUIRED IN THIS AREA

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

(8) Labels.

(i) 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.

(ii) Labels shall be printed in large, bold letters on a contrasting background.

(iii) Labels shall be used in accordance with the requirements of 29 CFR1910.1200(f) of OSHA's Hazard Communication standard, and shall contain the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(v) Labels shall contain a warning statement against breathing asbestos fibers.

(vi) The provisions for labels required by paragraphs (k)(8)(i) through (k)(8)(iii) of this section do not apply where:

(A) 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

(B) Asbestos is present in a product in concentrations less than 1.0 percent.

(vii) When a building/vessel 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 paragraph (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 extet 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.

(i) 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.

(ii) Training shall be provided prior to or at the time of initial assignment and at least annually thereafter.

(iii) 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).

(iv) Training for other Class II work.

(A) For work with asbestos containing roofing materials, flooring materials, siding materials, ceiling tiles, or transite panels, training shall include at a minimum all the elements included in paragraph (k)(9)(viii) of this section and in addition, the specific work practices and engineering controls set forth in paragraph (g) of this section which specifically relate to that category. Such course shall include “hands-on” training and shall take at least 8 hours.

(B) An employee who works with more than one of the

categories of material specified in paragraph (k)(9)(iv)(A) 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.

(C) For Class II operations not involving the categories of material specified in paragraph (k)(9)(iv)(A) of this section, training shall be provided which shall include at a minimum all the elements included in paragraph (k)(9)(viii) of this section and in addition, the specific work practices and engineering controls set forth in paragraph (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.

(v) 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 paragraph (k)(9)(viii) of this section and in addition, the specific work practices and engineering controls set forth in paragraph (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.

(vi) Training for employees performing Class IV operations shall be consistent with EPA requirements for training of local education agency maintence 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.

(vii) Training for employees who are likely to be

exposed in excess of the PEL and who are not otherwise required to be trained under paragraph (k)(9)(iii) through (vi) of this section, shall meet the requirements of paragraph (k)(9)(viii) of this section.

(viii) 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 paragraphs (k)(9)(iii) through (vi) of this section, the employer shall ensure that each such employee is informed of the following:

(A) Methods of recognizing asbestos, including the requirement in paragraph (k)(1) of this section to presume that certain building materials contain asbestos;

(B) The health effects associated with asbestos exposure;

(C) The relationship between smoking and asbestos in producing lung cancer;

(D) 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;

(E) The purpose, proper use, fitting instructions, and limitations of respirators as required by 29 CFR 1910.134;

(F) The appropriate work practices for performing the asbestos job;

(G) Medical surveillance program requirements;

(H) The content of this standard including appendices;

(I) 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

(J) 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.

(i) 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.

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

(iii) 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.

(l) 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 paragraph (g)(8)(ii) of this section apply.

(3) Care of asbestos-containing flooring/deck material.

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

(ii) Sanding of flooring/deck material is prohibited.

(iii) Stripping of finishes shall be conducted using low

abrasion pads at speeds lower than 300 rpm and wet methods.

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

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

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

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

(m) Medical surveillance

(1) General .

(i) Employees covered.

(A) 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 a 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.

(B) 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.

(ii) Examination.

(A) 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.

(B) 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.

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

(A) Prior to assignment of the employee to an area where negative-pressure respirators are worn;

(B) 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;

(C) And at least annually thereafter.

(D) 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.

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

(ii) Content. Medical examinations made available pursuant to paragraphs (m)(2)(i)(A) through (m)(2)(i)(C) of this section shall include:

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

(B) 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.

(C) A physical examination directed to the pulmonary and gastrointestinal systems, including a chest, x-ray to be administered at the discretion of the physician, and pulmonary function tests of forced vital capacity (FVC) and forced expiratory volume at one second (FEV(1). Interpretation and classification of chest roentgenogram

shall be conducted in accordance with Appendix E to this section;

(D) 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:

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

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

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

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

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

(4) Physician's written opinion.

(i) 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:

(A) 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;

(B) Any recommended limitations on the employee or on the use of personal protective equipment such as respirators;

(C) 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; and

(D) A statement that the employee has been informed by the physician of the increased risk of lung cancer attribut-

able to the combined effect of smoking and asbestos exposure.

(ii) 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.

(iii) 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 paragraph (f) of this section.

(i) 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 paragraph (f) of this section, the employer shall establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption.

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

(A) The product qualifying for exemption;

(B) The source of the objective data;

(C) The testing protocol, results of testing, and/or analysis of the material for the release of asbestos;

(D) A description of the operation exempted and how the data support the exemption; and

(E) Other data relevant to the operations, materials, processing, or employee exposures covered by the exemption.

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

(2) Exposure measurements.

(i) The employer shall keep an accurate record of all measurements taken to monitor employee exposure to asbestos as prescribed in paragraph (f) of this section. Note: The employer may utilize the services of qualified organizations such as industry trade associations and employee associations to maintain the records required by this section.

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

(A) The date of measurement;

(B) The operation involving exposure to asbestos that is being monitored;

(C) Sampling and analytical methods used and evidence of their accuracy;

(D) Number, duration, and results of samples taken;

(E) Type of protective devices worn, if any; and

(F) Name, social security number, and exposure of the employees whose exposures are represented.

(iii) The employer shall maintain this record for at least 30 years, in accordance with 29 CFR 1910.20.

(3) Medical surveillance.

(i) The employer shall establish and maintain an accurate record for each employee subject to medical surveillance by paragraph (m) of this section, in accordance with 29 CFR 1910.20.

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

(A) The name and social security number of the employee;

(B) A copy of the employee's medical examination results, including the medical history, questionnaire responses, results of any tests, and physician's recommendations.

(C) Physician's written opinions;

(D) Any employee medical complaints related to exposure to asbestos; and

(E) A copy of the information provided to the physician as

required by paragraph (m) of this section.

(iii) The employer shall ensure that this record is maintained for the duration of employment plus 30 years, in accordance with 29 CFR 1910.20.

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

(5) Data to Rebut PACM.

(i) 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 Notification

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

(7) Availability

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

(ii) The employer, upon request, shall make any exposure records required by paragraphs (f) and (n) of this section available for examination and copying to affected employees, former employees, designated representatives, and the Assistant Secretary, in accordance with 29 CFR 1910.20(a) through (e) and (g) through (i).

(iii) The employer, upon request, shall make employee medical records required by paragraphs (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 Assistant Secretary, in accordance with 29 CFR 1910.20.

(8) Transfer of records.

(i) The employer shall comply with the requirements concerning transfer of records set forth in 29 CFR 1910.20 (h).

(ii) 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) Qualified person

(1) General. On all shipyard worksites covered by this standard, the employer shall designate a qualified person, having the qualifications and authorities for ensuring worker safety and health required by Subpart C, General Safety and Health Provisions for Construction (29 CFR 1926.20 through 1926.32).

(2) Required Inspections by the Qualified Person. Sec. 1926.20(b)(2) 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 qualified persons, is incorporated.

(3) Additional Inspections. In addition, the qualified person shall make frequent and regular inspections of the job sites, in order to perform the duties set out in paragraph (o)(3)(i) of this section. 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.

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

(A) Set up the regulated area, enclosure, or other containment;

(B) Ensure (by on-site inspection) the integrity of the enclosure or containment;

(C) Set up procedures to control entry to and exit from the enclosure and/or area;

(D) Supervise all employee exposure monitoring required

by this section and ensure that it is conducted as required by paragraph (f) of this section;

(E) Ensure that employees working within the enclosure and/or using glove bags wear respirators and protective clothing as required by paragraphs (h) and (i) of this section;

(F) 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;

(G) Ensure that employees use the hygiene facilities and observe the decontamination procedures specified in paragraph (j) of this section;

(H) Ensure that through on-site inspection, engineering controls are functioning properly and employees are using proper work practices; and

(I) Ensure that notification requirements in paragraph (k) of this section are met.

(4) Training for the competent person.

(i) For Class I and II asbestos work the qualified 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.

(ii) For Class III and IV asbestos work, the qualified 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. Qualified persons for Class III and Class IV work may also be trained pursuant to the requirements of paragraph (o)(4)(i) 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. See 29 CFR Part 1915.

(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. See 29 CFR Part 1915.

1915.1002 - Coal Tar Pitch Volatiles: Interpretation of Term

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1002 of this chapter.

1915.1003 - 13 Carcinogens (4-Nitrobiphenyl, etc.)

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1004 - Alpha - Naphthylamine

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1006 - Methyl Chloromethyl Ether

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1007 - 3,3' - Dichlorobenzidine (and its salts)

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1008 - Bis-chloromethyl Ether

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1009 - Beta-Naphthylamine

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1010 - Benzidine

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1011 - 4-Aminodiphenyl

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1012 - Ethyleneimine

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1013 - Beta-Propiolactone

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1014 - 2-Acetylaminofluorene

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1015 - 4-Dimethylaminoazobenzene

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1016 - N-Nitrosodimethylamine

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1003 of this chapter.

1915.1017 - Vinyl Chloride

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1017 of this chapter.

1915.1018 - Inorganic Arsenic

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1018 of this chapter.

1915.1020 - Access to Employee Exposure and Medical Records

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1020 of this chapter.

1915.1025 - Lead

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1025 of this chapter.

1915.1027 - Cadmium

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1027 of this chapter.

1915.1028 - Benzene

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1028 of this chapter.

1915.1030 - Bloodborne Pathogens

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1030 of this chapter.

1915.1044 -1,2-Dibromo-3-Chloropropane

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1044 of this chapter.

1915.1045 - Acrylonitrile

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1045 of this chapter.

1915.1047 - Ethylene Oxide

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1047 of this chapter.

1915.1048 - Formaldehyde

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1048 of this chapter.

1915.1050 - Methylenedianiline

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1050 of this chapter.

1915.1052 - Methylene Chloride

The requirements applicable to shipyard employment under this section are identical to those set forth at 29 CFR 1910.1052.

1915.1200 - Hazard Communication

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1200 of this chapter.

1915.1450 - Occupational Exposure to Hazardous Chemicals in Laboratories

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.1450 of this chapter.

Other Sources of OSHA Assistance

Safety and Health Program Management Assistance

Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. To assist employers and employees in developing effective safety and health programs, OSHA published recommended *Safety and Health Program Management Guidelines* (*Federal Register* 54(18):3908-3916, January 26, 1989). These voluntary guidelines apply to all places of employment covered by OSHA.

The guidelines identify four general elements that are critical to the development of a successful safety and health management program:

• management commitment and employee involvement,

• worksite analysis,

• hazard prevention and control, and

• safety and health training.

The guidelines recommend specific actions under each of these general elements to achieve an effective safety and health program. A single, free copy of the guidelines can be obtained from the U.S. Department of Labor, OSHA/OICA Publications, P.O. Box 37535, Washington, DC 20013-7535, by sending a self-addressed mailing label with your request or by visiting OSHA's Web site at www.OSHA.gov.

State Programs

The *OSH Act of 1970* encourages states to develop and operate their own job safety and health plans. States administering occupational safety and health programs through plans approved under section 18(b) of the *Act* must adopt standards and enforce requirements that are "at least as effective" as federal requirements. There are currently 25 State Plan states: 23 cover the private and public sector (state and local governments) and 2 cover the public sector only. For more information on state plans, see the list of states with approved plans at the end of this publication.

Free Onsite Consultation

Consultation assistance is available on request to employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. Primarily developed for small employers with more hazardous operations, the consultation service is delivered by state government agencies or universities employing professional safety consultants and health consultants. Comprehensive assistance includes an appraisal of all work practices and environmental hazards of the workplace and all aspects of the employer's present job safety and health program.

The program is separate from OSHA's inspection efforts. No penalties are proposed or citations issued for any safety or health problems identified by the consultant. The service is confidential.

For more information concerning consultation assistance, see the list of consultation projects at the end of this publication and visit OSHA's Web site.

Voluntary Protection Programs (VPPs)

Voluntary protection programs (VPPs) and onsite consultation services when coupled with an effective enforcement program, expand worker protection to help meet the goals of the *Act*. The three VPPs—Star, Merit, and Demonstration— are designed to recognize outstanding achievement by companies that have successfully incorporated comprehensive safety and health programs into their total management system. They motivate others to achieve excellent safety and health results in the same outstanding way and they establish a cooperative relationship among employers, employees, and OSHA.

For additional information on VPPs and how to apply, contact the OSHA national, regional, or area offices listed at the end of this publication.

Training and Education

OSHA's area offices offer a variety of informations services such as publications, audiovisual aids, technical advice and speakers for special engagements. The OSHA Training Institute in Des Plaines, IL, provides basic and advanced courses in safety and health for federal and state compliance officers, state consultants, federal agency personnel, and private sector employers, employees, and their representatives.

OSHA also provides funds to nonprofit organizations, through grants, to conduct workplace training and education in subjects where OSHA believes there is a lack of workplace training. Grants are awarded annually and grant recipients are expected to contribute 20 percent of the toal grant cost.

For more information on grants, training, and education, contact the OSHA Training Institute, Office of Training and Education, 1555 Times Drive, Des Plaines, Il 60018, (847) 297-4810. For further information on any OSHA program, contact your nearest OSHA area or regional office listed at the end of this publication.

Electronic Information

Internet—OSHA standards, interpretations, directives, technical advisors, compliance assistance, and additional information are now on the World Wide Web at http:\\www.osha.gov.

CD-ROM—A wide variety of OSHA materials, including standards, interpretations, directives, and more, can be purchased on CD-ROM from the U.S. Government Printing Office. To order write to the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 or telephone (202) 512-1800. Specify OSHA Regulations, Documents, and Technical Information on CD-ROM (ORDT), GPO Order No. S/N 729-013-00000-5. The price is $43 per year ($53.75 foreign); $17 per single copy ($21.25 foreign).

Emergencies

For life-threatening situations only, call (800) 321-OSHA. Complaints will go immediately to the nearest OSHA area or state office for help.

For further information on any OSHA program, contact your nearest OSHA area or regional office listed at the end of this publication.

States with Approved Plans

Commissioner
Alaska Department of Labor
1111 West 8th Street
Room 306
Juneau, AK 99801
(907) 465-2700

Director
Industrial Commission
of Arizona
800 W. Washington
Phoenix, AZ 85007
(602) 542-5795

Director
California Department
of Industrial Relations
45 Fremont Street
San Francisco, CA 94105
(415) 972-8835

Commissioner
Connecticut Department
of Labor
200 Folly Brook Boulevard
Wethersfield, CT 06109
(860) 566-5123

Director
Hawaii Department of Labor
and Industrial Relations
830 Punchbowl Street
Honolulu, HI 96813
(808) 586-8844

Commissioner
Indiana Department of Labor
State Office Building
402 West Washington Street
Room W195
Indianapolis, IN 46204
(317) 232-2378

Commissioner
Iowa Division of Labor Services
1000 E. Grand Avenue
Des Moines, IA 50319
(515) 281-3447

Secretary
Kentucky Labor Cabinet
1047 U.S. Highway,
127 South, Suite 2
Frankfort, KY 40601
(502) 564-3070

Commissioner
Maryland Division of Labor
and Industry
Department of Labor
Licensing and Regulation
1100 N. Eutaw Street,
Room 613
Baltimore, MD 21201-2206
(410) 767-2215

Director
Michigan Department
of Consumer and Industry Services
4th Floor, Law Building
P.O. Box 30004
Lansing, MI 48909
(517) 373-7230

Commissioner
Minnesota Department
of Labor and Industry
443 Lafayette Road
St. Paul, MN 55155
(612) 296-2342

Administrator
Nevada Division of Industrial
Relations
400 West King Street
Carson City, NV 89710
(702) 687-3032

Secretary
New Mexico Environment
Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, NM 87502
(505) 827-2850

Commissioner
New York Department
of Labor
W. Averell Harriman State Office Building - 12,
Room 500
Albany, NY 12240
(518) 457-2741

Commissioner
North Carolina Department
of Labor
319 Chapanoke Road
Raleigh, NC 27603
(919) 662-4585

Administrator
Department of Consumer
& Business Services
Occupational Safety
and Health Division
(OR-OSHA)
350 Winter Street, NE,
Room 430
Salem, OR 97310-0220
(503) 378-3272

Secretary
Puerto Rico Department
of Labor and Human
Resources
Prudencio Rivera Martinez Building
505 Munoz Rivera Avenue
Hato Rey, PR 00918
(809) 754-2119

Director
South Carolina Department
of Labor Licensing
and Regulation
Koger Office Park, Kingstree Building
110 Centerview Drive
P.O. Box 11329
Columbia, SC 29210
(803) 896-4300

Commissioner
Tennessee Department
of Labor
Attention: Robert Taylor
710 James Robertson
Parkway
Nashville, TN 37243-0659
(615) 741-2582

Commissioner
Industrial Commission
of Utah
160 East 300 South, 3rd Floor
P.O. Box 146650
Salt Lake City, UT
84114-6650
(801) 530-6898

Commissioner
Vermont Department of Labor
and Industry
National Life Building -
Drawer 20
120 State Street
Montpelier, VT 05620
(802) 828-2288

Commissioner
Virginia Department of Labor
and Industry
Powers-Taylor Building
13 South 13th Street
Richmond, VA 23219
(804) 786-2377

Commissioner
Virgin Islands Department
of Labor
2131 Hospital Street, Box 890
Christiansted
St. Croix, VI 00820-4666
(809) 773-1994

Director
Washington Department
of Labor and Industries
General Administrative
Building
P.O. Box 44001
Olympia, WA 98504-4001
(360) 902-4200

Administrator
Worker's Safety
and Compensation Division
(WSC)
Wyoming Department
of Employment
Herschler Building, 2nd Floor East 122 West 25th Street
Cheyenne, WY 82002
(307) 777-7786

OSHA Consultation Project Directory

State	Telephone
Alabama	(205) 348-7136
Alaska	(907) 269-4957
Arizona	(602) 542-5795
Arkansas	(501) 682-4522
California	(415) 982-8515
Colorado	(970) 491-6151
Connecticut	(860) 566-4550
Delaware	(302) 761-8219
District of Columbia	(202) 576-6339
Florida	(904) 488-3044
Georgia	(404) 894-2646
Guam	011 (671) 475-0136
Hawaii	(808) 586-9100
Idaho	(208) 385-3283
Illinois	(312) 814-2337
Indiana	(317) 232-2688
Iowa	(515) 281-5352
Kansas	(913) 296-7476
Kentucky	(502) 564-6895
Louisiana	(504) 342-9601
Maine	(207) 624-6460
Maryland	(410) 333-4210
Massachusetts	(617) 727-3982
Michigan	(517) 332-8250(H)
	(517) 322-1809(S)
Minnesota	(612) 297-2393
Mississippi	(601) 987-3981
Missouri	(573) 751-3403
Montana	(406) 444-6418
Nebraska	(402) 471-4717
Nevada	(702) 486-5016
New Hampshire	(603) 271-2024
New Jersey	(609) 292-2424
New Mexico	(505) 827-4230
New York	(518) 457-2481
North Carolina	(919) 662-4644
North Dakota	(701) 328-5188
Ohio	(614) 644-2246
Oklahoma	(405) 528-1500
Oregon	(503) 378-3272
Pennsylvania	(412) 357-2561
Puerto Rico	(809) 754-2188
Rhode Island	(401) 277-2438
South Carolina	(803) 734-9614
South Dakota	(605) 688-4101
Tennessee	(615) 741-7036
Texas	(512) 440-3834
Utah	(801) 530-6868

Vermont .....(802) 828-2765
Virginia .....(804) 786-6359
Virgin Islands.....(809) 772-1315
Washington .....(360) 902-5638
West Virginia .....(304) 558-7890
Wisconsin ..... (608) 266-8579(H)
.....(414) 521-5063(S)
Wyoming .....(307) 777-7700

(H) Health
(S) Safety

OSHA Area Offices

Area	Telephone
Albany, NY	(518) 464-6742
Albuquerque, NM	(505) 248-5302
Allentown, PA	(610) 776-0592
Anchorage, AK	(907) 271-5152
Appleton, WI	(414) 734-4521
Austin, TX	(512) 916-5783
Avenel, NJ	(908) 750-3270
Baltimore, MD	(410) 962-2840
Bangor, ME	(207) 941-8177
Baton Rouge, LA	(504) 389-0474
Bayside, NY	(718) 279-9060
Bellevue, WA	(206) 553-7520
Billings, MT	(406) 247-7494
Birmingham, AL	(205) 731-1534
Bismarck, ND	(701) 250-4521
Boise, ID	(208) 334-1867
Bowmansville, NY	(716) 684-3891
Braintree, MA	(617) 565-6924
Bridgeport, CT	(203) 579-5581
Calumet City, IL	(708) 891-3800
Carson City, NV	(702) 885-6963
Charleston, WV	(304) 347-5937
Cincinnati, OH	(513) 841-4132
Cleveland, OH	(216) 522-3818
Columbia, SC	(803) 765-5904
Columbus, OH	(614) 469-5582
Concord, NH	(603) 225-1629
Corpus Christi, TX	(512) 888-3420
Dallas, TX	(214) 320-2400
Denver, CO	(303) 844-5285
Des Plaines, IL	(847) 803-4800
Des Moines, IA	(515) 284-4794
Englewood, CO	(303) 843-4500
Erie, PA	(814) 833-5758
Fort Lauderdale, FL	(305) 424-0242
Fort Worth, TX	(817) 581-7303
Frankfort, KY	(502) 227-7024
Harrisburg, PA	(717) 782-3902
Hartford, CT	(203) 240-3152
Hasbrouck Heights, NJ	(201) 288-1700
Guaynabo, PR	(787) 277-1560
Honolulu, HI	(808) 541-2685
Houston, TX	(713) 286-0583
Houston, TX	(713) 591-2438
Indianapolis, IN	(317) 226-7290
Jackson, MS	(601) 965-4606
Jacksonville, FL	(904) 232-2895
Kansas City, MO	(816) 483-9531
Lansing, MI	(517) 377-1892

Area	Telephone
Little Rock, AR	(501) 324-6291
Lubbock, TX	(806) 743-7681
Madison, WI	(608) 264-5388
Marlton, NJ	(609) 757-5181
Methuen, MA	(617) 565-8110
Milwaukee, WI	(414) 297-3315
Minneapolis, MN	(612) 664-5460
Mobile, AL	(334) 441-6131
Nashville, TN	(615) 781-5423
New York, NY	(212) 466-2482
Norfolk, VA	(804) 441-3820
North Aurora, IL	(630) 896-8700
Oklahoma City, OK	(405) 23105351
Omaha, NE	(402) 221-3182
Parsippany, NJ	(201) 263-1003
Peoria, IL	(309) 671-7033
Philadelphia, PA	(215) 597-4955
Phoenix, AZ	(602) 640-2007
Pittsburgh, PA	(412) 644-2903
Portland, OR	(503) 326-2251
Providence, RI	(401) 528-4669
Raleigh, NC	(919) 856-4770
Salt Lake City, UT	(801) 524-5080
San Francisco, CA	(415) 744-7120
Savannah, GA	(912) 652-4393
Smyrna, GA	(404) 984-8700
Springfield, MA	(413) 785-0123
St. Louis, MO	(314) 425-4249
Syracuse, NY	(315) 451-0808
Tampa, FL	(813) 626-1177
Tarrytown, NY	(914) 524-7510
Toledo, OH	(419) 259-7542
Tucker, GA	(770) 493-6644
Westbury, NY	(516) 334-3344
Wichita, KS	(316) 269-6644
Wilkes-Barre, PA	(717) 826-6538
Wilmington, DE	(302) 573-6115

OSHA REGIONAL Offices

Region I
(CT,* MA, ME, NH, RI, VT*)
JKF Federal Building
Room E-340
Boston, MA 02203
Telephone: (617) 565-9860

Region II
(NJ, NY,* PR,* VI*)
201 Varick Street
Room 670
New York, NY 10014
Telephone: (212) 337-2378

Region III
(DC, DE, MD,* PA, VA,* WV)
Gateway Building, Suite 2100
3535 Market Street
Philadelphia, PA 19104
Telephone: (215) 596-1201

Region IV
(AL, FL, GA, KY,* MS, NC,* SC,* TN*)
Atlanta Federal Center
61 Forsyth Street, SW,
Room 6T50
Atlanta, GA 30303
Telephone: (404) 562-2300

Region V
(IL, IN,* MI,* MN,* OH, WI)
230 South Dearborn Street
Room 3244
Chicago, IL 60604
Telephone: (312) 353-2220

Region VI
(AR, LA, NM,* OK, TX)
525 Griffin Street
Room 602
Dallas, TX 75202
Telephone: (214) 767-4731

Region VII
(IA,* KS, MO, NE)
City Center Square
1100 Main Street, Suite 800
Kansas City, MO 64105
Telephone: (816) 426-5861

Region VIII
(CO, MT, ND, SD, UT,* WY*)
1999 Broadway, Suite 1690
Denver, CO 80202-5716
Telephone: (303) 844-1600

Region IX
(American Samoa, AZ,* CA,* Guam, HI,* NV,* Trust Territories of the Pacific)
71 Stevenson Street
Room 420
San Francisco, CA 94105
Telephone: (415) 975-4310

Region X
(AK,* ID, OR,* WA*)
1111 Third Avenue
Suite 715
Seattle, WA 98101-3212
Telephone: (206) 553-5930

*These states and territories operate their own OSHA-approved job safety and health programs (Connecticut and New York plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard.