OSHA®

Occupational Safety and Health Administration

www.osha.gov

Shipyard Industry Standards

OSHA 2268-10R 2014

www.osha.gov

Occupational Safety and Health Act of 1970
To assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health.

This publication is not a standard or regulation, and it creates no new legal obligations. It contains recommendations as well as descriptions of mandatory safety and health standards. The recommendations are advisory in nature, informational in content, and are intended to assist employers in providing a safe and healthful workplace. The *Occupational Safety and Health Act* requires employers to comply with safety and health standards and regulations promulgated by OSHA or by a state with an OSHA-approved state plan. In addition, the Act's General Duty Clause, Section 5(a)(1), requires employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm.

Material contained in this publication is in the public domain and may be reproduced, fully or partially, without permission. Source credit is requested but not required.

This information will be made available to sensory-impaired individuals upon request. Voice phone: (202) 693-1999; teletypewriter (TTY) number: 1-877-889-5627.

Shipyard Industry Standards

U.S. Department of Labor

Occupational Safety and Health Administration

OSHA 2268-10R
2014

Cover photo from the American Shipbuilding Association, courtesy of General Dynamics NASSCO in San Diego, CA.

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, 2014. Also included are brief discussions of 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 Consultation Program, which is available to assist 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 website: www.osha.gov). 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, *Applicability of Standards*).

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.

Employees of employers performing shipyard 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 covered by the Shipyard standards.

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 OSH Act must adopt standards and enforce requirements that are "at least as effective" as Federal OSHA requirements. There are currently 26 State Plan states: 22 cover the private and public sectors (state and local governments) and 4 cover the public sector only. For more information on state plans, see www.osha.gov/dcsp/osp.

Contents

Maritime Coverage under State Plans 13

Guidelines for Workplace Safety and Health Programs in the Shipyard Industry . . . 13
Basic Elements 14
Management Commitment. 14
Employee Participation 16
Large Shipyard 17
Medium Shipyard/Large Boatyard 17
Small Shipyard or Boatyard 18
Hazard Identification, Assessment and Control 18
Accident and Incident Investigation 22
Training 23
Program Evaluation 25
Procedures for Multi-Employer Workplaces 26
Recordkeeping 27

Subpart A – General Provisions 29
1915.1 Purpose and Authority. 29
1915.2 Scope and Application. 29
1915.3 Responsibility 29
1915.4 Definitions 30
1915.5 Incorporation by Reference 33
1915.6 Commercial Diving Operations 38
1915.7 Competent Person 38
1915.8 OMB Control Numbers Under the Paperwork Reduction Act 40
1915.9 Compliance Duties Owed to Each Employee 40

Subpart B – Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment 41
1915.11 Scope, Application, and Definitions Applicable to this Subpart. 41
1915.12 Precautions and the Order of Testing Before Entering Confined and Enclosed Spaces and Other Dangerous Atmospheres 44
1915.13 Cleaning and Other Cold Work 50
1915.14 Hot Work. 53
1915.15 Maintenance of Safe Conditions. 55
1915.16 Warning Signs and Labels 56

APPENDIX A to SUBPART B –
Compliance Assistance Guidelines for Confined and Enclosed Spaces and Other Dangerous Atmospheres **56**

APPENDIX B to SUBPART B –
Reprint of U.S. Coast Guard Regulations Referenced in Subpart B, for Determination of Coast Guard Authorized Persons **56**

Subpart C – Surface Preparation and Preservation **57**
1915.31 Scope and Application of Subpart **57**
1915.32 Toxic Cleaning Solvents **57**
1915.33 Chemical Paint and Preservative Removers **57**
1915.34 Mechanical Paint Removers **58**
1915.35 Painting **60**
1915.36 Flammable Liquids **63**

Subpart D – Welding, Cutting and Heating **65**
1915.51 Ventilation and Protection in Welding, Cutting and Heating **65**
1915.53 Welding, Cutting and Heating in Way of Preservative Coatings **68**
1915.54 Welding, Cutting and Heating of Hollow Metal Containers and Structures Not Covered by §1915.12 . . . . . **70**
1915.55 Gas Welding and Cutting **71**
1915.56 Arc Welding and Cutting **75**
1915.57 Uses of Fissionable Material in Ship Repairing and Shipbuilding **77**

Subpart E – Scaffolds, Ladders and Other Working Surfaces **79**
1915.71 Scaffolds or Staging **79**
1915.72 Ladders **88**
1915.73 Guarding of Deck Openings and Edges . . .**90**
1915.74 Access to Vessels **91**
1915.75 Access to and Guarding of Dry Docks and Marine Railways **93**
1915.76 Access to Cargo Spaces and Confined Spaces **95**
1915.77 Working Surfaces **96**

Subpart F – General Working Conditions 97
1915.80 Scope, application, definitions, and effective dates **97**
1915.81 Housekeeping **103**
1915.82 Lighting. **104**
1915.83 Utilities **107**
1915.84 Working alone **108**
1915.85 Vessel radar and communication systems. **108**
1915.86 Lifeboats **109**
1915.87 Medical services and first aid. **110**
1915.88 Sanitation **114**
1915.89 Control of hazardous energy (lockout/tags-plus) **118**
1915.90 Safety color code for marking physical hazards **141**
1915.91 Accident prevention signs and tags **141**
1915.92 Retention of DOT markings, placards, and labels **141**
1915.93 Motor vehicle safety equipment, operation and maintenance **142**
1915.94 Servicing multi-piece and single-piece rim wheels **144**

Subpart G – Gear and Equipment for Rigging and Materials Handling 145
1915.111 Inspection **145**
1915.112 Ropes, Chains and Slings **145**
1915.113 Shackles and Hooks **147**
1915.114 Chain Falls and Pull-Lifts **148**
1915.115 Hoisting and Hauling Equipment **148**
1915.116 Use of Gear **149**
1915.117 Qualifications of Operators **151**
1915.118 Tables **151**
1915.120 Powered Industrial Truck Operator Training **156**

Subpart H – Tools and Related Equipment . . 157
1915.131 General Precautions **157**
1915.132 Portable Electric Tools **158**
1915.133 Hand Tools **158**
1915.134 Abrasive Wheels **159**
1915.135 Powder Actuated Fastening Tools **161**
1915.136 Internal Combustion Engines, Other Than Ship's Equipment **162**

Subpart I – Personal Protective Equipment (PPE) 164
1915.151 Scope, Application and Definitions **164**
1915.152 General Requirements **166**
1915.153 Eye and Face Protection **169**
1915.154 Respiratory Protection **172**
1915.155 Head Protection **173**
1915.156 Foot Protection **173**
1915.157 Hand and Body Protection **174**
1915.158 Lifesaving Equipment **175**
1915.159 Personal Fall Arrest Systems (PFAS) **175**
1915.160 Positioning Device Systems **179**

APPENDIX A to SUBPART I – 180
Non-Mandatory Guidelines for Hazard Assessment, Personal Protective Equipment (PPE) Selection, and PPE Training Program

APPENDIX B to SUBPART I – 180
General Testing Conditions and Additional Guidelines for Personal Fall Protection Systems (Non-Mandatory)

Subpart J – Ship's Machinery and Piping Systems 181
1915.161 Scope and Application of Subpart **181**
1915.162 Ship's Boilers **181**
1915.163 Ship's Piping Systems **181**
1915.164 Ship's Propulsion Machinery **182**
1915.165 Ship's Deck Machinery **183**

Subpart K – Portable, Unfired Pressure Vessels, Drums and Containers, Other Than Ship's Equipment 184
1915.171 Scope and Application of Subpart **184**
1915.172 Portable Air Receivers and Other Unfired Pressure Vessels **184**
1915.173 Drums and Containers **185**

Subpart L – Electrical Machinery 186
1915.181 Electrical Circuits and Distribution Boards **186**

Subparts M – O [Reserved] 187

Subpart P – Fire Protection in Shipyard Employment 187
1915.501 General Provisions **187**
1915.502 Fire Safety Plan **188**
1915.503 Precautions for Hot Work **189**
1915.504 Fire Watches **190**
1915.505 Fire Response **192**
1915.506 Hazards of Fixed Extinguishing Systems on Board Vessels and Vessel Sections . . **198**
1915.507 Landside Fire Protection Systems **200**
1915.508 Training **202**
1915.509 Definitions Applicable to this Subpart . . . **205**

APPENDIX A to SUBPART P of PART 1915 – . . 210
Model Fire Safety Plan (Non-Mandatory)

Subpart Q – Y [Reserved] 211

Subpart Z – Toxic and Hazardous Substances 211
1915.1000 Air Contaminants **211**
1915.1001 Asbestos **234**
1915.1002 Coal Tar Pitch Volatiles; Interpretation of Term **288**
1915.1003 13 Carcinogens (4-Nitrobiphenyl, etc.) . . **288**
1915.1004 alpha-Naphthylamine **288**
1915.1005 [Reserved] **288**
1915.1006 Methyl Chloromethyl Ether **288**
1915.1007 3,3′-Dichlorobenzidene (and its Salts) . . **288**
1915.1008 bis-Chloromethyl Ether **288**
1915.1009 beta-Naphthylamine **288**
1915.1010 Benzidine **288**
1915.1011 4-Aminodiphenyl **288**
1915.1012 Ethyleneimine **288**
1915.1013 beta-Propiolactone **288**
1915.1014 2-Acetylaminofluorene **288**
1915.1015 4-Dimethylaminoazobenzene **288**
1915.1016 N-Nitrosodimethylamine **288**
1915.1017 Vinyl Chloride **288**
1915.1018 Inorganic Arsenic **288**
1915.1020 Access to Employee Exposure and Medical Records **288**
1915.1025 Lead **288**
1915.1026 Chromium (VI) **288**

1915.1027 Cadmium **301**
1915.1028 Benzene **301**
1915.1030 Bloodborne Pathogens **301**
1915.1044 1,2-Dibromo-3-Chloropropane **301**
1915.1045 Acrylonitrile **301**
1915.1047 Ethylene Oxide **301**
1915.1048 Formaldehyde **301**
1915.1050 Methylenedianiline. **301**
1915.1052 Methylene Chloride **301**
1915.1200 Hazard Communication **301**
1915.1450 Occupational Exposure to Hazardous Chemicals in Laboratories **301**

Workers' Rights 302

OSHA Assistance, Services and Programs . . 302

NIOSH Health Hazard Evaluation Program . . 306

OSHA Regional Offices 307

How to Contact OSHA. 309

AUTHORITY: Section 41, *Longshore and Harbor Workers' Compensation Act* (33 U.S.C 941); Sections 4, 6, and 8 of the *Occupational Safety and Health Act of 1970* (29 U.S.C. 653, 655, 657); and Secretary of Labor's Order Nos. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), 6-96 (62 FR 111), 3-2000 (62 FR 50017), or 5-2002 (67 FR 65008) as applicable. Sections 1915.120 and 1915.152 of 29 CFR also issued under 29 CFR Part 1911.

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 employees are covered by the State. Federal OSHA retains responsibility for all other maritime coverage. A few state plans – California, Minnesota, Vermont, and Washington – include coverage for private sector onshore maritime employees. 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 employee fatalities, injuries, and illnesses and the costs associated with them. In response, many states have regulations and guidelines on workplace safety and health programs (SHPs), also called safety and health management systems (SHMS). Occupational safety and health organizations and professionals as well as insurance companies also have such programs. These programs are called accident prevention programs, injury and illness 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 NAICS 336611) and boatyards (SIC 3732 and NAICS 336612) developed the guidelines for OSHA. According to MACOSH, all workplaces in the shipyard industry should have a safety and health program regardless of the size of the workplace or the number of hazards.

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 has shown them to be effective in reducing workplace injuries and illnesses when the basic elements listed above are present in some form. The elements are flexible and performance-based so 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 three basic ways in which the employer can show commitment:

- Establish a workplace policy and culture 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 down to the frontline employees. Such leadership provides the motivating force and sets the tone for the entire program. Only management can assert and continually reaffirm that employee protection is a fundamental value of the organization, on par with other organizational functions such as production. Likewise, only management can ensure that the SHP is integrated

into the management structure and fabric of the company. Also, only management can ensure that organizational resources are properly directed to activities that support the SHP.

To demonstrate management commitment, the employer should formulate a clear 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 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 the workplace safety and health policy at the very highest levels of management;
- Clear assignment of roles and 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 sufficient time for employees 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 "toolbox" 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, a SHP needs the involvement of all persons in the shipyard – managers, ship superintendents, foremen, crane operators, ship fitters, welders, engineers, maintenance, procurement, healthcare, and human resource personnel. Participation of employees throughout the workplace is important because often the successful identification, prevention and control of hazards require 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 to make recommendations about appropriate ways to address hazards. Prompt responses to such reports are an essential way that 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 employees during the course of a workplace walkthrough. Other methods for 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 makeup 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 independently of management on various tasks. At other unionized

workplaces, non-supervisory 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 that they are able to carry out their responsibilities successfully. As for respect, at unionized workplaces it is respect between representatives of organizations. At nonunion 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 nonunionized workplaces is likely to be achieved differently from unionized workplaces. In nonunionized 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 employees 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 employees.

Small Shipyard or Boatyard

In situations where the workforce is small (10 employees or less), at an isolated location (e.g., sea trials), or where 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. "Toolbox" and instructional meetings between employees and crew leaders is another way that 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 smaller workplaces, employers still need to take steps to ensure 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;
- Evaluate the seriousness of identified hazards that are not covered by OSHA standards; and

- Interview frontline supervisors and employees regarding the safety and health program and any other safety or health concerns they may have.

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

- Timely abatement of unsafe or unhealthy conditions;
- Interim employee 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 employee 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 are 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 a routine basis that is appropriate to the particular workplace or the conditions and hazards present.

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

- Reviewing records of injuries and illnesses. A review of OSHA 300 logs can help employers learn what has caused problems in the past and how

they can be avoided in the future. Small businesses, which are not required to keep OSHA 300 logs, should review workers' compensation claims.

- Reviewing 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 walkarounds. Looking at the workplace and recording conditions and actions that appear to be hazardous is another useful way to identify hazards. The walkaround should go 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 to which they belong.
- 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 a 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 an 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 that 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 a fatality, 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). 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 becomes 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 an 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 personnel 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 recurrence.

Training

The employer needs to ensure that each employee who may be exposed to a workplace 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 that they are able to carry out their responsibilities.

Employees who may be exposed to workplace 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 may be exposed to workplace 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, 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 is not feasible that general SHP guidelines should or could specify the number of hours, frequency or format that 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 other organizations to train their employees. Some employers may utilize formal classroom training every year while other employers rely on regular "toolbox" 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 may be 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, workers' compensation experience modifiers, insurance premiums; and
- 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 significant changes or controls are implemented and thereafter at some regular interval that is appropriate to the workplace. Some specific examples may include adjustments in the operation, process, or number of employees (increase or decrease). 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 that improvements in employee safety and health are not occurring, it is important that the employer make necessary changes in the program to correct or eliminate the problems.

Procedures for Multi-Employer Workplaces

At multi-employer workplaces, it is important that host and contract employers exchange available information on workplace hazards, safety rules, and emergency procedures with any other employer whose employees also may be exposed to those hazards. To be effective, this exchange of information needs to address the reasonable allocation of workplace safety and health responsibilities among the employers.

Host employers shall inform the contract employers of any known safety and health hazards to which the contract employees may be exposed prior to their starting any work. The host employer also shall inform contract employers of applicable provisions of the host employer's SHP.

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

With the increasing number of multiple employers in maritime workplaces, additional problems and complexities in the communication and coordination

of employee safety and health are introduced. Further, there needs to be a reasonable allocation of workplace safety and health responsibilities among these employers to take account of this added complexity. This includes the requirement and need for two-way communication between host and contract employers specific to standards such as 29 CFR §§1910.1001 and 1915.501. Generally, the host employer is in the best position to ensure that communication and coordination of workplace safety and health are 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 that 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 fatalities, 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 SHP 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 "walkaround" may be the extent of the SHP records. On the other hand, larger workplaces or workplaces with safety and health committees may maintain detailed records on various aspects of the SHP such as inspection and accident investigation records and

reports, job checklists and employee survey results, and even reports on committee meetings. Examples of some records that employers typically maintain on workplace safety and health include:

- First reports of injury;
- OSHA 300 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 employments and related employments.

(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, installations, cleaning, painting, and maintenance work.

(k) The term "*shipbuilding*" means the construction of a vessel including the installation of machinery and equipment.

(l) 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 Department of Transportation 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 ppm in the case of a gas or vapor, below 500 mg/m^3 for fumes, and below 25 mppcf 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 – Incorporation by Reference

(a) 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.

(b) The materials listed in paragraph (d) of this section are incorporated by reference in the corresponding sections noted as they exist on the date of the approval, and a notice of any change in these materials will be published in the Federal Register. These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.

(1) The standards listed in paragraph (d) of this section are incorporated by reference in the corresponding sections noted as the sections exist on the date of the approval, and a notice of any change in these standards will be published in the **Federal Register**. The Director of the Federal Register approved these incorporations by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.

(2) Any changes in the standards incorporated by reference in this Part and an official historic file of such changes are available for inspection in the Docket Office at the national office of the Occupational Safety and Health Administration, U.S. Department of Labor, Washington, DC 20210; telephone: 202-693-2350 (TTY number: 877-889-5627).

(c) Copies of standards listed in this section and issued by private standards organizations are available for purchase from the issuing organizations at the addresses or through the other contact information listed below for these private standards organizations.

In addition, these standards are available for inspection at the National Archives and Records Administration (NARA). For information on the availability of these standards at NARA, telephone: 202-741-6030, or go to www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Also, the standards are available for inspection at any Regional Office of the Occupational Safety and Health Administration (OSHA), or at the OSHA Docket Office, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-2625, Washington, DC 20210; telephone: 202-693-2350 (TTY number: 877-889-5627).

(d)(1) Except as noted, copies of the standards listed below in this paragraph are available for purchase from the American National Standards Institute (ANSI), 25 West 43rd Street, 4th Floor, New York, NY 10036; telephone: 212-642-4900; fax: 212-398-0023; Web site: www.ansi.org.

(i) ANSI A14.1-1975 Safety Requirements for Portable Wood Ladders, IBR approved for §1915.72(a)(6).

(ii) ANSI A14.2-1972 Safety Requirements for Portable Metal Ladders, IBR approved for §1915.72(a)(4).

(iii) ANSI B7.1-1964 Safety Code for the Use, Care, and Protection of Abrasive Wheels, IBR approval for §1915.134(c).

(iv) ANSI Z41-1999, American National Standard for Personal Protection — Protective Footwear; IBR approved for §1915.156(b)(1)(ii). Copies of ANSI Z41-1999 are available for purchase only from the National Safety Council, P.O. Box 558, Itasca, IL 60143-0558; telephone: 1-800-621-7619; fax: 708-285-0797; Web site: www.nsc.org.

(v) ANSI Z41-1991, American National Standard for Personal Protection — Protective Footwear; IBR approved for §1915.156(b)(1)(iii). Copies of ANSI Z41-1991 are available for purchase only from the National Safety Council, P.O. Box 558, Itasca, IL 60143-0558; telephone: 1-800-621-7619; fax: 708-285-0797; Web site: www.nsc.org.

(vi) ANSI Z87.1-2003, American National Standard Practice for Occupational and Educational Eye and Face Protection; IBR approved for §1915.153(b)(1)(i). Copies of ANSI Z87.1-2003 are available for purchase only from the American Society of Safety Engineers, 1800 East Oakton Street, Des Plaines, IL

60018-2187; telephone: 847-699-2929; or from the International Safety Equipment Association (ISEA), 1901 North Moore Street, Arlington, VA 22209-1762; telephone: 703-525-1695; fax: 703-528-2148; Web site: www.safetyequipment.org.

(vii) ANSI Z87.1-1989 (R-1998), American National Standard Practice for Occupational and Educational Eye and Face Protection; IBR approved for §1915.153(b)(1)(ii). Copies of ANSI Z87.1-1989 (R-1998) are available for purchase only from the American Society of Safety Engineers, 1800 East Oakton Street, Des Plaines, IL 60018-2187; telephone: 847-699-2929.

(viii) ANSI Z87.1-1989, American National Standard Practice for Occupational and Educational Eye and Face Protection; IBR approved for §1915.153(b)(1)(iii).

(ix) American National Standards Institute (ANSI) Z89.1-2009, American National Standard for Industrial Head Protection, approved January 26, 2009; IBR approved for §1915.155(b)(1)(i). Copies of ANSI Z89.1-2009 are available for purchase only from the International Safety Equipment Association, 1901 North Moore Street, Arlington, VA 22209-1762; telephone: 703-525-1695; fax: 703-528-2148; Web site: www.safetyequipment.org.

(x) American National Standards Institute (ANSI) Z89.1-2003, American National Standard for Industrial Head Protection; IBR approved for §1915.155(b)(1)(ii). Copies of ANSI Z89.1-2003 are available for purchase only from the International Safety Equipment Association, 1901 North Moore Street, Arlington, VA 22209-1762; telephone: 703-525-1695; fax: 703-528-2148; Web site: www.safetyequipment.org.

(xi) American National Standards Institute (ANSI) Z89.1-1997, American National Standard for Personnel Protection — Protective Headwear for Industrial Workers--Requirements; IBR approved for §1915.155(b)(1)(iii). Copies of ANSI Z89.1-1997 are available for purchase only from the International Safety Equipment Association, 1901 North Moore Street, Arlington, VA 22209-1762; telephone: 703-525-1695; fax: 703-528-2148; Web site: www.safetyequipment.org.

(xii) ANSI/IESNA RP-7-01, Recommended Practice for Lighting Industrial Facilities, ANSI approved July 26, 2001, IBR approved for §1915.82(a)(3).

(xiii) ANSI/ISEA Z308.1-2009, Revision of ANSI Z308.1-2003, Minimum Requirements for Workplace First Aid Kits and Supplies, ANSI approved May 8, 2009, IBR approved for §1915.87 Appendix A.

(2) The following material is available for purchase from the American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017:

(i) ASME Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Unfired Pressure Vessels, 1963, IBR approved for §1915.172(a).

(3) The following material is available for purchase from the American Conference of Governmental Industrial Hygienists (ACGIH), 1014 Broadway, Cincinnati, OH 45202:

(i) Threshold limit values, 1970, IBR approved for §§1915.12(b) and 1915.1000, table Z.

(4) The following material is available for purchase from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101:

(i) NFPA 1981-2002 Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services, IBR approved for §1915.505(e)(3)(v).

(ii) NFPA 1971-2000, Standard on Protective Ensemble for Structural Fire Fighting, IBR approved for §1915.505(e)(4)(ii).

(iii) NFPA 1976-2000, Standard on Protective Ensemble for Proximity Fire Fighting, IBR approved for §1915.505(e)(5).

(iv) NFPA 1982-1998, Standard on Personal Alert Safety Systems (PASS), IBR approved for §1915.505(e)(6)(ii).

(v) NFPA 1983-2001, Standard on Fire Service Life Safety Rope and System Components, IBR approved for §1915.505(e)(7)(i).

(vi) NFPA 10-2002 Standard for Portable Fire Extinguishers, IBR approved for §§1915.507(b)(1) and (b)(2).

(vii) NFPA 14-2003 Standard for the Installation of Standpipe and Hose Systems, IBR approved for §§1915.507(b)(2) and (d)(1).

(viii) NFPA 72-2002 National Fire Alarm Code, IBR approved for §1915.507(c)(6).

(ix) NFPA 13-2002 Standard for the Installation of Sprinkler Systems, IBR approved for §1915.507(d)(2).

(x) NFPA 750-2003 Standard on Water Mist Fire Protection Systems, IBR approved for §1915.507(d)(2).

(xi) NFPA 25-2002, Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, IBR approved for §1915.507(d)(2).

(xii) NFPA 15-2001, Standard for Water Spray Fixed Systems for Fire Protection, IBR approved for §1915.507(d)(3).

(xiii) NFPA 11-2005 Standard for Low-, Medium-, and High-Expansion Foam, IBR approved for §1915.507(d)(3).

(xiv) NFPA 17-2002, Standard for Dry Chemical Extinguishing Systems, IBR approved for §1915.507(d)(4).

(xv) NFPA 12-2005, Standard on Carbon Dioxide Extinguishing Systems, IBR approved for §1915.507(d)(5).

(xvi) NFPA 12A-2004, Standard on Halon 1301 Fire Extinguishing Systems, IBR approved for §1915.507(d)(5).

(xvii) NFPA 2001-2004, Standard on Clean Agent Fire Extinguishing Systems, IBR approved for §1915.507(d)(5).

(xviii) NFPA 1403-2002, Standard on Live Fire Training Evolutions, IBR approved for §1915.508(d)(8).

(5) Copies of the standards listed below in this paragraph are available for purchase from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959; telephone: 610-832-9585; fax: 610-832-9555; e-mail: sevice@astm.org; Web site: www.astm.org:

(i) ASTM F-2412-2005, Standard Test Methods for Foot Protection; IBR approved for §1915.156(b)(1)(i).

(ii) ASTM F-2413-2005, Standard Specification for Performance Requirements for Protective Footwear; IBR approved for §1915.156(b)(1)(i).

§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 employers' 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;

(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 Marine Chemist or 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, time, date, 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.

§1915.8 – OMB Control Numbers Under the Paperwork Reduction Act

This section contains a collection of information requirements which have been approved by the Office of Management and Budget. For a complete listing, by control number, see www.osha.gov or §1915.8.

§1915.9 – Compliance Duties Owed to Each Employee

(a) *Personal protective equipment*. Standards in this Part requiring the employer to provide personal protective equipment (PPE), including respirators and other types of PPE, because of hazards to employees impose a separate compliance duty with respect to each employee covered by the requirement. The employer must provide PPE to each employee required to use the PPE, and each failure to provide PPE to an employee may be considered a separate violation.

(b) Training. Standards in this Part requiring training on hazards and related matters, such as standards requiring that employees receive training or that the employer train employees, provide training to employees, or institute or implement a training program, impose a separate compliance duty with respect to each employee covered by the requirement. The employer must train each affected employee in the manner required by the standard, and each failure to train an employee may be considered a separate violation.

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

§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 vessels, vessel sections, and on land-side operations regardless of geographic location.

(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 requirement of Appendix B to Subpart B of this Part 1915 for tank vessels, for passenger vessels, and for cargo and miscellaneous vessels.

"*Dangerous atmosphere*" 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 percent 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 percent by volume or at a level at or below 50 percent 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 percent 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 provides information on the status or condition of the work space to which it is attached.

"*Lower explosive 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 for 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 percent of the lower explosive limit (LEL);

(3) Any toxic materials in the atmosphere associated with cargo, fuel, tank coatings, 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 or 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 and the Order of Testing Before Entering Confined and Enclosed Spaces and Other Dangerous Atmospheres

The employer shall ensure that atmospheric testing is performed in the following sequence: oxygen content, flammability, toxicity.

(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 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:

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

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

(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 percent 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 monitored continuously;

(iii) Atmospheres at or above the upper explosive limit are maintained; 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 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

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

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 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 this section; and

(ii) Whenever there is a change in operations or in an employee's duties that presents 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]

[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.

[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.

(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 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 or 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 or cold work in a space. Special care

[6] Note to paragraph (b): 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.

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:

(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.[8]

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

(6) 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

[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)(4): See Appendix A for additional information on frequency of testing.

for installation of ventilation equipment provided:[9]

(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.

(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."[10]

(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 those spaces.

[9] Note to paragraph (b)(6): Other provisions for work in IDLH and other dangerous atmospheres are located in Subpart I of this Part.

[10] 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.

(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 land-side spaces, grounded to prevent an electric discharge in the space.

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

§1915.14 – Hot Work[11]

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

(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":

(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.

(iv) Exception: On dry cargo, miscellaneous and passenger vessels and in the landside operations within spaces which meet the standards for oxygen, flammability and toxicity in §1915.12, but are adjacent to spaces containing flammable gases or liquids, with a flash point below 150˚F (65.6˚C) when the distance between such spaces and the work is 25 feet (7.62 m) or greater.[12]

[11] Note to §1915.14: See Appendix A of this Subpart for additional information relevant to performing hot work safely.
[12] Note to paragraph (a)(1)(iv): For flammable liquids with flash points above 150˚F (65.6˚C), see paragraph (b) of this section.

(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)(iv) of this section, and

(v) Land-side 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 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 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 off, 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.[13]

(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 Part and determined a space to

[13] 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.

be safe for an employee to enter, he or she shall continue to test and visually inspect 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, 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.

APPENDIX A TO SUBPART B OF PART 1915 – COMPLIANCE ASSISTANCE GUIDELINES FOR CONFINED AND ENCLOSED SPACES AND OTHER DANGEROUS ATMOSPHERES

APPENDIX B TO SUBPART B OF PART 1915 – REPRINT OF U.S. COAST GUARD REGULATIONS REFERENCED IN SUBPART B, FOR DETERMINATION OF COAST GUARD AUTHORIZED PERSONS

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 for the entire work period.

(3) Employees shall be protected against toxic vapors by suitable respiratory protective equipment in accordance with the requirements of Subpart I of this Part and, where necessary, against exposure of skin and eye contact with 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 Department 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 with the requirements of §1915.36.

§1915.33 – Chemical Paint and Preservative Removers

(a) Employees shall be protected against 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 Subpart I of this Part.

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

(c) 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 using goggles or face shields in accordance with the requirements of Subpart I of this Part.

(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 Subpart I of this Part.

(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 Subpart I. 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 the requirements of Subpart I of this Part.

(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 line respirators, or by air helmets of a positive pressure type in accordance with the requirements of Subpart I of this Part.

(ii) Abrasive blasters working in the open shall be protected as indicated in paragraph (c)(3)(i) of this section except that when synthetic abrasive containing less than one percent free silica are used, 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, used in conjunction with the proper eye, face and head protection, may be used in accordance with Subpart I of this Part.

(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 Subpart I of this Part.

(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 Subpart I of this Part.

(ii) In tanks or compartments, employees continuously exposed to such spraying shall be protected by air line respirators in accordance with the requirements of Subpart I. Where mechanical ventilation is provided, employees shall be protected by respirators in accordance with the requirements of Subpart I of this Part.

(iii) In large and well ventilated areas, employees exposed to such spraying shall be protected by respirators in accordance with the requirements of Subpart I of this Part.

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

(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's 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 ten (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 reaches or exceeds ten (10) percent of the lower explosive limit, painting shall be stopped and the compartment shall be evacuated until the concentration again falls below ten (10) percent of the lower explosive limit. If the concentration does not fall when painting is stopped, additional ventilation to bring the concentration to below ten (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 I, 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 Subpart I of this Part 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 Subpart I of this Part.

(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 Subpart I of this Part 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 (ten) 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 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 §1915.154, 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 (b) 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 §1915.154:

(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, and employees performing such operations on beryllium-containing base or filler metals shall be protected by air line respirators, in accordance with the requirements of §1915.154.

(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 two hundred (200) 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 §1915.153. When two or more welders are exposed to each other's arc, filter lens goggles of a suitable type meeting the requirements of §1915.153 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 paragraph (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 §1915.153.

(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.

§1915.53 – 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 1½ inch or larger fire 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 with toxic preservatives shall be stripped of all toxic coatings for a distance of at least 4 inches from the area of heat application or the employees shall be protected by air line respirators meeting the requirements of §1915.154.

(2) In the open air, employees shall be protected by a filter type respirator in accordance with the requirements of §1915.154.

(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 to 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 and 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 1½ 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 shut-off 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 one (1) inch 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) **Hose**.

(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 out of 8 inches 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 (200) psi. 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 ten (10) feet 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 tapes 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 in Ship Repairing and Shipbuilding

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 four (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 plump. Poles shall rest on a foundation of sufficient size and strength to distribute the loan and to prevent displacement.

(2) In light-duty scaffolds, not more than 24 feet in height, poles may be spliced by overlapping the ends not less than 4 feet 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 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. 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 - 1 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 length-wise 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 is prohibited. The total height of base and extension may, however, be more than 20 feet.

(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 long shall have side rails of not less than $1^{5}/_{16}$ x $2^{3}/_{4}$ inch lumber.

(ii) Ladders over 16 feet long and up to and including those 20 feet long shall have side rails of not less than $1^5/_{16}$ x 3 inch 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 long shall have side rails of not less than $1^5/_{16}$ x $2^1/_4$ inch lumber.

(ii) Ladders over 12 feet long and up to and including those 16 feet long shall have side rails of not less than $1^5/_{16}$ x $2^1/_2$ inch lumber.

(iii) Ladders over 16 feet long and up to and including those 20 feet long shall have side rails of not less than $1^5/_{16}$ x $2^3/_4$ inch 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 per foot 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 for all ladders and sections 6 feet or less in length. For longer lengths of ladder, the width shall be increased at least 1 inch for each additional foot of length. The width between the side rails of the extension section of the trestle ladder shall be not less than 12 inches.

(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 nor more than 18 inches apart; on the

extension section of the extension trestle ladder, rungs shall be spaced not less than 6 inches nor more than 12 inches 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 side rails.

(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 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 diameter manila rope properly rigged into a set of standard 6 inch 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 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 persons 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 persons 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.

(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 tie rods. The tie rods shall be not less than $^{5}/_{16}$ inch in diameter, located no more than 5 feet 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 diameter, with $^{7}/_{8}$ inch tenons mortised into the side rails not less than $^{7}/_{8}$ inch and shall be spaced no more than 18 inches on centers.

(v) Flooring strips shall be spaced no more than $^{5}/_{8}$ inch apart except at the side rails, where 1 inch 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 lumber.

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

(iii) The planks shall be tied together by cleats of not less than 1 x 6 inch lumber, nailed on their undersides at intervals of not more than 4 feet.

(iv) The planks shall extend not less than 6 inches nor more than 18 inches 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 apart.

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

(i) The side stringers shall be of sound, straight-grained lumber, free from knots, and of not less than 2 x 6 inch 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.

(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 nor more than 12 inches at each end of the platform.

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

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

(vii) The platform shall be formed of boards 7/8 inch in thickness by not less than 6 inches 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 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 than two 10 inch 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 but in no case shall project more than 12 inches 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 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 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 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, rails shall be equivalent in strength to 2 x 4 inch 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 solid surfaces shall be protected by safety belts and life lines meeting the requirements of §§1915.159 and 1915.160, and employees working over water shall be protected by buoyant work vests meeting the requirements of §1915.158(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 lumber shall be provided.

(k) **Access to staging**.

(1) Access from below to staging more than 5 feet 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 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 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 not 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 paragraph (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 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 ANSI Standard A14.2-1972: Safety Requirements for Portable Metal Ladders (incorporated by reference, see §1915.5).

(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 ANSI Standard A14.1-1975: Safety Requirements for Portable Wood Ladders (incorporated by reference, see §1915.5).

(b) **Construction of portable wood cleated ladders up to 30 feet 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 be not more than 1/2 inch in diameter or within 1/2 inch of the edge of the rail or nearer than 3 inches to a tread or rung.

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

(5) The width between side rails at the base shall be not less than 11 1/2 inches for ladders 10 feet or less in length. For longer ladders this width shall be increased at least 1/4 inch for each additional 2 feet in length.

(6) Side rails shall be at least 1 5/8 x 3 5/8 inches 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, or filler blocks shall be used on the rails between the cleats. The cleats shall be secured to each rail with three 10d common wire nails or fastened with through bolts or other fasteners of equivalent strength. Cleats shall be uniformly spaced not more than 12 inches apart.

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

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

(1) Ladders from 30 to 60 feet 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 lumber.

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

(iii) Cleats shall be nailed to each rail with five 10d common wire nails or fastened with through bolts or other fasteners 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, 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 or around other large openings, the edge of the opening shall be guarded in the working area

to height of 36 to 42 inches, 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 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 §1915.158(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 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 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 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 turn table if used, shall have a railing with a minimum height of approximately 33 inches measured perpendicularly from rail to walking surface at the stanchion, with a midrail. 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 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 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 flush with the top of the bulwark, substantial steps properly secured and equipped with at least one substantial handrail approximately 33 inches 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 lying abreast, from one vessel to another.

(c) **Access to barges and river towboats**.

(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 meeting the requirements of paragraph (c)(1) of this section or a safe walkway meeting the requirements of paragraph (a)(7) of this section shall be provided. When a walkway is impractible, a substantial straight ladder, extending at least 36 inches 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 Jackob'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) 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 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 midrail. Such railings on gangways or ramps shall be approximately 42 inches in height; and railings on permanent stairways shall be not less than approximately 30 or more than approximately 34 inches 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 in height, with a midrail, 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 railings with a midrail. When such a railing would be impracticable or ineffective, other effective means shall be provided to prevent employees 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 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 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 and 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 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 §§1915.159 and 1915.160. 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 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 §1915.158(a).

Subpart F – General Working Conditions

§1915.80 – Scope, application, definitions, and effective dates

(a) The provisions of this subpart apply to general working conditions in shipyard employment, including work on vessels, on vessel sections, and at landside operations, regardless of geographic location.

(b) **Definitions applicable to this subpart.**

(1) ***Additional safety measure.*** A component of the tags-plus system that provides an impediment (in addition to the energy-isolating device) to the release of energy or the energization or startup of the machinery, equipment, or system being serviced. Examples of additional safety measures include, but are not limited to, removing an isolating circuit element; blocking a controlling switch; blocking, blanking, or bleeding lines; removing a valve handle or wiring it in place; opening an extra disconnecting device.

(2) ***Affected employee.*** An employee who normally operates or uses the machinery, equipment, or system that is going to be serviced under lockout/tags-plus or who is working in the area where servicing is being performed under lockout/tags-plus. An affected employee becomes an authorized employee when the employer assigns the employee to service any machine, equipment, or system under a lockout/tags-plus application.

(3) ***Authorized employee.***

(i) An employee who performs one or more of the following lockout/tags-plus responsibilities:

(A) Executes the lockout/tags-plus procedures;

(B) Installs a lock or tags-plus system on machinery, equipment, or systems; or

(C) Services any machine, equipment, or system under lockout/tags-plus application.

(ii) An affected employee becomes an authorized employee when the employer assigns the employee to service any machine, equipment, or system under a lockout/tags-plus application.

(4) ***Capable of being locked out.*** An energy-isolating device is capable of being locked out if it has a locking mechanism built into it, or it has a hasp or other means of attachment to which, or through which, a lock can be affixed. Other energy-isolating devices are capable of being locked out if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy-control capability.

(5) ***Contract employer.*** An employer, such as a painting, joinery, carpentry, or scaffolding subcontractor, that performs shipyard-related services or work under contract to the host employer or to another employer under contract to the host employer at the host employer's worksite. This excludes employers who provide services that are not directly related to shipyard employment, such as mail delivery, office supply, and food vending services.

(6) ***Dummy load.*** A device used in place of an antenna to aid in the testing of a radio transmitter that converts transmitted energy into heat to minimize energy radiating outward or reflecting back to its source during testing.

(7) ***Energy-isolating device.*** A mechanical device that, when utilized or activated, physically prevents the release or transmission of energy. Energy-isolating devices include, but are not limited to, manually operated electrical circuit breakers; disconnect switches; line valves; blocks; and any similar device used to block or isolate energy. Control-circuit devices (for example, push buttons, selector switches) are not considered energy-isolating devices.

(8) ***Hazardous energy.*** Any energy source, including mechanical (for example, power transmission apparatus, counterbalances, springs, pressure, gravity), pneumatic, hydraulic, electrical, chemical, and thermal (for example, high or low temperature) energies, that could cause injury to employees.

(9) ***Hazardous substances.*** A substance that may cause injury, illness, or disease, or otherwise harm an employee by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful.

(10) ***Health care professional.*** A physician or any other healthcare professional whose legally permitted scope of practice allows the provider to independently provide, or be delegated the responsibility to provide, some or all of the advice or consultation this subpart requires.

(11) ***Host employer.*** An employer that is in charge of coordinating shipyard-related work, or that hires other employers to perform shipyard-related work or to provide shipyard-related services, at a multi-employer worksite.

(12) ***Isolated location.*** An area in which employees are working alone or with little assistance from others due to the type, time, or location of their work. Such locations include remote locations or other work areas where employees are not in close proximity to others.

(13) ***Lock.*** A device that utilizes a positive means, either a key or combination lock, to hold an energy-isolating device in a "safe" position that prevents the release of energy and the startup or energization of the machinery, equipment, or system to be serviced.

(14) ***Lockout.*** The placement of a lock on an energy-isolating device in accordance with an established procedure, thereby ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the lock is removed.

(15) ***Lockout/tags-plus coordinator.*** An employee whom the employer designates to coordinate and oversee all lockout and tags-plus applications on vessels or vessel sections and at landside work areas when employees are performing multiple servicing operations on the same machinery, equipment, or systems at the same time, and when employees are servicing multiple machinery, equipment, or systems on the same vessel or vessel section at the same time. The lockout/tags-plus coordinator also maintains the lockout/tags-plus log.

(16) ***Lockout/tags-plus materials and hardware.*** Locks, chains, wedges, blanks, key blocks, adapter pins, self-locking fasteners, or other hardware used for isolating, blocking, or securing

machinery, equipment, or systems to prevent the release of energy or the startup or energization of machinery, equipment, or systems to be serviced.

(17) ***Motor vehicle.*** Any motor-driven vehicle operated by an employee that is used to transport employees, material, or property. For the purposes of this subpart, motor vehicles include passenger cars, light trucks, vans, motorcycles, all-terrain vehicles, small utility trucks, powered industrial trucks, and other similar vehicles. Motor vehicles do not include boats, or vehicles operated exclusively on a rail or rails.

(18) ***Motor vehicle safety equipment.*** Systems and devices integral to or installed on a motor vehicle for the purpose of effecting the safe operation of the vehicle, and consisting of such systems or devices as safety belts, airbags, headlights, tail lights, emergency/hazard lights, windshield wipers, defogging or defrosting devices, brakes, horns, mirrors, windshields and other windows, and locks.

(19) ***Navy ship's force.*** The crew of a vessel that is owned or operated by the U.S. Navy, other than a time- or voyage-chartered vessel, that is under the control of a Commanding Officer or Master.

(20) ***Normal production operations.*** The use of machinery or equipment, including, but not limited to, punch presses, bending presses, shears, lathes, keel press rollers, and automated burning machines, to perform a shipyard-employment production process.

(21) ***Portable toilet.*** A non-sewered portable facility for collecting and containing urine and feces. A portable toilet may be either flushable or non-flushable. For purposes of this section, portable toilets do not include privies.

(22) ***Potable water.*** Water that meets the standards for drinking purposes of the state or local authority having jurisdiction, or water that meets the quality standards prescribed by the U.S. Environmental Protection Agency's National Primary Water Regulations (40 CFR part 141).

(23) ***Readily accessible/available.*** Capable of being reached quickly enough to ensure, for

example, that emergency medical services and first aid intervention are appropriate or that employees can reach sanitation facilities in time to meet their health and personal needs.

(24) ***Sanitation facilities.*** Facilities, including supplies, maintained for employee personal and health needs such as potable drinking water, toilet facilities, hand-washing and -drying facilities, showers (including quick-drenching or flushing) and changing rooms, eating and drinking areas, first aid stations, and on-site medical-service areas. Sanitation supplies include soap, waterless cleaning agents, single-use drinking cups, drinking water containers, toilet paper, and towels.

(25) ***Serviceable condition.*** The state or ability of supplies or goods, or of a tool, machine, vehicle, or other device, to be used or to operate in the manner prescribed by the manufacturer.

(26) ***Servicing.*** Workplace activities that involve the construction, installation, adjustment, inspection, modification, testing, or repair of machinery, equipment, or systems. Servicing also includes maintaining machines, equipment, or systems when performing these activities would expose the employee to harm from the start-up or energization of the system being serviced, or the release of hazardous energy.

(27) ***Sewered toilet.*** A fixture maintained for the purpose of urination and defecation that is connected to a sanitary sewer, septic tank, holding tank (bilge), or on-site sewage-disposal treatment facility, and that is flushed with water.

(28) ***Shield.*** To install a covering, protective layer, or other effective measure on or around steam hoses or temporary steam-piping systems, including metal fittings and couplings, to protect employees from contacting hot surfaces or elements.

(29) ***Short bight.*** A loop created in a line or rope that is used to tie back or fasten objects such as hoses, wiring, and fittings.

(30) ***Tag.*** A prominent warning device that includes a means of attachment that can be securely fastened to an energy-isolating device in accordance with an established procedure to

indicate that the energy-isolating device and the equipment being controlled must not be operated until the tag is removed by an authorized employee.

(31) ***Tags-plus system.*** A system to control hazardous energy that consists of an energy-isolating device with a tag affixed to it, and at least one additional safety measure.

(32) ***Verification of isolation.*** The means necessary to detect the presence of hazardous energy, which may involve the use of a test instrument (for example, a voltmeter), and, for other than electric shock protection, a visual inspection, or a deliberate attempt to start-up the machinery, equipment, or system.

(33) ***Vermin.*** Insects, birds, and other animals, such as rodents and feral cats, that may create safety and health hazards for employees.

(34) ***Vessel section.*** A subassembly, module, or other component of a vessel being built or repaired.

(35) ***Walkway.*** Any surface, whether vertical, slanted, or horizontal, on which employees walk, including areas that employees pass through, to perform their job tasks. Walkways include, but are not limited to, access ways, designated walkways, aisles, exits, gangways, ladders, ramps, stairs, steps, passageways, and scaffolding. If an area is, or could be, used to gain access to other locations, it is to be considered a walkway.

(36) ***Work area.*** A specific area, such as a machine shop, engineering space, or fabrication area, where one or more employees are performing job tasks.

(37) ***Working surface.*** Any surface where work is occurring, or areas where tools, materials, and equipment are being staged for performing work.

(38) ***Worksite.*** A general work location where one or more employees are performing work, such as a shipyard, pier, barge, vessel, or vessel section.

(c) **Effective dates.** This final rule becomes effective and enforceable on August 1, 2011, except for the provisions in §1915.89, which become effective and enforceable on October 31, 2011.

§1915.81 – Housekeeping

(a) **General requirements.**

(1) The employer shall establish and maintain good housekeeping practices to eliminate hazards to employees to the extent practicable.

(2) The employer shall eliminate slippery conditions, such as snow and ice, on walkways and working surfaces as necessary. If it is not practicable for the employer to remove slippery conditions, the employer either shall:

(i) Restrict employees to designated walkways and working surfaces where the employer has eliminated slippery conditions; or

(ii) Provide slip-resistant footwear in accordance with 29 CFR part 1915, subpart I.

(3) The employer shall store materials in a manner that does not create a hazard for employees.

(4) The employer shall maintain easy and open access to each fire-alarm box, fire-call station, fire-fighting equipment, and each exit, including ladders, staircases, scaffolds, and gangways.

(5) The employer shall dispose of flammable and combustible substances, such as paint thinners, solvents, rags, scrap, and waste, or store them in covered fire-resistant containers at the end of each workshift or when the job is completed, whichever occurs first.

(b) **Walkways.**

(1) In addition to the requirements in paragraph (a), the employer also shall ensure that each walkway:

(i) Provides adequate passage;

(ii) Is clear of debris, including solid and liquid wastes, that may create a hazard for employees;

(iii) Is clear of tools, materials, equipment, and other objects that may create a hazard for employees; and

(iv) Is clear of hoses and electrical service cords. The employer shall:

(A) Place each hose and cord above walkways in a location that will prevent injury to employees and damage to the hoses and cords;

(B) Place each hose and cord underneath walkways;

(C) Place each hose and cord on walkways, provided the hoses and cords are covered by crossovers or other means that will prevent injury to employees and damage to the hoses and cords; or

(D) Protect each hose and cord by other suitable means.

(2) While a walkway or part of a walkway is being used as a working surface, the employer shall cordon off that portion to prevent it from being used as a walkway.

(c) **Working surfaces.** In addition to the requirements in paragraph (a), the employer also shall ensure that each working surface:

(1) Is cleared of tools, materials, and equipment that are not necessary to perform the job in progress;

(2) Is cleared of debris, including solid and liquid wastes, at the end of each workshift or job, whichever occurs first;

(3) Is maintained, so far as practicable, in a dry condition. When a wet process is used, the employer shall maintain drainage and provide false floors, platforms, mats, or other dry standing places. When the employer demonstrates that this procedure is not practicable, the employer shall provide each employee working in the wet process with protective footgear, in accordance with 29 CFR part 1915, subpart I.

§1915.82 – Lighting

(a) **General Requirements.**

(1) The employer shall ensure that each work area and walkway is adequately lighted whenever an employee is present.

(2) For landside areas, the employer shall provide illumination that meets the levels set forth in Table F-1 to §1915.82.

Table F-1 to §1915.82 – Minimum Lighting Intensities in Foot-Candles[14]

Lumens (Foot-candles)	Area or operation
3	General areas on vessels and vessel sections such as accessways, exits, gangways, stairs, and walkways.
5	General landside areas such as corridors, exits, stairs, and walkways.
5	All assigned work areas on any vessel or vessel section.
5	Landside tunnels, shafts, vaults, pumping stations, and underground work areas.
10	Landside work areas such as machine shops, electrical equipment rooms, carpenter shops, lofts, tool rooms, warehouses, and outdoor work areas.
10	Changing rooms, showers, sewered toilets, and eating, drinking, and break areas.
30	First aid stations, infirmaries, and offices.

(3) For vessels and vessel sections, the employer shall provide illumination that meets the levels set forth in the table to paragraph (a)(2) or meet ANSI/IESNA RP-7-01 (incorporated by reference, see §1915.5).

(4) When adequate illumination is not obtainable by permanent lighting sources, temporary lighting may be used as supplementation.

(5) The employer shall ensure that neither matches nor open-flame devices are used for lighting.

(b) **Temporary lights.** The employer shall ensure that temporary lights meet the following requirements:

(1) Lights with bulbs that are not completely recessed are equipped with guards to prevent accidental contact with the bulb;

(2) Lights are equipped with electric cords designed with sufficient capacity to safely carry the electric load;

[14] Note to Table F-1: The required illumination levels in this table do not apply to emergency or portable lights.

(3) Connections and insulation on electric cords are maintained in a safe condition;

(4) Lights and lighting stringers are not suspended solely by their electric cords unless they are designed by the manufacturer to be suspended in this way;

(5) Lighting stringers do not overload branch circuits;

(6) Branch circuits are equipped with over-current protection with a capacity that does not exceed the rated current-carrying capacity of the cord used;

(7) Splices have insulation with a capacity that exceeds that of the original insulation of the cord; and

(8) Exposed, non-current-carrying metal parts of lights are grounded. The employer shall ensure that grounding is provided either through a third wire in the cord containing the circuit conductors or through a separate wire that is grounded at the source of the current. Grounding shall be done in accordance with the requirements of 29 CFR 1910, subpart S.

(c) **Portable lights.**

(1) In any dark area that does not have permanent or temporary lights, where lights are not working, or where lights are not readily accessible, the employer shall provide portable or emergency lights and ensure that employees do not enter those areas without such lights.

(2) Where the only means of illumination on a vessel or vessel section are from lighting sources that are not part of the vessel or vessel section, the employer shall provide portable or emergency lights for the safe movement of each employee. If natural sunlight provides sufficient illumination, portable or emergency lights are not required.

(d) **Explosion-proof, self-contained lights.** The employer shall provide and ensure that each employee uses only explosion-proof, self-contained temporary and portable lights, approved for hazardous conditions by a nationally recognized testing laboratory (NRTL), in any area that the atmosphere is determined to contain a concentration of flammable vapors that are at or above 10 percent of the lower explosive limit (LEL) as specified in 29 CFR part 1915, subparts B and C.

§1915.83 – Utilities

(a) **Steam supply system.**

(1) The employer shall ensure that the vessel's steam piping system, including hoses, is designed to safely handle the working pressure prior to supplying steam from an outside source. The employer shall obtain a written or oral determination from a responsible vessel's representative, a contractor, or any other person who is qualified by training, knowledge, or experience to make such determination that the working pressure of the vessel's steam piping system is safe.

(2) The employer shall ensure that each outside steam supply connected to a vessel's steam piping system meets the following requirements:

(i) A pressure gauge and a relief valve are installed at the point where the temporary steam hose joins the vessel's steam piping system;

(ii) Each relief valve is set to relieve excess steam at, and is capable of relieving steam at, a pressure that does not exceed the safe working pressure of the system in its present condition;

(iii) There are no means of inadvertently disconnecting any relief valve from the system that it protects;

(iv) Each pressure gauge and relief valve is legible and located so it is visible and readily accessible; and

(v) Each relief valve is positioned so it is not likely to cause injury if steam is released.

(b) **Steam hoses.** The employer shall ensure that each steam hose meets the following requirements:

(1) The steam hose and its fittings are used in accordance with manufacturer's specifications;

(2) Each steam hose is hung tightly with short bights that prevent chafing and to reduce tension on the hose and its fittings;

(3) Each steam hose is protected from damage; and

(4) Each steam hose or temporary steam piping, including metal fittings and couplings, that pass through a walking or working area is shielded to protect employees from contact.

(c) **Electric shore power.** When a vessel is supplied with electric shore power, the employer shall take the following precautions prior to energizing any of the vessel's circuits:

(1) Ensure that the vessel is grounded;

(2) Equip each circuit to be energized with over-current protection that does not exceed the rated current-carrying capacity of the conductors; and

(3) Ensure that each circuit to be energized is in a safe condition. The employer must obtain a determination of the safe condition, either orally or in writing, from a responsible vessel's representative, a contractor, or any other person who is qualified by training, knowledge, or experience to make such determination.

(d) **Heat lamps.** The employer shall ensure that each heat lamp, including the face, is equipped with surround-type guards to prevent contact with the lamp and bulb.

§1915.84 – Working alone

(a) Except as provided in §1915.51(c)(3) of this part, whenever an employee is working alone, such as in a confined space or isolated location, the employer shall account for each employee:

(1) Throughout each workshift at regular intervals appropriate to the job assignment to ensure the employee's safety and health; and

(2) At the end of the job assignment or at the end of the workshift, whichever occurs first.

(b) The employer shall account for each employee by sight or verbal communication.

§1915.85 – Vessel radar and communication systems

(a) The employer shall service each vessel's radar and communication systems in accordance with 29 CFR 1915.89, Control of Hazardous Energy.

(b) The employer shall secure each vessel's radar and communication system so it is incapable

of energizing or emitting radiation before any employee begins work:

(1) On or in the vicinity of the system;

(2) On or in the vicinity of a system equipped with a dummy load; or

(3) Aloft, such as on a mast or king post.

(c) When a vessel's radar or communication system is operated, serviced, repaired, or tested, the employer shall ensure that:

(1) There is no other work in progress aloft; and

(2) No employee is closer to the system's antenna or transmitter than the manufacturer's specified safe minimum distance for the type, model, and power of the equipment.

(d) The employer shall ensure that no employee enters an area designated as hazardous by manufacturers' specifications while a radar or communication system is capable of emitting radiation.

(e) The requirements of this section do not apply when a radar or communication system is incapable of emitting radiation at levels that could injure workers in the vicinity of the system, or if the radar or communication system is incapable of energizing in a manner than could injure workers working on or in the vicinity of the system.

§1915.86 – Lifeboats

(a) Before any employee works in or on a stowed or suspended lifeboat, the employer shall secure the lifeboat independently from the releasing gear to prevent it from falling or capsizing.

(b) The employer shall not permit any employee to be in a lifeboat while it is being hoisted or lowered, except when the employer demonstrates that it is necessary to conduct operational tests or drills over water, or in the event of an emergency.

(c) The employer shall not permit any employee to work on the outboard side of a lifeboat that is stowed on chocks unless the lifeboat is secured by gripes or another device that prevents it from swinging.

§1915.87 – Medical services and first aid

(a) **General requirement.** The employer shall ensure that emergency medical services and first aid are readily accessible.

(b) **Advice and consultation.** The employer shall ensure that healthcare professionals are readily available for advice and consultation on matters of workplace health.

(c) **First aid providers.**

(1) The employer shall ensure that there is an adequate number of employees trained as first aid providers at each worksite during each workshift unless:

(i) There is an on-site clinic or infirmary with first aid providers during each workshift; or

(ii) The employer can demonstrate that outside first aid providers (i.e., emergency medical services) can reach the worksite within five (5) minutes of a report of injury or illness. The employer must take appropriate steps to ascertain that emergency medical assistance will be readily available promptly if an injury or illness occurs.

(2) The employer shall ensure that a first aid provider is able to reach an injured/ill employee within five (5) minutes of a report of a serious injury, illness, or accident such as one involving cardiac arrest, acute breathing problems, uncontrolled bleeding, suffocation, electrocution, or amputation.

(3) The employer shall use the following factors in determining the number and location of employees who must have first aid training: size and location of each worksite; the number of employees at each worksite; the hazards present at each worksite; and the distance of each worksite from hospitals, clinics, and rescue squads.

(4) The employer shall ensure that first aid providers are trained to render first aid, including cardiopulmonary resuscitation (CPR).

(5) The employer shall ensure that each first aid provider maintains current first aid and CPR certifications, such as issued by the Red Cross,

American Heart Association, or other equivalent organization.

(d) **First aid supplies.**

(1) The employer shall provide and maintain adequate first aid supplies that are readily accessible to each worksite. An employer's on-site infirmary or clinic containing first aid supplies that are readily accessible to each worksite complies with this requirement.

(2) The employer shall ensure that the placement, content, and amount of first aid supplies are adequate for the size and location of each worksite, the number of employees at each worksite, the hazards present at each worksite, and the distance of each worksite from hospitals, clinics, and rescue squads.

(3) The employer shall ensure that first aid supplies are placed in a weatherproof container.

(4) The employer shall maintain first aid supplies in a dry, sterile, and serviceable condition.

(5) The employer shall replenish first aid supplies as necessary to ensure that there is an adequate supply when needed.

(6) The employer shall inspect first aid supplies at sufficient intervals to ensure that they are adequate and in a serviceable condition.

(e) **Quick-drenching and flushing facilities.** Where the potential exists for an employee to be splashed with a substance that may result in an acute or serious injury, the employer shall provide facilities for quick-drenching or flushing the eyes and body. The employer shall ensure that such a facility is located for immediate emergency use within close proximity to operations where such substances are being used.

(f) **Basket stretchers.**

(1) The employer shall provide an adequate number of basket stretchers, or the equivalent, readily accessible to where work is being performed on a vessel or vessel section. The employer is not required to provide basket stretchers or the

equivalent where emergency response services have basket stretchers or the equivalent that meet the requirements of this paragraph.

(2) The employer shall ensure each basket stretcher, or the equivalent, is equipped with:

(i) Permanent lifting bridles that enable the basket stretcher, or the equivalent, to be attached to hoisting gear capable of lifting at least 5,000 pounds (2,270 kg);

(ii) Restraints that are capable of securely holding the injured/ill employee while the basket stretcher, or the equivalent, is lifted or moved; and

(iii) A blanket or other suitable covering for the injured/ill employee.

(3) The employer shall store basket stretchers, or the equivalent, and related equipment (i.e., restraints, blankets) in a clearly marked location in a manner that prevents damage and protects the equipment from environmental conditions.

(4) The employer shall inspect stretchers, or the equivalent, and related equipment at intervals that ensure the equipment remains in a safe and serviceable condition, but at least once a year.

Appendix A to §1915.87 – First aid kits and automated external defibrillators (Non-Mandatory)

1. First aid supplies are required to be adequate and readily accessible under paragraphs §1915.87(a) and (d). An example of the minimal contents of a generic first aid kit for workplace settings is described in ANSI/ISEA Z308.1-2009, "Minimum Requirements for Workplace First Aid Kits and Supplies" (incorporated by reference as specified in §1915.5). The contents of the kit listed in this ANSI standard should be adequate for small worksites. When larger operations or multiple operations are being conducted at the same worksite, employers should determine the need for additional first aid kits, additional types of first aid equipment and supplies, and additional quantities and types of supplies and equipment in the first aid kits.

2. In a similar fashion, employers that have unique or changing first aid needs at their worksite may need to enhance their first aid kits. The employer can use the OSHA 300 Log, OSHA 301 Incident Report form, or other reports to identify these unique problems. Consultation from the local fire or rescue department, appropriate healthcare professional or local emergency room may be helpful to employers in these circumstances. By assessing the specific needs of their worksite, employers can ensure that reasonably anticipated supplies are available. Employers should assess the specific needs of their worksite periodically, and augment first aid kits appropriately.

3. If it is reasonably anticipated that employees will be exposed to blood or other potentially infectious materials while using first aid supplies, employers must provide appropriate personal protective equipment (PPE) in compliance with the provisions of the Occupational Exposure to Bloodborne Pathogens standard, §1910.1030(d)(3). This standard lists appropriate PPE for this type of exposure, such as gloves, gowns, face shields, masks, and eye protection.

4. Employers who provide automated external defibrillators (AEDs) at their workplaces should designate who will use AEDs and train those employees so they know how to correctly use the AEDs. Although a growing number of AEDs are now designed to be used by any person, even without training, training reinforces proper use and promotes the usefulness of AEDs as part of an effective cardiopulmonary resuscitation plan. For AEDs to be effective, employers should:

a. Ensure that AEDs are located so they can be utilized within three to five minutes of a report of an accident or injury;

b. Ensure that employees use AEDs in accordance with manufacturers' specifications; and

c. Inspect, test, and maintain AEDs in accordance with manufacturers' specifications.

§1915.88 – Sanitation

(a) **General requirements.**

(1) The employer shall provide adequate and readily accessible sanitation facilities.

(2) The employer shall establish and implement a schedule for servicing, cleaning, and supplying each facility to ensure it is maintained in a clean, sanitary, and serviceable condition.

(b) **Potable water.**

(1) The employer shall provide potable water for all employee health and personal needs and ensure that only potable water is used for these purposes.

(2) The employer shall provide potable drinking water in amounts that are adequate to meet the health and personal needs of each employee.

(3) The employer shall dispense drinking water from a fountain, a covered container with single-use drinking cups stored in a sanitary receptacle, or single-use bottles. The employer shall prohibit the use of shared drinking cups, dippers, and water bottles.

(c) **Non-potable water.**

(1) The employer may use non-potable water for other purposes such as firefighting and cleaning outdoor premises so long as it does not contain chemicals, fecal matter, coliform, or other substances at levels that may create a hazard for employees.

(2) The employer shall clearly mark non-potable water supplies and outlets as "not safe for health or personal use."

(d) **Toilets.**

(1) ***General requirements.*** The employer shall ensure that sewered and portable toilets:

(i) Provide privacy at all times. When a toilet facility contains more than one toilet, each toilet shall occupy a separate compartment with a door and walls or partitions that are sufficiently high to ensure privacy; and

(ii) Are separate for each sex, except as provided in (d)(1)(ii)(B) of this section;

(A) The number of toilets provided for each sex shall be based on the maximum number of employees of that sex present at the worksite at any one time during a workshift. A single-occupancy toilet room shall be counted as one toilet regardless of the number of toilets it contains; and

(B) The employer does not have to provide separate toilet facilities for each sex when they will not be occupied by more than one employee at a time, can be locked from the inside, and contain at least one toilet.

(iii) The employer shall establish and implement a schedule to ensure that each sewered and portable toilet is maintained in a clean, sanitary, and serviceable condition.

(2) ***Minimum number of toilets.*** (i) The employer shall provide at least the following number of toilets for each sex. Portable toilets that meet the requirements of paragraph (d)(3) of this section may be included in the minimum number of toilets.

Table F-2 to §1915.88[15]

Number of employees of each sex	Minimum number of toilets per sex
1 to 15	1
16 to 35	2
36 to 55	3
56 to 80	4
81 to 110	5
111 to 150	6
Over 150	1 additional toilet for each additional 40 employees.

(3) ***Portable toilets.***

(i) The employer shall provide portable toilets, pursuant to paragraph (d)(2)(i) and Table to

[15] Note to Table F-2: When toilets will only be used by men, urinals may be provided instead of toilets, except that the number of toilets in such cases shall not be reduced to less than two-thirds of the minimum specified.

paragraph (d)(2) of this section, only when the employer demonstrates that it is not feasible to provide sewered toilets, or when there is a temporary increase in the number of employees for a short duration of time.

(ii) The employer shall ensure that each portable toilet is vented and equipped, as necessary, with lighting.

(4) ***Exception for normally unattended worksites and mobile work crews.*** The requirement to provide toilets does not apply to normally unattended worksites and mobile work crews, provided that the employer ensures that employees have immediately available transportation to readily accessible sanitation facilities that are maintained in a clean, sanitary, and serviceable condition and meet the other requirements of this section.

(e) **Handwashing facilities.**

(1) The employer shall provide handwashing facilities at or adjacent to each toilet facility.

(2) The employer shall ensure that each handwashing facility:

(i) Is equipped with either hot and cold or lukewarm running water and soap, or with waterless skin-cleansing agents that are capable of disinfecting the skin or neutralizing the contaminants to which the employee may be exposed; and

(ii) If the facility uses soap and water, it is supplied with clean, single-use hand towels stored in a sanitary container and a sanitary means for disposing of them, clean individual sections of continuous cloth toweling, or a hand-drying air blower.

(3) The employer shall inform each employee engaged in the application of paints or coatings or in other operations in which hazardous or toxic substances can be ingested or absorbed about the need for removing surface contaminants from their skins surface by thoroughly washing their hands and face at the end of the workshift and prior to eating, drinking, or smoking.

(f) **Showers.**

(1) When showers are required by an OSHA standard, the employer shall provide one shower for each 10, or fraction of 10, employees of each sex who are required to shower during the same workshift.

(2) The employer shall ensure that each shower is equipped with soap, hot and cold water, and clean towels for each employee who uses the shower.

(g) **Changing rooms.** When an employer provides protective clothing to prevent employee exposure to hazardous or toxic substances, the employer shall provide the following:

(1) Changing rooms that provide privacy for each sex; and

(2) Storage facilities for street clothes, as well as separate storage facilities for protective clothing.

(h) **Eating, drinking, and break areas.** The employer shall ensure that food, beverages, and tobacco products are not consumed or stored in any area where employees may be exposed to hazardous or toxic substances.

(i) **Waste disposal.**

(1) The employer shall provide waste receptacles that meet the following requirements:

(i) Each receptacle is constructed of materials that are corrosion resistant, leak-proof, and easily cleaned or disposable;

(ii) Each receptacle is equipped with a solid tight-fitting cover, unless it can be kept in clean, sanitary, and serviceable condition without the use of a cover;

(iii) Receptacles are provided in numbers, sizes, and locations that encourage their use; and

(iv) Each receptacle is emptied as often as necessary to prevent it from overfilling and in a manner that does not create a hazard for employees. Waste receptacles for food shall be emptied at least every day, unless unused.

(2) The employer shall not permit employees to work in the immediate vicinity of uncovered garbage that could endanger their safety and health.

(3) The employer shall ensure that employees working beneath or on the outboard side of a vessel are not contaminated by drainage or waste from overboard discharges.

(j) **Vermin control.**

(1) To the extent reasonably practicable, the employer shall clean and maintain the workplace in a manner that prevents vermin infestation.

(2) Where vermin are detected, the employer shall implement and maintain an effective vermin-control program.

§1915.89 – Control of hazardous energy (lockout/tags-plus)

(a) **Scope, application, and effective dates.**

(1) ***Scope.*** This section covers the servicing of machinery, equipment, and systems when the energization or startup of machinery, equipment, or systems, or the release of hazardous energy, could endanger an employee.

(2) ***Application.***

(i) This section applies to the servicing of any machinery, equipment, or system that employees use in the course of shipyard employment work and that is conducted:

(A) In any landside facility that performs shipyard employment work; and

(B) On any vessel or vessel section.

(ii) This section applies to such servicing conducted on a vessel by any employee including, but not limited to, the ship's officers and crew unless such application is preempted by the regulations of another federal agency.

(3) When other standards in 29 CFR part 1915 and applicable standards in 29 CFR part 1910 require the use of a lock or tag, the employer shall use and supplement them with the procedural and training requirements specified in this section.

(4) ***Exceptions.*** This section does not apply to:

(i) Work on cord-and-plug-connected machinery, equipment, or system, provided the employer

ensures that the machinery, equipment, or system is unplugged and the plug is under the exclusive control of the employee performing the servicing;

(ii) Minor servicing activities performed during normal production operations, including minor tool changes and adjustments, that are routine, repetitive, and integral to the use of the machinery, equipment, or system, provided the employer ensures that the work is performed using measures that provide effective protection from energization, startup, or the release of hazardous energy.

(b) **Lockout/tags-plus program.** The employer shall establish and implement a written program and procedures for lockout and tags-plus systems to control hazardous energy during the servicing of any machinery, equipment, or system in shipyard employment. The program shall cover:

(1) Procedures for lockout/tags-plus systems while servicing machinery, equipment, or systems in accordance with paragraph (c) of this section;

(2) Procedures for protecting employees involved in servicing any machinery, equipment, or system in accordance with paragraphs (d) through (m) of this section;

(3) Specifications for locks and tags-plus hardware in accordance with paragraph (n) of this section;

(4) Employee information and training in accordance with paragraph (o) of this section;

(5) Incident investigations in accordance with paragraph (p) of this section; and

(6) Program audits in accordance with paragraph (q) of this section.

(c) **General requirements.**

(1) The employer shall ensure that, before any authorized employee performs servicing when energization or startup, or the release of hazardous energy, may occur, all energy sources are identified and isolated, and the machinery, equipment, or system is rendered inoperative.

(2) If an energy-isolating device is capable of being locked, the employer shall ensure the use of a lock to prevent energization or startup, or the release of hazardous energy, before any servicing is started, unless the employer can demonstrate that the utilization of a tags-plus system will provide full employee protection as set forth in paragraph (c)(6) of this section.

(3) If an energy-isolating device is not capable of being locked, the employer shall ensure the use of a tags-plus system to prevent energization or startup, or the release of hazardous energy, before any servicing is started.

(4) Each tags-plus system shall consist of:[16]

(i) At least one energy-isolating device with a tag affixed to it; and

(ii) At least one additional safety measure that, along with the energy-isolating device and tag required in (c)(4)(i) of this section, will provide the equivalent safety available from the use of a lock.

(5) After October 31, 2011, the employer shall ensure that each energy-isolating device for any machinery, equipment, or system is designed to accept a lock whenever the machinery, equipment, or system is extensively repaired, renovated, modified, or replaced, or whenever new machinery, equipment, or systems are installed. This requirement does not apply when a shipyard employer:

(i) Does not own the machinery, equipment, or system; or

(ii) Builds or services a vessel or vessel section according to customer specifications.

[16] Note to paragraph (c)(4): When the Navy ship's force maintains control of the machinery, equipment, or systems on a vessel and has implemented such additional measures it determines are necessary, the provisions of paragraph (c)(4)(ii) of this section shall not apply, provided that the employer complies with the verification procedures in paragraph (g) of this section.

(6) ***Full employee protection***[17]

(i) When a tag is used on an energy-isolating device that is capable of being locked out, the tag shall be attached at the same location that the lock would have been attached, and;

(ii) The employer shall demonstrate that the use of a tags-plus system will provide a level of safety equivalent to that obtained by using a lock. In demonstrating that an equivalent level of safety is achieved, the employer shall:

(A) Demonstrate full compliance with all tags-plus-related provisions of this standard; and

(B) Implement such additional safety measures as are necessary to provide the equivalent safety available from the use of a lock.

(7) ***Lockout/tags-plus coordination***[18]

(i) The employer shall establish and implement lockout/tags-plus coordination when:

(A) Employees on vessels and in vessel sections are servicing multiple machinery, equipment, or systems at the same time; or

(B) Employees on vessels, in vessel sections, and at landside facilities are performing multiple servicing operations on the same machinery, equipment, or system at the same time.

(ii) The coordination process shall include a lockout/tags-plus coordinator and a lockout/tags-plus log. Each log shall be specific to each vessel, vessel section, and landside work area.

(iii) The employer shall designate a lockout/tags-plus coordinator who is responsible for overseeing and approving:

[17] Note to paragraph (c)(6): When the Navy ship's force maintains control of the machinery, equipment, or systems on a vessel and has implemented such additional measures it determines are necessary, the provisions of paragraph (c)(6)(ii)(B) of this section do not apply, provided that the employer complies with the verification procedures in paragraph (g) of this section.

[18] Note to paragraph (c)(7): When the Navy ship's force serves as the lockout/tags-plus coordinator and maintains control of the lockout/tags-plus log, the employer will be in compliance with the requirements in paragraph (c)(7) of this section when coordination between the ship's force and the employer occurs to ensure that applicable lockout/tags-plus procedures are followed and documented.

(A) The application of each lockout and tags-plus system;

(B) The verification of hazardous-energy isolation before the servicing of any machinery, equipment, or system begins; and

(C) The removal of each lockout and tags-plus system.

(iv) The employer shall ensure that the lockout/tags-plus coordinator maintains and administers a continuous log of each lockout and tags-plus system. The log shall contain:

(A) Location of machinery, equipment, or system to be serviced;

(B) Type of machinery, equipment, or system to be serviced;

(C) Name of the authorized employee applying the lockout/tags-plus system;

(D) Date that the lockout/tags-plus system is applied;

(E) Name of authorized employee removing the lock or tags-plus system; and

(F) Date that lockout/tags-plus system is removed.

(d) **Lockout/tags-plus written procedures**

(1) The employer shall establish and implement written procedures to prevent energization or startup, or the release of hazardous energy, during the servicing of any machinery, equipment, or system. Each procedure shall include:[19]

(i) A clear and specific outline of the scope and purpose of the lockout/tags-plus procedure;

(ii) The means the employer will use to enforce compliance with the lockout/tags-plus program and procedures; and

(iii) The steps that must be followed for:

[19] Note to paragraph (d)(1): The employer need only develop a single procedure for a group of similar machines, equipment, or systems if the machines, equipment, or systems have the same type and magnitude of energy and the same or similar types of controls, and if a single procedure can satisfactorily address the hazards and the steps to be taken to control these hazards.

(A) Preparing for shutting down and isolating of the machinery, equipment, or system to be serviced, in accordance with paragraph (e) of this section;

(B) Applying the lockout/tags-plus system, in accordance with paragraph (f) of this section;

(C) Verifying isolation, in accordance with paragraph (g) of this section;

(D) Testing the machinery, equipment, or system, in accordance with paragraph (h) of this section;

(E) Removing lockout/tags-plus systems, in accordance with paragraph (i) of this section;

(F) Starting up the machinery, equipment, or system that is being serviced, in accordance with paragraph (j) of this section;

(G) Applying lockout/tags-plus systems in group servicing operations, in accordance with paragraph (k) of this section;

(H) Addressing multi-employer worksites involved in servicing any machinery, equipment, or system, in accordance with paragraph (l) of this section; and

(I) Addressing shift or personnel changes during servicing operations, in accordance with paragraph (m) of this section.

(2) The employer's lockout procedures do not have to be in writing for servicing machinery, equipment, or systems, provided that all of the following conditions are met:

(i) There is no potential for hazardous energy to be released (or to reaccumulate) after shutting down, or restoring energy to, the machinery, equipment, or system;

(ii) The machinery, equipment, or system has a single energy source that can be readily identified and isolated;

(iii) The isolation and lock out of that energy source will result in complete de-energization and deactivation of the machinery, equipment, or system, and there is no potential for reaccumulation of energy;

(iv) The energy source is isolated and secured from the machinery, equipment, or system during servicing;

(v) Only one lock is necessary for isolating the energy source;

(vi) The lock is under the exclusive control of the authorized employee performing the servicing;

(vii) The servicing does not create a hazard for any other employee; and

(viii) The employer, in utilizing this exception, has not had any accidents or incidents involving the activation or reenergization of this type of machinery, equipment, or system during servicing.

(e) **Procedures for shutdown and isolation**[20]

(1) Before an authorized employee shuts down any machinery, equipment, or system, the employer shall:

(i) Ensure that the authorized employee has knowledge of:

(A) The source, type, and magnitude of the hazards associated with energization or startup of the machine, equipment, or system;

(B) The hazards associated with the release of hazardous energy; and

(C) The means to control these hazards; and

(ii) Notify each affected employee that the machinery, equipment, or system will be shut down and deenergized prior to servicing, and that a lockout/tags-plus system will be implemented.

(2) The employer shall ensure that the machinery, equipment, or system is shut down according to the written procedures the employer established.

(3) The employer shall use an orderly shutdown to prevent exposing any employee to risks associated with hazardous energy.

[20] Note to paragraph (e): When the Navy ship's force shuts down any machinery, equipment, or system, and relieves, disconnects, restrains, or otherwise renders safe all potentially hazardous energy that is connected to the machinery, equipment, or system, the employer will be in compliance with the requirements in paragraph (e) of this section when the employer's authorized employee verifies that the machinery, equipment, or system being serviced has been properly shut down, isolated, and deenergized.

(4) The employer shall ensure that the authorized employee relieves, disconnects, restrains, or otherwise renders safe all potentially hazardous energy that is connected to the machinery, equipment, or system.

(f) **Procedures for applying lockout/tags-plus systems**[21]

(1) The employer shall ensure that only an authorized employee applies a lockout/tags-plus system.

(2) When using lockout systems, the employer shall ensure that the authorized employee affixes each lock in a manner that will hold the energy-isolating device in a safe or off position.

(3) When using tags-plus systems, the employer shall ensure that the authorized employee affixes a tag directly to the energy-isolating device that clearly indicates that the removal of the device from a safe or off position is prohibited.

(4) When the tag cannot be affixed directly to the energy-isolating device the employer shall ensure that the authorized employee locates it as close as safely possible to the device, in a safe and immediately obvious position.

(5) The employer shall ensure that each energy-isolating device that controls energy to the machinery, equipment, or system is effective in isolating the machinery, equipment, or system from all potentially hazardous energy source(s).

(g) **Procedures for verification of deenergization and isolation**

(1) Before servicing machinery, equipment, or a system that has a lockout/tags-plus system, the employer shall ensure that the authorized employee, or the primary authorized employee in a group lockout/tags-plus application, verifies that the machinery, equipment, or system is deenergized and all energy sources isolated.

[21] Note to paragraph (f): When the Navy ship's force applies the lockout/tags-plus systems or devices, the employer will be in compliance with the requirements in paragraph (f) of this section when the employer's authorized employee verifies the application of the lockout/tags-plus systems or devices.

(2) The employer shall ensure that the authorized employee, or the primary authorized employee in a group lockout/tags-plus application, continues verifying deenergization and isolation while servicing the machinery, equipment, or system.

(3) Each authorized employee in a group lockout/tags-plus application who will be servicing the machinery, equipment, or system must be given the option to verify that the machinery, equipment, or system is deenergized and all energy sources isolated, even when verification is performed by the primary authorized employee.

(h) **Procedures for testing.** In each situation in which a lockout/tags-plus system must be removed temporarily and the machinery, equipment, or system restarted to test it or to position a component, the employer shall ensure that the authorized employee does the following in sequence:[22]

(1) Clears tools and materials from the work area;

(2) Removes nonessential employees from the work area;

(3) Removes each lockout/tags-plus system in accordance with paragraph (i) of this section;

(4) Restarts the machinery, equipment, or system and then proceeds with testing or positioning; and

(5) After completing testing or positioning, deenergizes and shuts down the machinery, equipment, or system and reapplies all lockout/tags-plus systems in accordance with paragraphs (e)-(g) of this section to continue servicing.

[22] Note to paragraph (h): When the Navy ship's force serves as the lockout/tags-plus coordinator, performs the testing, and maintains control of the lockout/tags-plus systems or devices during testing, the employer is in compliance with paragraph (h) when the employer's authorized employee acknowledges to the lockout/tags-plus coordinator that the employer's personnel and tools are clear and the machinery, equipment, or system being serviced is ready for testing, and upon completion of the testing, verifies the reapplication of the lockout/tags-plus systems.

(i) **Procedures for removal of lockout and tags-plus systems**[23]

(1) Before removing any lockout/tags-plus system and restoring the machinery, equipment, or system to use, the employer shall ensure that the authorized employee does the following:

(i) Notifies all other authorized and affected employees that the lockout/tags-plus system will be removed;

(ii) Ensures that all employees in the work area have been safely positioned or removed; and

(iii) Inspects the work area to ensure that nonessential items have been removed and machinery, equipment, or system components are operationally intact.

(2) The employer shall ensure that each lock or tags-plus system is removed by the authorized employee who applied it.

(3) When the authorized employee who applied the lockout/tags-plus system is not available to remove it, the employer may direct removal by another authorized employee, provided the employer developed and incorporated into the lockout/tags-plus program the specific procedures and training that address such removal, and demonstrates that the specific procedures used provide a level of employee safety that is at least as effective in protecting employees as removal of the system by the authorized employee who applied it. After meeting these requirements, the employer shall do the following in sequence:

(i) Verify that the authorized employee who applied the lockout/tags-plus system is not in the facility;

(ii) Make all reasonable efforts to contact the authorized employee to inform him/her that the lockout/tags-plus system has been removed; and

[23] Note to paragraph (i): When the Navy ship's force serves as lockout/tags-plus coordinator and removes the lockout/tags-plus systems or devices, the employer is in compliance with the requirements in paragraph (i) of this section when the employer's authorized employee informs the lockout/tags-plus coordinator that the procedures in paragraph (i)(1) of this section have been performed.

(iii) Ensure that the authorized employee who applied the lock or tags-plus system has knowledge of the removal before resuming work on the affected machinery, equipment, or system.

(j) **Procedures for startup**[24]

(1) Before an authorized employee turns on any machinery, equipment, or system after servicing is completed, the employer shall ensure that the authorized employee has knowledge of the source, type, and magnitude of the hazards associated with energization or startup, and the means to control these hazards.

(2) The employer shall execute an orderly startup to prevent or minimize any additional or increased hazard(s) to employees. The employer shall perform the following tasks before starting up the machinery, equipment, or system:

(i) Clear tools and materials from the work area;

(ii) Remove any non-essential employees from the work area; and

(iii) Start up the machinery, equipment, or system according to the detailed procedures the employer established for that machinery, equipment, or system.

(k) **Procedures for group lockout/tags-plus.** When more than one authorized employee services the same machinery, equipment, or system at the same time, the following procedures shall be implemented:

(1) ***Primary authorized employee.*** The employer shall:

(i) Assign responsibility to one primary authorized employee for each group of authorized employees performing servicing on the same machinery, equipment, or system;

[24] Note to paragraph (j): When the Navy ship's force serves as lockout/tags-plus coordinator and maintains control of the lockout/tags-plus systems or devices during startup, and the employer is prohibited from starting up the machinery, equipment, or system, the employer is in compliance with the requirements in paragraph (j) of this section when the employer's authorized employee informs the lockout/tags-plus coordinator the procedures in paragraphs (j)(2)(i) and (j)(2)(ii) of this section have been performed.

(ii) Ensure that the primary authorized employee determines the safe exposure status of each authorized employee in the group with regard to the lockout/tags-plus system;

(iii) Ensure that the primary authorized employee obtains approval from the lockout/tags-plus coordinator to apply and remove the lockout/tags-plus system; and

(iv) Ensure that the primary authorized employee coordinates the servicing operation with the coordinator when required by paragraph (c)(7)(i) of this section.

(2) ***Authorized employees.*** The employer shall either:[25]

(i) Have each authorized employee apply a personal lockout/tags-plus system; or

(ii) Use a procedure that the employer can demonstrate affords each authorized employee a level of protection equivalent to the protection provided by having each authorized employee apply a personal lockout/tags-plus system. Such procedures shall incorporate a means for each authorized employee to have personal control of, and accountability for, his or her protection such as, but not limited to, having each authorized employee:

(A) Sign a group tag (or a group tag equivalent), attach a personal identification device to a group lockout device, or performs a comparable action before servicing is started; and

[25] Note to paragraph (k)(2): When the Navy ship's force maintains control of the machinery, equipment, or systems on a vessel and prohibits the employer from applying or removing the lockout/tags-plus system or starting up the machinery, equipment, or systems being serviced, the employer is in compliance with the requirements in paragraphs (k)(1)(iii) and (k)(2), provided that the employer ensures that the primary authorized employee takes the following steps in the following order: (1) before servicing begins and after deenergization, (a) verifies the safe exposure status of each authorized employee, and (b) signs a group tag (or a group tag equivalent) or performs a comparable action; and (2) after servicing is complete and before reenergization, (a) verifies the safe exposure status of each authorized employee, and (b) signs off the group tag (or the group tag equivalent) or performs a comparable action.

(B) Sign off the group tag (or the group tag equivalent), remove the personal identification device, or perform a comparable action when servicing is finished.

(l) **Procedures for multi-employer worksites**[26]

(1) The host employer shall establish and implement procedures to protect employees from hazardous energy in multi-employer worksites. The procedures shall specify the responsibilities for host and contract employers.

(2) ***Host employer responsibilities.*** The host employer shall carry out the following responsibilities in multi-employer worksites:

(i) Inform each contract employer about the content of the host employer's lockout/tags-plus program and procedures;

(ii) Instruct each contract employer to follow the host employer's lockout/tags-plus program and procedures; and

(iii) Ensure that the lockout/tags-plus coordinator knows about all servicing operations and communicates with each contract employer who performs servicing or works in an area where servicing is being conducted.

(3) ***Contract employer responsibilities.*** Each contract employer shall perform the following duties when working in a multi-employer worksite:

(i) Follow the host employer's lockout/tags-plus program and procedures;

(ii) Ensure that the host employer knows about the lockout/tags-plus hazards associated with the contract employer's work and what the contract employer is doing to address these hazards; and

[26] Note 1 to paragraph (l): The host employer may include provisions in its contract with the contract employer for the contract employer to have more control over the lockout/tags-plus program if such provisions will provide an equivalent level of protection for the host employer's and contract employer's employees as that provided by paragraph (l) of this section.

Note 2 to paragraph (l): When the U.S Navy contracts directly with a contract employer and the Navy ship's force maintains control of the lockout/tags-plus systems or devices, that contract employer shall consider the Navy to be the host employer for the purposes of §1915.89(l)(3).

(iii) Inform the host employer of any previously unidentified lockout/tags-plus hazards that the contract employer identifies at the multi-employer worksite.

(m) **Procedures for shift or personnel changes**

(1) The employer shall establish and implement specific procedures for shift or personnel changes to ensure the continuity of lockout/tags-plus protection.

(2) The employer shall establish and implement provisions for the orderly transfer of lockout/tags-plus systems between authorized employees when they are starting and ending their workshifts, or when personnel changes occur during a workshift, to prevent energization or startup of the machinery, equipment, or system being serviced or the release of hazardous energy.

(n) **Lockout/tags-plus materials and hardware**

(1) The employer shall provide locks and tags-plus system hardware used for isolating, securing, or blocking machinery, equipment, or systems from all hazardous-energy sources.

(2) The employer shall ensure that each lock and tag is uniquely identified for the purpose of controlling hazardous energy and is not used for any other purpose.

(3) The employer shall ensure that each lock and tag meets the following requirements:

(i) ***Durable***

(A) Each lock and tag is capable of withstanding the existing environmental conditions for the maximum period of time that servicing is expected to last;

(B) Each tag is made so that weather conditions, wet or damp conditions, corrosive substances, or other conditions in the work area where the tag is used or stored will not cause it to deteriorate or become illegible;

(ii) ***Standardized***

(A) Each lock and tag is standardized in at least one of the following areas: color, shape, or size; and

(B) Each tag is standardized in print and format;

(iii) ***Substantial***

(A) Each lock is sturdy enough to prevent removal without the use of extra force or unusual techniques, such as bolt cutters or other metal-cutting tools;

(B) Each tag and tag attachment is sturdy enough to prevent inadvertent or accidental removal;

(C) Each tag attachment has the general design and basic safety characteristics of a one-piece, all-environment-tolerant nylon tie;

(D) Each tag attachment is non-reusable, attachable by hand, self-locking, and non-releasable, and has a minimum unlocking strength of 50 pounds;

(iv) ***Identifiable.*** Each lock and tag indicates the identity of the authorized employee applying it; and

(v) Each tag warns of hazardous conditions that could arise if the machinery, equipment, or system is energized and includes a legend such as one of the following: *"Do Not Start," "Do Not Open," "Do Not Close," "Do Not Energize," or "Do Not Operate."*

(o) **Information and training**

(1) ***Initial training.*** The employer shall train each employee in the applicable requirements of this section no later than October 31, 2011.

(2) ***General training content.*** The employer shall train each employee who is, or may be, in an area where lockout/tags-plus systems are being used so they know:

(i) The purpose and function of the employer's lockout/tags-plus program and procedures;

(ii) The unique identity of the locks and tags to be used in the lockout/tags-plus system, as well as the standardized color, shape or size of these devices;

(iii) The basic components of the tags-plus system: an energy-isolating device with a tag affixed to it and an additional safety measure;

(iv) The prohibition against tampering with or removing any lockout/tags-plus system; and

(v) The prohibition against restarting or reenergizing any machinery, equipment, or system being serviced under a lockout/tags-plus system.

(3) ***Additional training requirements for affected employees.*** In addition to training affected employees in the requirements in paragraph (o)(2) of this section, the employer also shall train each affected employee so he/she knows:

(i) The use of the employer's lockout/tags-plus program and procedures;

(ii) That affected employees are not to apply or remove any lockout/tags-plus system; and

(iii) That affected employees are not to bypass, ignore, or otherwise defeat any lockout/tags-plus system.

(4) ***Additional training requirements for authorized employees.*** In addition to training authorized employees in the requirements in paragraphs (o)(2) and (o)(3) of this section, the employer also shall train each authorized employee so he/she knows:

(i) The steps necessary for the safe application, use, and removal of lockout/tags-plus systems to prevent energization or startup or the release of hazardous energy during servicing of machinery, equipment, or systems;

(ii) The type of energy sources and the magnitude of the energy available at the worksite;

(iii) The means and methods necessary for effective isolation and control of hazardous energy;

(iv) The means for determining the safe exposure status of other employees in a group when the authorized employee is working as a group's primary authorized employee.

(v) The requirement for tags to be written so they are legible and understandable to all employees;

(vi) The requirement that tags and their means of attachment be made of materials that will withstand the environmental conditions encountered in the workplace;

(vii) The requirement that tags be securely attached to energy-isolating devices so they cannot be accidentally removed while servicing machinery, equipment, or systems;

(viii) That tags are warning devices, and alone do not provide physical barriers against energization or startup, or the release of hazardous energy, provided by locks, and energy-isolating devices; and

(ix) That tags must be used in conjunction with an energy-isolating device to prevent energization or startup or the release of hazardous energy.

(5) ***Additional training for lockout/tags-plus coordinator.*** In addition to training lockout/tags-plus coordinators in the requirements in paragraphs (o)(2), (o)(3), and (o)(4) of this section, the employer shall train each lockout/tags-plus coordinator so he/she knows:

(i) How to identify and isolate any machinery, equipment, or system that is being serviced; and

(ii) How to accurately document lockout/tags-plus systems and maintain the lockout/tags-plus log.

(6) ***Employee retraining.***

(i) The employer shall retrain each employee, as applicable, whenever:

(A) There is a change in his/her job assignment that presents new hazards or requires a greater degree of knowledge about the employer's lockout/tags-plus program or procedures;

(B) There is a change in machinery, equipment, or systems to be serviced that presents a new energy-control hazard;

(C) There is a change in the employer's lockout/tags-plus program or procedures; or

(D) It is necessary to maintain the employee's proficiency.

(ii) The employer also shall retrain each employee, as applicable, whenever an incident investigation or program audit indicates that there are:

(A) Deviations from, or deficiencies in, the employer's lockout/tags-plus program or procedures; or

(B) Inadequacies in an employee's knowledge or use of the lockout/tags-plus program or procedures.

(iii) The employer shall ensure that retraining establishes the required employee knowledge and proficiency in the employer's lockout/tags-plus program and procedures and in any new or revised energy-control procedures.

(7) Upon completion of employee training, the employer shall keep a record that the employee accomplished the training, and that this training is current. The training record shall contain at least the employee's name, date of training, and the subject of the training.

(p) **Incident investigation.**

(1) The employer shall investigate each incident that resulted in, or could reasonably have resulted in, energization or startup, or the release of hazardous energy, while servicing machinery, equipment, or systems.

(2) Promptly but not later than 24 hours following the incident, the employer shall initiate an incident investigation and notify each employee who was, or could reasonably have been, affected by the incident.

(3) The employer shall ensure that the incident investigation is conducted by at least one employee who has the knowledge of, and experience in, the employer's lockout/tags-plus program and procedures, and in investigating and analyzing incidents involving the release of hazardous energy. The employer may also use additional individuals to participate in investigating the incident.

(4) The employer shall ensure that the individual(s) conducting the investigation prepare(s) a written report of the investigation that includes:

(i) The date and time of the incident;

(ii) The date and time the incident investigation began;

(iii) Location of the incident;

(iv) A description of the incident;

(v) The factors that contributed to the incident;

(vi) A copy of any lockout/tags-plus log that was current at the time of the incident; and

(vii) Any corrective actions that need to be taken as a result of the incident.

(5) The employer shall review the written incident report with each employee whose job tasks are relevant to the incident investigation findings, including contract employees when applicable.

(6) The employer shall ensure that the incident investigation and written report are completed, and all corrective actions implemented, within 30 days following the incident.

(7) If the employer demonstrates that it is infeasible to implement all of the corrective actions within 30 days, the employer shall prepare a written abatement plan that contains an explanation of the circumstances causing the delay, a proposed timetable for the abatement, and a summary of the steps the employer is taking in the interim to protect employees from hazardous energy while servicing machinery, equipment, or systems.

(q) **Program audits**

(1) The employer shall conduct an audit of the lockout/tags-plus program and procedures currently in use at least annually to ensure that the procedures and the requirements of this section are being followed and to correct any deficiencies.

(2) The employer shall ensure that the audit is performed by:

(i) An authorized employee other than the one(s) currently using the energy-control procedure being reviewed; or

(ii) Individuals other than an authorized employee who are knowledgeable about the employer's lockout/tags-plus program and procedures and the machinery, equipment, or systems being audited.

(3) The employer shall ensure that the audit includes:

(i) A review of the written lockout/tags-plus program and procedures;

(ii) A review of the current lockout/tags-plus log;

(iii) Verification of the accuracy of the lockout/tags-plus log;

(iv) A review of incident reports since the last audit.

(v) A review conducted between the auditor and authorized employees regarding the authorized employees' responsibilities under the lockout systems being audited; and

(vi) A review conducted between the auditor and affected and authorized employees regarding their responsibilities under the tags-plus systems being audited.

(4) The employer shall ensure that, within 15 days after completion of the audit, the individual(s) who conducted the audit prepare and deliver to the employer a written audit report that includes at least:

(i) The date of the audit;

(ii) The identity of the individual(s) who performed the audit;

(iii) The identity of the procedure and machinery, equipment, or system that were audited;

(iv) The findings of the program audit and recommendations for correcting deviations or deficiencies identified during the audit;

(v) Any incident investigation reports since the previous audit; and

(vi) Descriptions of corrective actions the employer has taken in response to the findings and recommendations of any incident investigation reports prepared since the previous audit.

(5) The employer shall promptly communicate the findings and recommendations in the written audit report to each employee having a job task that may be affected by such findings and recommendations.

(6) The employer shall correct the deviations or inadequacies in the lockout/tags-plus program within 15 days after receiving the written audit report.

(r) **Recordkeeping**

(1) Table to paragraph (r)(1) of this section specifies what records the employer must retain and how long the employer must retain them:

Table to paragraph (r)(1) of this section – Retention of Records Required by §1915.89

The employer must keep the following records . . .	For at least . . .
(i) Current lockout/ tags-plus program and procedures	Until replaced by updated program and procedures
(ii) Training records	Until replaced by updated records for each type of training
(iii) Incident investigation reports	Until the next program audit is completed
(iv) Program audit report	12 months after being replaced by the next audit report

(2) The employer shall make all records required by this section available to employees, their representatives, and the Assistant Secretary in accordance with the procedures and time periods specified in 29 CFR 1910.1020(e)(1) and (e)(3).

(s) **Appendices.** Non-mandatory Appendix A to this section is a guideline to assist employers and employees in complying with the requirements of this section, and to provide them with other useful information. The information in Appendix A does not add to, or in any way revise, the requirements of this section.

Appendix A to §1915.89 – (Non-Mandatory) Typical Minimal Lockout/Tags-plus Procedures

General
Lockout/Tags-plus Procedure

Lockout/Tags-plus Procedure for:

_____

[Name of company for single procedure or identification of machinery, equipment, or system if multiple procedures used.]

Purpose
This procedure establishes the minimum requirements for the lockout/tags-plus application of energy-isolating devices on vessels and vessel sections, and for landside facilities whenever servicing is done on machinery, equipment, or systems in shipyards. This procedure shall be used

to ensure that all potentially hazardous-energy sources have been isolated and the machinery, equipment, or system to be serviced has been rendered inoperative through the use of lockout or tags-plus procedures before employees perform any servicing when the energization or start-up of the machinery, equipment, or system, or the release hazardous energy could cause injury.

Compliance with This Program
All employees are required to comply with the restrictions and limitations imposed on them during the use of lockout or tags-plus applications. Authorized employees are required to perform each lockout or tags-plus application in accordance with this procedure. No employee, upon observing that machinery, equipment, or systems are secured using lockout or tags-plus applications, shall attempt to start, open, close, energize, or operate that machinery, equipment, or system.

[Type of compliance enforcement to be taken for violation of the above.]

Procedures for Lockout/ Tags-plus Systems
(1) Notify each affected employee that servicing is required on the machinery, equipment, or system, and that it must be isolated and rendered inoperative using a lockout or tags-plus system.

[Method of notifying all affected employees.]

(2) The authorized employee shall refer to shipyard employer's procedures to identify the type and magnitude of the energy source(s) that the machinery, equipment, or system uses, shall understand the hazards of the energy, and shall know the methods to control the energy source(s).

[Type(s) and magnitude(s) of energy, its hazards and the methods to control the energy.]

(3) If the machinery, equipment, or system is operating, shut it down in accordance with the written procedures (depress the stop button, open switch, close valve, etc.) established by the employer.

[Type(s) and location(s) of machinery, equipment, or system operating controls.]

(4) Secure each energy-isolating device(s) through the use of a lockout or tags-plus system (for instance, disconnecting, blanking, and affixing tags) so that the energy source is isolated and the machinery, equipment, or system rendered inoperative.

[Type(s) and location(s) of energy-isolating devices.]

(5) *Lockout System*. Affix a lock to each energy-isolating device(s) with assigned individual lock(s) that will hold the energy-isolating device(s) in a safe or off position. Potentially hazardous energy (such as that found in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be controlled by methods such as grounding, repositioning, blocking, bleeding down, etc.

(6) *Tags-Plus System*. Affix a tag to each energy-isolating device and provide at least one additional safety measure that clearly indicates that removal of the device from the safe or off position is prohibited. Potentially hazardous energy (such as that found in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems and air, gas, steam, or water pressure, etc.) must be controlled by methods such as grounding, repositioning, blocking, bleeding down, etc.

[Type(s) of hazardous energy – methods used to control them.]

(7) Ensure that the machinery, equipment, or system is relieved, disconnected, restrained, or rendered safe from the release of all potentially hazardous energy by checking that no personnel are exposed, and then verifying the isolation of energy to the machine, equipment, or system by operating the push button or other normal operating control(s), or by testing to make certain it will not operate.

CAUTION: Return operating control(s) to the safe or off position after verifying the isolation of the machinery, equipment, or system.

[Method of verifying the isolation of the machinery, equipment, or system.]

(8) The machinery, equipment, or system is now secured by a lockout or tags-plus system, and servicing by the authorized person may be performed.

Procedures for Removal of Lockout/Tags-plus Systems
When servicing is complete and the machinery, equipment, or system is ready to return to normal operating condition, the following steps shall be taken:

(1) Notify each authorized and affected employee(s) that the lockout/tags-plus system will be removed and the machinery, equipment, or system reenergized.

(2) Inspect the work area to ensure that all employees have been safely positioned or removed.

(3) Inspect the machinery, equipment, or system and the immediate area around the machinery, equipment, or system to ensure that nonessential items have been removed and that the machinery, equipment or system components are operationally intact.

(4) Reconnect the necessary components, remove the lockout/tags-plus material and hardware, and reenergize the machinery, equipment, or system through the established detailed procedures determined by the employer.

(5) Notify all affected employees that servicing is complete and the machinery, equipment, or system is ready for testing or use.

§1915.90 – Safety color code for marking physical hazards

The requirements applicable to shipyard employment under this section are identical to the requirements set forth at 29 CFR 1910.144 of this chapter.

§1915.91 – Accident prevention signs and tags

The requirements applicable to shipyard employment under this section are identical to the requirements set forth at 29 CFR 1910.145 of this chapter.

§1915.92 – Retention of DOT markings, placards, and labels

(a) Any employer who receives a package of hazardous material that is required to be marked, labeled, or placarded in accordance with the U.S. Department of

Transportation 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 U.S. Department of Transportation 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 are sufficiently removed to prevent any potential hazards.

(c) The employer shall maintain markings, placards, and labels in a manner that ensures that they are readily visible.

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

(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 specified in the U.S. Department of Transportation Hazardous Materials Regulations.

§1915.93 – Motor vehicle safety equipment, operation and maintenance

(a) **Application**

(1) This section applies to any motor vehicle used to transport employees, materials, or property at worksites engaged in shipyard employment. This section does not apply to motor vehicle operation on public streets and highways.

(2) The requirements of this section apply to employer-provided motor vehicles. The requirements of paragraphs (b)(2), (b)(4), and (c)(2) of this section also apply to employee-provided motor vehicles.

(3) Only the requirements of paragraphs (b)(1) through (b)(3) apply to powered industrial trucks, as defined in §1910.178. The maintenance,

inspection, operation, and training requirements in 29 CFR 1910.178 continue to apply to powered industrial trucks used for shipyard employment.

(b) **Motor vehicle safety equipment**

(1) The employer shall ensure that each motor vehicle acquired or initially used after August 1, 2011 is equipped with a safety belt for each employee operating or riding in the motor vehicle. This requirement does not apply to any motor vehicle that was not equipped with safety belts at the time of manufacture.

(2) The employer shall ensure that each employee uses a safety belt, securely and tightly fastened, at all times while operating or riding in a motor vehicle.

(3) The employer shall ensure that vehicle safety equipment is not removed from any employer-provided vehicle. The employer shall replace safety equipment that is removed.

(4) The employer shall ensure that each motor vehicle used to transport an employee has firmly secured seats for each employee being transported and that all employees being transported are using such seats.

(c) **Motor vehicle maintenance and operation**

(1) The employer shall ensure that each motor vehicle is maintained in a serviceable and safe operating condition, and removed from service if it is not in such condition.

(2) The employer shall ensure that, before a motor vehicle is operated, any tools and materials being transported are secured if their movements may create a hazard for employees.

(3) The employer shall implement measures to ensure that motor vehicle operators are able to see, and avoid harming, pedestrians and bicyclists at shipyards. Measures that employers may implement to comply with this requirement include:

(i) Establishing dedicated travel lanes for motor vehicles, bicyclists, and pedestrians;

(ii) Installing crosswalks and traffic control devices such as stop signs, mirrors at blind spots, or physical barriers to separate travel lanes;

(iii) Establishing appropriate speed limits for all motor vehicles;

(iv) Establishing "no drive" times to allow for safe movement of pedestrians;

(v) Providing reflective vests or other gear so pedestrians and bicyclists are clearly visible to motor vehicle operators;

(vi) Ensuring that bicycles have reflectors, lights, or other equipment to maximize visibility of the bicyclist; or

(vii) Other measures that the employer can demonstrate are as effective in protecting pedestrians and bicyclists as those measures specified in paragraphs (c)(3)(i) through (c)(3)(vi) of this section.

§1915.94 – Servicing multi-piece and single-piece rim wheels

The requirements applicable to shipyard employment under this section are identical to the requirements set forth at 29 CFR 1910.177 of this chapter.

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**. Employers must ensure that manila rope and manila-rope slings:

(1) Have permanently affixed and legible identification markings as prescribed by the manufacturer that indicate the recommended safe working load for the type(s) of hitch(es) used, the angle upon which it is based, and the number of legs if more than one;

(2) Not be loaded in excess of its recommended safe working load as prescribed on the identification markings by the manufacturer; and

(3) Not be used without affixed and legible identification markings as required by paragraph (a)(1) of this section.

(b) **Wire rope and wire-rope slings**.

(1) Employers must ensure that wire rope and wire-rope slings:

(i) Have permanently affixed and legible identification markings as prescribed by the manufacturer that indicate the recommended safe working load for the type(s) of hitch(es) used, the angle upon which it is based, and the number of legs if more than one;

(ii) Not be loaded in excess of its recommended safe working load as prescribed on the identification markings by the manufacturer; and

(iii) Not be used without affixed and legible identification markings as required by paragraph (b)(1)(i) of this section.

(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-1 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) Employers must ensure that chain and chain slings:

(i) Have permanently affixed and legible identification markings as prescribed by the manufacturer that indicate the recommended safe working load for the type(s) of hitch(es) used, the angle upon which it is based, and the number of legs if more than one;

(ii) Not be loaded in excess of its recommended safe working load as prescribed on the identification markings by the manufacturer; and

(iii) Not be used without affixed and legible identification markings as required by paragraph (c)(1)(i) of this section.

(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) Employers must note interlink wear, not accompanied by stretch in excess of 5 percent, and remove the chain from service when maximum allowable wear at any point of link, as indicated in Table G-2 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 five (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 six 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.

(7) A load shall not be lifted with a chain having a kink or knot in it. A chain shall not be shortened by bolting, wiring or knotting.

§1915.113 – Shackles and hooks

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

(a) **Shackles**. Employers must ensure that shackles:

(1) Have permanently affixed and legible identification markings as prescribed by the manufacturer that indicate the recommended safe working load;

(2) Not be loaded in excess of its recommended safe working load as prescribed on the identification markings by the manufacturer; and

(3) Not be used without affixed and legible identification markings as required by paragraph (a)(1)(i) of this section.

(b) **Hooks**.

(1) The manufacturer's 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, 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, 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 or 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 moving 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 eighteen (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	>24≤40	>40≤60	≤24	>24≤40	>40≤60
Poles or uprights (in inches)	2x4	3x4 or 2x6	4x4	3x4	4x4	4x6
Bearers (in inches)	2x6	2x6	2x6	2x8	2x8	2x10
Ledgers (in inches)	2x6	2x6	2x6	2x8	2x8	2x8
Stringers (not supporting bearers) (in inches)	1x6	1x6	1x6	1x6	1x6	1x6
Braces (in inches)	1x4	1x6	1x6	1x6	1x6	1x6
Pole spacing-longitudinally (in feet)	7½	7½	7½	7	7	7
Pole spacing-transversely (in feet)	6½ min	7½ min	8½ min	6½	10	10
Ledger spacing-vertically (in feet)	7	7	7	4½	4½	4½

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)		
	≤10	>10≤16	16≤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
	2x10	1 5/8 x 9 1/2	2x12	1 5/8 x 11 1/2	3x8	2 5/8 x 7 1/2	3x10	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	

Footnote(A) Rough lumber. Footnote(B) Dressed lumber.

Table G-1 – 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

Table G-2 – Maximum Allowable Wear at Any Point of Link

Chain size in inches	Maximum allowable wear in fractions 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

§1915.120 – Powered Industrial Truck Operator Training

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at §1910.178(l) of this chapter.

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 a dry dock 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 high, which shall be painted either on the manifolds 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) Floor stand 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 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, B7.1-1964. 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 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 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 Subpart I of this Part 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 of the unsupported edge or corner, or into steel surfaces within 1/2 inch of the unsupported edge or corner. When fastening other material, such as 2 x 4 inch lumber to a concrete surface, fasteners of greater than 7/32 inch shank diameter shall not be used and fasteners shall not be driven within 2 inches 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 personal protective equipment in accordance with the requirements of Subpart I of this Part.

(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 (PPE)

§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 applicable to this Subpart**.

"*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 its 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:[27]

(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.

(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 §§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;

[27] 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.

(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 affected 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.

(f) **Payment for protective equipment**.[28]

(1) Except as provided by paragraphs (f)(2) through (f)(6) of this section, the protective equipment, including personal protective equipment (PPE), used to comply with this Part, shall be provided by the employer at no cost to employees.

(2) The employer is not required to pay for non-specialty safety-toe protective footwear (including steel-toe shoes or steel-toe boots) and non-specialty prescription safety eyewear, provided that the employer permits such items to be worn off the job-site.

(3) When the employer provides metatarsal guards and allows the employee, at his or her request, to use shoes or boots with built-in metatarsal protection, the employer is not required to reimburse the employee for the shoes or boots.

[28] Note to §1915.152(f): When the provisions of another OSHA standard specify whether or not the employer must pay for specific equipment, the payment provisions of that standard shall prevail.

4) The employer is not required to pay for:

(i) Everyday clothing, such as long-sleeve shirts, long pants, street shoes, and normal work boots; or

(ii) Ordinary clothing, skin creams, or other items, used solely for protection from weather, such as winter coats, jackets, gloves, parkas, rubber boots, hats, raincoats, ordinary sunglasses, and sunscreen.

(5) The employer must pay for replacement PPE, except when the employee has lost or intentionally damaged the PPE.

(6) Where an employee provides appropriate protective equipment he or she owns, the employer may allow the employee to use it and is not required to reimburse the employee for that equipment. The employer shall not require an employee to provide or pay for his or her own PPE, unless the PPE is excepted by paragraphs (f)(2) through (f)(5) of this section.

(7) This paragraph (f) shall become effective on February 13, 2008. Employers must implement the PPE payment requirements no later than May 15, 2008.

§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 potentially 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, §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 – inches	Plate thickness – mm	Minimum protective shade
Gas welding:			
Light……....	Under 1/8....	Under 3.2	4
Medium…...	1/8 to ½……	3.2 to 12.7	5
Heavy…....…	Over ½…..…	Over 12.7	6
Oxygen cutting:			
Light….....…	Under 1…...	Under 25	3
Medium.....	1 to 6…….....	25 to 150	4
Heavy…....…	Over 6…....…	Over 150	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 protection devices must comply with any of the following consensus standards:

(i) ANSI Z87.1-2003, "American National Standard Practice for Occupational and Educational Eye and Face Protection," which is incorporated by reference in §1915.5;

(ii) ANSI Z87.1-1989 (R-1998), "American National Standard Practice for Occupational and Educational Eye and Face Protection," which is incorporated by reference in §1915.5; or

(iii) ANSI Z87.1-1989, "American National Standard Practice for Occupational and Educational Eye and Face Protection," which is incorporated by reference in §1915.5.

(2) Eye and face protection devices that the employer demonstrates are at least as effective as protective as eye and face protection devices that are constructed in accordance with one of the above consensus standards will be deemed to be in compliance with the requirements of this section.

§1915.154 – Respiratory Protection

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) Head protection must comply with any of the following consensus standards:

(i) American National Standards Institute (ANSI) Z89.1-2009, "American National Standard for Industrial Head Protection," incorporated by reference in §1915.5;

(ii) American National Standards Institute (ANSI) Z89.1-2003, "American National Standard for Industrial Head Protection," incorporated by reference in §1915.5; or

(iii) American National Standards Institute (ANSI) Z89.1-1997, "American National Standard for Personnel Protection — Protective Headwear for Industrial Workers — Requirements," incorporated by reference in §1915.5.

(2) Eye and face protection devices that the employer demonstrates are at least as effective as protective as eye and face protection devices that are constructed in accordance with one of the above consensus standards will be deemed to be in compliance with the requirements of this section.

§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 must comply with any of the following consensus standards:

(i) ASTM F-2412-2005, "Standard Test Methods for Foot Protection," and ASTM F-2413-2005, "Standard Specification for Performance requirements for Protective Footwear," which are incorporated by reference in §1915.5;

(ii) ANSI Z41-1999, "American National Standard for Personal Protection Protective Footwear," which is incorporated by reference in §1915.5; or

(iii) ANSI Z41-1991, "American National Standard for Personal Protection — Protective Footwear," which is incorporated by reference in §1915.5.

(2) Protective footwear that the employer demonstrates is at least as effective as protective footwear that is constructed in accordance with one of the above consensus standards will be deemed to be in compliance with the requirements of this section.

§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) PFDs (life preservers, life jackets, or work vests) worn by each affected employee must be United States Coast Guard (USCG) approved pursuant to 46 CFR Part 160 (Type I, II, III, or V PFD) and marked for use as a work vest, for commercial use, or for use on vessels. USCG approval is pursuant to 46 CFR Part 160, 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 m) or more in length, at least three 30-inch (0.76 m) 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 m) in length, at least one 30-inch (0.76 m) 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 m) 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 (27.43m) 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 (22.24 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 (22.24 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 (22.24 Kn).

(3) Self-retracting lifelines and lanyards that automatically limit free fall distances to 2 feet (0.61 m) or less shall be capable of sustaining a minimum tensile load of 3,000 pounds (13.34 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 m) or less, ripstitch lanyards and tearing and deforming lanyards shall be capable of sustaining a minimum static tensile load of 5,000 pounds (22.24 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 two.

(6) Effective November 20, 1996, personal fall arrest systems shall:[29]

(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 m), and

[29] Note to Paragraph (b)(6): 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 (140.62 kg) or more, systems that meet the criteria and protocols contained in Appendix B will be deemed to comply with the provisions of paragraph (b)(6) only if they are modified appropriately to provide protection for the extra weight of the employee and tools.

(iv) Have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.83 m), or the free fall distance permitted by the system, whichever is less;

(7) Personal fall arrest systems shall be rigged such that an employee can neither free fall more than 6 feet (1.8 m) 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 cm), 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 (4.13 cm) 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 (22.24 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 (13.34 Kn).

(2) The following system performance criteria for positioning device systems are effective November 20, 1996:[30]

[30] Note to Paragraph (b)(2): 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).

(i) A window cleaner's positioning system shall be capable of withstanding without failure a drop test consisting of a 6 foot (1.83 m) drop of a 250-pound (113.4 kg) weight. The system shall limit the initial arresting force to not more than 2,000 pounds (8.9 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 (1.22 m) drop of a 250-pound (113.4 kg) weight.

(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.

APPENDIX A TO SUBPART I OF PART 1915—NON-MANDATORY GUIDELINES FOR HAZARD ASSESSMENT, PERSONAL PROTECTIVE EQUIPMENT (PPE) SELECTION, AND PPE TRAINING PROGRAM

APPENDIX B TO SUBPART I OF 1915—GENERAL TESTING CONDITIONS AND ADDITIONAL GUIDELINES FOR PERSONAL FALL PROTECTION SYSTEMS (NON-MANDATORY)

Subpart J – Ship's Machinery and Piping Systems

§1915.161 – Scope and Application of Subpart

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

§1915.162 – Ship's 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 then locked or tagged, in accordance with §1915.89, indicating that employees are working on the boiler. This lock or 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 boiler, or until the work on the boiler is completed, in accordance with §1915.89. When 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, and then locked or tagged, in accordance with §1915.89.

(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 – Ship's 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 live system or systems shall be secured, blanked, and then locked or tagged, in accordance with §1915.89, indicating that employees are working on the systems. The lock or tag shall not be removed or 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, or until the work on the system is completed, in accordance with §1915.89. When 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, and then locked or tagged, in accordance with §1915.89.

(2) Drain connections to the atmosphere on all of the dead interconnecting systems shall be opened for visual observation of drainage.

§1915.164 – Ship's 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 employer shall ensure that the stop valves to the jacking gear are secured, and then locked or tagged, in accordance with §1915.89.

(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, and then locked or tagged in accordance with §1915.89.

(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 – Ship's 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 (also known as chain stoppers) 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 VIII, 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 by-pass 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 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 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.

§1915.181 – Electrical Circuits and Distribution Boards

(a) The provisions of this section shall apply to ship repairing and shipbuilding 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 then be locked out or tagged in accordance with §1915.89.

(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 M – O [Reserved]

Subpart P – Fire Protection in Shipyard Employment

§1915.501 – General Provisions

(a) **Purpose**. The purpose of the standard in this Subpart is to require employers to protect all employees from fire hazards in shipyard employment, including employees engaged in fire response activities.

(b) **Scope**. This Subpart covers employers with employees engaged in shipyard employment aboard vessels and vessel sections, and on land-side operations regardless of geographic location.

(c) **Employee participation**. The employer must provide ways for employees or employee representatives, or both to participate in developing and periodically reviewing programs and policies adopted to comply with this Subpart.

(d) **Multi-employer worksites**.

(1) *Host employer responsibilities*. The host employer's responsibilities are to:

(i) Inform all employers at the worksite about the content of the fire safety plan including hazards, controls, fire safety and health rules, and emergency procedures;

(ii) Make sure the safety and health responsibilities for fire protection are assigned as appropriate to other employers at the worksite; and

(iii) If there is more than one host employer, each host employer must communicate relevant information about fire-related hazards to other host employers. When a vessel owner or operator (temporarily) becomes a host shipyard employer by directing the work of ships' crews on repair or modification of the vessel or by hiring other contractors directly, the vessel owner or operator must also comply with these provisions for host employers.

(2) *Contract employer responsibilities*. The contract employer's responsibilities are to:

(i) Make sure that the host employer knows about the fire-related hazards associated with the contract employer's work and what the contract employer is doing to address them; and

(ii) Advise the host employer of any previously unidentified fire-related hazards that the contract employer identifies at the worksite.

§1915.502 – Fire Safety Plan

(a) **Employer responsibilities**. The employer must develop and implement a written fire safety plan that covers all the actions that employers and employees must take to ensure employee safety in the event of a fire. (See Appendix A to this Subpart for a Model Fire Safety Plan.)

(b) **Plan elements**. The employer must include the following information in the fire safety plan:

(1) Identification of the significant fire hazards;

(2) Procedures for recognizing and reporting unsafe conditions;

(3) Alarm procedures;

(4) Procedures for notifying employees of a fire emergency;

(5) Procedures for notifying fire response organizations of a fire emergency;

(6) Procedures for evacuation;

(7) Procedures to account for all employees after an evacuation; and

(8) Names, job titles, or departments for individuals who can be contacted for further information about the plan.

(c) **Reviewing the plan with employees**. The employer must review the plan with each employee at the following times:

(1) Within 90 days of December 14, 2004, for employees who are currently working;

(2) Upon initial assignment for new employees; and

(3) When the actions the employee must take under the plan change because of a change in duties or a change in the plan.

(d) **Additional employer requirements**. The employer also must:

(1) Keep the plan accessible to employees, employee representatives, and OSHA;

(2) Review and update the plan whenever necessary, but at least annually;

(3) Document that affected employees have been informed about the plan as required by paragraph (c) of this section; and

(4) Ensure any outside fire response organization that the employer expects to respond to fires at the employer's worksite has been given a copy of the current plan.

(e) **Contract employers**. Contract employers in shipyard employment must have a fire safety plan for their employees, and this plan must comply with the host employer's fire safety plan.

§1915.503 – Precautions for Hot Work

(a) **General requirements**.

(1) *Designated areas*. The employer may designate areas for hot work in sites such as vessels, vessel sections, fabricating shops, and subassembly areas that are free of fire hazards.

(2) *Non-designated areas*.[31]

(i) Before authorizing hot work in a non-designated area, the employer must visually inspect the area where hot work is to be performed, including adjacent spaces, to ensure the area is free of fire hazards, unless a Marine Chemist's certificate or Shipyard Competent Person's log is used for authorization.

[31] Note to Paragraph (a)(2): The requirements of paragraph (a)(2) apply to all hot work operations in shipyard employment except those covered by §1915.14.

(ii) The employer shall authorize employees to perform hot work only in areas that are free of fire hazards, or that have been controlled by physical isolation, fire watches, or other positive means.

(b) **Specific requirements**.

(1) *Maintaining fire hazard-free conditions*. The employer must keep all hot work areas free of new hazards that may cause or contribute to the spread of fire. Unexpected energizing and energy release are covered by 29 CFR 1915.181, Subpart L. Exposure to toxic and hazardous substances is covered in 29 CFR 1915.1000 through 1915.1450, Subpart Z.

(2) *Fuel gas and oxygen supply lines and torches*. The employer must make sure that:

(i) No unattended fuel gas and oxygen hose lines or torches are in confined spaces;

(ii) No unattended charged fuel gas and oxygen hose lines or torches are in enclosed spaces for more than 15 minutes; and

(iii) All fuel gas and oxygen hose lines are disconnected at the supply manifold at the end of each shift;

(iv) All disconnected fuel gas and oxygen hose lines are rolled back to the supply manifold or to open air to disconnect the torch; or extended fuel gas and oxygen hose lines are not reconnected at the supply manifold unless the lines are given a positive means of identification when they were first connected and the lines are tested using a drop test or other positive means to ensure the integrity of fuel gas and oxygen burning system.

§1915.504 – Fire Watches

(a) **Written fire watch policy**. The employer must create and keep current a written policy that specifies the following requirements for employees performing fire watch in the workplace:

(1) The training employees must be given (§1915.508(c) contains detailed fire watch training requirements);

(2) The duties employees are to perform;

(3) The equipment employees must be given; and

(4) The personal protective equipment (PPE) that must be made available and worn as required by 29 CFR Part 1915, Subpart I.

(b) **Posting fire watches**. The employer must post a fire watch if during hot work any of the following conditions are present:

(1) Slag, weld splatter, or sparks might pass through an opening and cause a fire;

(2) Fire-resistant guards or curtains are not used to prevent ignition of combustible materials on or near decks, bulkheads, partitions, or overheads;

(3) Combustible material closer than 35 ft. (10.7m) to the hot work in either the horizontal or vertical direction cannot be removed, protected with flame-proof covers, or otherwise shielded with metal or fire-resistant guards or curtains;

(4) The hot work is carried out on or near insulation, combustible coatings, or sandwich-type construction that cannot be shielded, cut back, or removed, or in a space within a sandwich type construction that cannot be inerted;

(5) Combustible materials adjacent to the opposite sides of bulkheads, decks, overheads, metal partitions, or sandwich-type construction may be ignited by conduction or radiation;

(6) The hot work is close enough to cause ignition through heat radiation or conduction on the following:

(i) Insulated pipes, bulkheads, decks, partitions, or overheads; or

(ii) Combustible materials and/or coatings;

(7) The work is close enough to unprotected combustible pipe or cable runs to cause ignition; or

(8) A Marine Chemist, a Coast Guard-authorized person, or a shipyard Competent Person, as defined in 29 CFR Part 1915, Subpart B, requires that a fire watch be posted.

(c) **Assigning employees to fire watch duty**.

(1) The employer must not assign other duties to a fire watch while the hot work is in progress.

(2) Employers must ensure that employees assigned to fire watch duty:

(i) Have a clear view of and immediate access to all areas included in the fire watch;

(ii) Are able to communicate with workers exposed to hot work;

(iii) Are authorized to stop work if necessary and restore safe conditions within the hot work area;

(iv) Remain in the hot work area for at least 30 minutes after completion of the hot work, unless the employer or its representative surveys the exposed area and makes a determination that there is no further fire hazard;

(v) Are trained to detect fires that occur in areas exposed to the hot work;

(vi) Attempt to extinguish any incipient stage fires in the hot work area that are within the capability of available equipment and within the fire watch's training qualifications, as defined in §1915.508;

(vii) Alert employees of any fire beyond the incipient stage; and

(viii) If unable to extinguish fire in the areas exposed to the hot work, activate the alarm.

(3) The employer must ensure that employees assigned to fire watch are physically capable of performing these duties.

§1915.505 – Fire Response

(a) **Employer responsibilities**. The employer must:

(1) Decide what type of response will be provided and who will provide it; and

(2) Create, maintain, and update a written policy that:

(i) Describes the internal and outside fire response organizations that the employer will use; and

(ii) Defines what evacuation procedures employees must follow, if the employer chooses to require a total or partial evacuation of the worksite at the time of a fire.

(b) **Required written policy information**.

(1) *Internal fire response*. If an internal fire response is to be used, the employer must include the following information in the employer's written policy:

(i) The basic structure of the fire response organization;

(ii) The number of trained fire response employees;

(iii) The fire response functions that may need to be carried out;

(iv) The minimum number of fire response employees necessary, the number and types of apparatuses, and a description of the fire suppression operations established by written standard operating procedures for each type of fire response at the employer's facility;

(v) The type, amount, and frequency of training that must be given to fire response employees; and

(vi) The procedures for using protective clothing and equipment.

(2) *Outside fire response*. If an outside fire response organization is used, the employer must include the following information in the written policy:

(i) The types of fire suppression incidents to which the fire response organization is expected to respond at the employer's facility or worksite;

(ii) The liaisons between the employer and the outside fire response organizations; and

(iii) A plan for fire response functions that:

(A) Addresses procedures for obtaining assistance from the outside fire response organization;

(B) Familiarizes the outside fire response organization with the layout of the employer's facility or worksite, including access routes to controlled areas, and site-specific operations, occupancies, vessels or vessel sections, and hazards; and,

(C) Sets forth how hose and coupling connection threads are to be made compatible and includes where the adapter couplings are kept; or

(D) States that the employer will not allow the use of incompatible hose connections.

(3) *A combination of internal and outside fire response*. If a combination of internal and outside fire response is to be used, the employer must include the following information, in addition to the requirements in paragraphs (b)(1) and (2) of this section, in the written policy:

(i) The basic organizational structure of the combined fire response;

(ii) The number of combined trained fire responders;

(iii) The fire response functions that may need to be carried out;

(iv) The minimum number of fire response employees necessary, the number and types of apparatuses, and a description of the fire suppression operations established by written standard operating procedures for each particular type of fire response at the worksite; and

(v) The type, amount, and frequency of joint training with outside fire response organizations if given to fire response employees.

(4) *Employee evacuation*. The employer must include the following information in the employer's written policy:

(i) Emergency escape procedures;

(ii) Procedures to be followed by employees who may remain longer at the worksite to perform critical shipyard employment operations during the evacuation;

(iii) Procedures to account for all employees after emergency evacuation is completed;

(iv) The preferred means of reporting fires and other emergencies; and

(v) Names or job titles of the employees or departments to be contacted for further information or explanation of duties.

(5) *Rescue and emergency response*. The employer must include the following information in the employer's written policy:

(i) A description of the emergency rescue procedures; and

(ii) Names or job titles of the employees who are assigned to perform them.

(c) **Medical requirements for shipyard fire response employees**. The employer must ensure that:

(1) All fire response employees receive medical examinations to assure that they are physically and medically fit for the duties they are expected to perform;

(2) Fire response employees, who are required to wear respirators in performing their duties, meet the medical requirements of §1915.154;

(3) Each fire response employee has an annual medical examination; and

(4) The medical records of fire response employees are kept in accordance with §1915.1020.

(d) **Organization of internal fire response functions**. The employer must:

(1) Organize fire response functions to ensure enough resources to conduct emergency operations safely;

(2) Establish lines of authority and assign responsibilities to ensure that the components of the internal fire response are accomplished;

(3) Set up an incident management system to coordinate and direct fire response functions, including:

(i) Specific fire emergency responsibilities;

(ii) Accountability for all fire response employees participating in an emergency operation; and

(iii) Resources offered by outside organizations; and

(4) Provide the information required in this paragraph (d) to the outside fire response organization to be used.

(e) **Personal protective clothing and equipment for fire response employees**.

(1) *General requirements*. The employer must:

(i) Supply to all fire response employees, at no cost, the appropriate personal protective clothing and equipment they may need to perform expected duties; and

(ii) Ensure that fire response employees wear the appropriate personal protective clothing and use the equipment, when necessary, to protect them from hazardous exposures.

(2) *Thermal stability and flame resistance*. The employer must:

(i) Ensure that each fire response employee exposed to the hazards of flame does not wear clothing that could increase the extent of injury that could be sustained; and

(ii) Prohibit wearing clothing made from acetate, nylon, or polyester, either alone or in blends, unless it can be shown that:

(A) The fabric will withstand the flammability hazard that may be encountered; or

(B) The clothing will be worn in such a way to eliminate the flammability hazard that may be encountered.

(3) *Respiratory protection*. The employer must:

(i) Provide self-contained breathing apparatus (SCBA) to all fire response employees involved in an emergency operation in an atmosphere that is immediately dangerous to life or health (IDLH), potentially IDLH, or unknown;

(ii) Provide SCBA to fire response employees performing emergency operations during hazardous chemical emergencies that will expose them to known hazardous chemicals in vapor form or to unknown chemicals;

(iii) Provide fire response employees who perform or support emergency operations that will expose them to hazardous chemicals in liquid form either:

(A) SCBA, or

(B) Respiratory protective devices certified by the National Institute for Occupational Safety and Health (NIOSH) under 42 CFR Part 84 as suitable for the specific chemical environment;

(iv) Ensure that additional outside air supplies used in conjunction with SCBA result in positive pressure systems that are certified by NIOSH under 42 CFR Part 84;

(v) Provide only SCBA that meet the requirements of NFPA 1981-2002 Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services (incorporated by reference, see §1915.5); and

(vi) Ensure that the respiratory protection program and all respiratory protection equipment comply with §1915.154.

(4) *Interior structural firefighting operations*. The employer must:

(i) Supply at no cost to all fire response employees exposed to the hazards of shipyard fire response, a helmet, gloves, footwear, and protective hoods, and either a protective coat and trousers or a protective coverall; and

(ii) Ensure that this equipment meets the applicable recommendations in NFPA 1971-2000 Standard on Protective Ensemble for Structural Fire Fighting (incorporated by reference, see §1915.5).

(5) *Proximity firefighting operations*. The employer must provide, at no cost, to all fire response employees who are exposed to the hazards of proximity firefighting, appropriate protective proximity clothing meets the applicable recommendations in NFPA 1976-2000 Standard on Protective Ensemble for Proximity Fire Fighting (incorporated by reference, see §1915.5).

(6) *Personal Alert Safety System (PASS) devices*. The employer must:

(i) Provide each fire response employee involved in firefighting operations with a PASS device; and

(ii) Ensure that each PASS device meets the recommendations in NFPA 1982-1998 Standard on Personal Alert Safety Systems (PASS), (incorporated by reference, see §1915.5).

(7) *Life safety ropes, body harnesses, and hardware*. The employer must ensure that:

(i) All life safety ropes, body harnesses, and hardware used by fire response employees for emergency operations meet the applicable recommendations in NFPA 1983-2001, Standard on Fire Service Life Safety Rope and System Components (incorporated by reference, see §1915.5);

(ii) Fire response employees use only Class I body harnesses to attach to ladders and aerial devices; and

(iii) Fire response employees use only Class II and Class III body harnesses for fall arrest and rappelling operations.

(f) **Equipment maintenance**.

(1) *Personal protective equipment*. The employer must inspect and maintain personal protective equipment used to protect fire response employees to ensure that it provides the intended protection.

(2) *Fire response equipment*. The employer must:

(i) Keep fire response equipment in a state of readiness;

(ii) Standardize all fire hose coupling and connection threads throughout the facility and on vessels and vessel sections by providing the same type of hose coupling and connection threads for hoses of the same or similar diameter; and

(iii) Ensure that either all fire hoses and coupling connection threads are the same within a facility or vessel or vessel section as those used by the outside fire response organization, or supply suitable adapter couplings if such an organization is expected to use the fire response equipment within a facility or vessel or vessel section.

§1915.506 – Hazards of Fixed Extinguishing Systems on Board Vessels and Vessel Sections

(a) **Employer responsibilities**. The employer must comply with the provisions of this section whenever employees are exposed to fixed extinguishing systems that could create a dangerous atmosphere when activated in vessels and vessel sections, regardless of geographic location.

(b) **Requirements for automatic and manual systems**. Before any work is done in a space equipped with fixed extinguishing systems, the employer must either:

(1) Physically isolate the systems or use other positive means to prevent the systems' discharge; or

(2) Ensure employees are trained to recognize:

(i) Systems' discharge and evacuation alarms and the appropriate escape routes; and

(ii) Hazards associated with the extinguishing systems and agents including the dangers of disturbing system components and equipment such as piping, cables, linkages, detection devices, activation devices, and alarm devices.

(c) **Sea and dock trials**. During trials, the employer must ensure that all systems shall remain operational.

(d) **Doors and hatches**. The employer must:

(1) Take protective measures to ensure that all doors, hatches, scuttles, and other exit openings remain working and accessible for escape in the event the systems are activated; and

(2) Ensure that all inward opening doors, hatches, scuttles, and other potential barriers to safe exit are removed, locked open, braced, or otherwise secured so that they remain open and accessible for escape if systems' activation could result in a positive pressure in the protected spaces sufficient to impede escape.

(e) **Testing the system**.

(1) When testing a fixed extinguishing system involves a total discharge of extinguishing medium into a space, the employer must evacuate all employees from the space and assure that no employees remain in the space during the discharge. The employer must retest the atmosphere in accordance with §1915.12 to ensure that the oxygen levels are safe for employees to enter.

(2) When testing a fixed extinguishing system does not involve a total discharge of the systems extinguishing medium, the employer must make sure that the system's extinguishing medium is

physically isolated and that all employees not directly involved in the testing are evacuated from the protected space.

(f) **Conducting system maintenance**. Before conducting maintenance on a fixed extinguishing system, the employer must ensure that the system is physically isolated.

(g) **Using fixed manual extinguishing systems for fire protection**. If fixed manual extinguishing systems are used to provide fire protection for spaces in which the employees are working, the employer must ensure that:

(1) Only authorized employees are allowed to activate the system;

(2) Authorized employees are trained to operate and activate the systems; and

(3) All employees are evacuated from the protected spaces, and accounted for, before the fixed manual extinguishing system is activated.

§1915.507 – Landside Fire Protection Systems

(a) **Employer responsibilities**. The employer must ensure all fixed and portable fire protection systems needed to meet an OSHA standard for employee safety or employee protection from fire hazards in landside facilities, including, but not limited to, buildings, structures, and equipment, meet the requirements of this section.

(b) **Portable fire extinguishers and hose systems**.

(1) The employer must select, install, inspect, maintain, and test all portable fire extinguishers according to NFPA 10-2002 Standard for Portable Fire Extinguishers (incorporated by reference, see §1915.5).

(2) The employer is permitted to use Class II or Class III hose systems, in accordance with NFPA 10-2002 (incorporated by reference, see §1915.5), as portable fire extinguishers if the employer selects, installs, inspects, maintains, and tests those systems according to the specific

recommendations in NFPA 14-2003 Standard for the Installation of Standpipe and Hose Systems (incorporated by reference, see §1915.5).

(c) **General requirements for fixed extinguishing systems**. The employer must:

(1) Ensure that any fixed extinguishing system component or extinguishing agent is approved by an OSHA Nationally Recognized Testing Laboratory, meeting the requirements of 29 CFR 1910.7, for use on the specific hazards the employer expects it to control or extinguish;

(2) Notify employees and take the necessary precautions to ensure employees are safe from fire if for any reason a fire extinguishing system stops working, until the system is working again;

(3) Ensure all repairs to fire extinguishing systems and equipment are done by a qualified technician or mechanic;

(4) Provide and ensure employees use proper personal protective equipment when entering discharge areas in which the atmosphere remains hazardous to employee safety or health, or provide safeguards to prevent employees from entering those areas. See §1915.12 for additional requirements applicable to safe entry into spaces containing dangerous atmospheres;

(5) Post hazard warning or caution signs at both the entrance to and inside of areas protected by fixed extinguishing systems that use extinguishing agents in concentrations known to be hazardous to employee safety or health; and

(6) Select, install, inspect, maintain, and test all automatic fire detection systems and emergency alarms according to NFPA 72-2002 National Fire Alarm Code (incorporated by reference, see §1915.5)

(d) **Fixed extinguishing systems**. The employer must select, install, maintain, inspect, and test all fixed systems required by OSHA as follows:

(1) Standpipe and hose systems according to NFPA 14-2003 Standard for the Installation of Standpipe and Hose Systems (incorporated by reference, see §1915.5);

(2) Automatic sprinkler systems according to NFPA 25-2002 Standard for the Inspection, Testing, and Maintenance of Water-based Fire Protection Systems, (incorporated by reference, see §1915.5), and either (i) NFPA 13-2002 Standard for the Installation of Sprinkler Systems (incorporated by reference, see §1915.5), or (ii) NFPA 750-2003 Standard on Water Mist Fire Protection Systems (incorporated by reference, see §1915.5);

(3) Fixed extinguishing systems that use water or foam as the extinguishing agent according to NFPA 15-2001 Standard for Water Spray Fixed Systems for Fire Protection (incorporated by reference, see §1915.5) and NFPA 11-2005 Standard for Low-, Medium-, and High-Expansion Foam (incorporated by reference, see §1915.5);

(4) Fixed extinguishing systems using dry chemical as the extinguishing agent according to NFPA 17-2002 Standard for Dry Chemical Extinguishing Systems (incorporated by reference, see §1915.5); and

(5) Fixed extinguishing systems using gas as the extinguishing agent according to NFPA 12-2005 Standard on Carbon Dioxide Extinguishing Systems (incorporated by reference, see §1915.5); NFPA 12A-2004 Standard on Halon 1301 Fire Extinguishing Systems (incorporated by reference, see §1915.5); and NFPA 2001-2004 Standard on Clean Agent Fire Extinguishing Systems (incorporated by reference, see §1915.5).

§1915.508 – Training

(a) The employer must train employees in the applicable requirements of this section:

(1) Within 90 days of December 14, 2004, for employees currently working;

(2) Upon initial assignment for new employees; and

(3) When necessary to maintain proficiency for employees previously trained.

(b) **Employee training**. The employer must ensure that all employees are trained on:

(1) The emergency alarm signals, including system discharge alarms and employee evacuation alarms; and

(2) The primary and secondary evacuation routes that employees must use in the event of a fire in the workplace. While all vessels and vessel sections must have a primary evacuation route, a secondary evacuation route is not required when impracticable.

(c) **Additional training requirements for employees expected to fight incipient stage fires**. The employer must ensure that employees expected to fight incipient stage fires are trained on the following:

(1) The general principles of using fire extinguishers or hose lines, the hazards involved with incipient firefighting, and the procedures used to reduce these hazards;

(2) The hazards associated with fixed and portable fire protection systems that employees may use or to which they may be exposed during discharge of those systems; and

(3) The activation and operation of fixed and portable fire protection systems that the employer expects employees to use in the workplace.

(d) **Additional training requirements for shipyard employees designated for fire response**. The employer must:

(1) Have a written training policy stating that fire response employees must be trained and capable of carrying out their duties and responsibilities at all times;

(2) Keep written standard operating procedures that address anticipated emergency operations and update these procedures as necessary;

(3) Review fire response employee training programs and hands-on sessions before they are used in fire response training to make sure that fire response employees are protected from hazards associated with fire response training;

(4) Provide training for fire response employees that ensures they are capable of carrying out their duties and responsibilities under the employer's standard operating procedures;

(5) Train new fire response employees before they engage in emergency operations;

(6) At least quarterly, provide training on the written operating procedures to fire response employees who are expected to fight fires;

(7) Use qualified instructors to conduct the training;

(8) Conduct any training that involves live fire response exercises in accordance with NFPA 1403-2002 Standard on Live Fire Training Evolutions (incorporated by reference, see §1915.5);

(9) Conduct semi-annual drills according to the employer's written procedures for fire response employees that cover site-specific operations, occupancies, buildings, vessels and vessel sections, and fire-related hazards; and

(10) Prohibit the use of smoke generating devices that create a dangerous atmosphere in training exercises.

(e) **Additional training requirements for fire watch duty**.

(1) The employer must ensure that each fire watch is trained by an instructor with adequate fire watch knowledge and experience to cover the items as follows:

(i) Before being assigned to fire watch duty;

(ii) Whenever there is a change in operations that presents a new or different hazard;

(iii) Whenever the employer has reason to believe that the fire watch's knowledge, skills, or understanding of the training previously provided is inadequate; and

(iv) Annually.

(2) The employer must ensure that each employee who stands fire watch duty is trained in:

(i) The basics of fire behavior, the different classes of fire and of extinguishing agents, the stages of fire, and methods for extinguishing fires;

(ii) Extinguishing live fire scenarios whenever allowed by local and federal law;

(iii) The recognition of the adverse health effects that may be caused by exposure to fire;

(iv) The physical characteristics of the hot work area;

(v) The hazards associated with fire watch duties;

(vi) The personal protective equipment (PPE) needed to perform fire watch duties safely;

(vii) The use of PPE;

(viii) The selection and use of any fire extinguishers and fire hoses likely to be used by a fire watch in the work area;

(ix) The location and use of barriers;

(x) The means of communication designated by the employer for fire watches;

(xi) When and how to start fire alarm procedures; and

(xii) The employer's evacuation plan.

(3) The employer must ensure that each fire watch is trained to alert others to exit the space whenever:

(i) The fire watch perceives an unsafe condition;

(ii) The fire watch perceives that a worker performing hot work is in danger;

(iii) The employer or a representative of the employer orders an evacuation; or

(iv) An evacuation signal, such as an alarm, is activated.

(f) **Records**. The employer must keep records that demonstrate that employees have been trained as required by paragraphs (a) through (e) of this section.

(1) The employer must ensure that the records include the employee's name; the trainer's name; the type of training; and the date(s) on which the training took place.

(2) The employer must keep each training record for one year from the time it was made or until it is replaced with a new training record, whichever is shorter, and make it available for inspection and copying by OSHA on request.

§1915.509 – Definitions Applicable to this Subpart

"*Alarm*" – a signal or message from a person or device that indicates that there is a fire, medical emergency or other situation that requires emergency response or evacuation. At some shipyards, this may be called an "incident" or a "call for service."

"*Alarm system*" – a system that warns employees at the worksite of danger.

"*Body harness*" – a system of straps that 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.

"*Class II standpipe system*" – a 1½ inch (3.8 cm) hose system which provides a means for the control or extinguishment of incipient stage fires.

"*Contract employer*" – an employer, such as a painter, joiner, carpenter, or scaffolding sub-contractor, who performs work under contract to the host employer or to another employer under contract to the host employer at the host employer's worksite. This excludes employers who provide incidental services that do not influence shipyard employment (such as mail delivery or office supply services).

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

"*Designated area*" – an area established for hot work after an inspection that is free of fire hazards.

"*Drop Test*" – a method utilizing gauges to ensure the integrity of an oxygen fuel gas burning system. The method requires that the burning torch is installed to one end of the oxygen and fuel gas lines and then the gauges are attached to the other end of the hoses. The manifold or cylinder supply valve is opened and the system is pressurized. The manifold or cylinder supply valve is then closed and the gauges are watched for at least sixty (60) seconds. Any drop in pressure indicates a leak.

"*Emergency operations*" – activities performed by fire response organizations that are related to: rescue, fire suppression, emergency medical care,

and special operations or activities that include responding to the scene of an incident and all activities performed at that scene.

"*Fire hazard*" – a condition or material that may start or contribute to the spread of fire.

"*Fire protection*" – methods of providing fire prevention, response, detection, control, extinguishment, and engineering.

"*Fire response*" – the activity taken by the employer at the time of an emergency incident involving a fire at the worksite, including fire suppression activities carried out by internal or external resources or a combination of both, or total or partial employee evacuation of the area exposed to the fire.

"*Fire response employee*" – a shipyard employee who carries out the duties and responsibilities of shipyard firefighting in accordance with the fire safety plan.

"*Fire response organization*" – an organized group knowledgeable, trained, and skilled in shipyard firefighting operations that responds to shipyard fire emergencies, including: fire brigades, shipyard fire departments, private or contractual fire departments, and municipal fire departments.

"*Fire suppression*" – the activities involved in controlling and extinguishing fires.

"*Fire watch*" – the activity of observing and responding to the fire hazards associated with hot work in shipyard employment and the employees designated to do so.

"*Fixed extinguishing system*" – a permanently installed fire protection system that either extinguishes or controls fire occurring in the space it protects.

"*Flammable liquid*" – any liquid having a flashpoint below 100˚F (37.8˚C), except any mixture having components with flashpoints of 100˚F (37.8˚C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

"*Hazardous substance*" – a substance likely to cause injury by reason of being explosive, flammable, poisonous, corrosive, oxidizing, an irritant, or otherwise harmful.

"*Hose systems*" – fire protection systems consisting of a water supply, approved fire hose, and a means to control the flow of water at the output end of the hose.

"*Host employer*" – an employer who is in charge of coordinating work or who hires other employers to perform work at a multi-employer workplace.

"*Incident management system*" – a system that defines the roles and responsibilities to be assumed by personnel and the operating procedures to be used in the management and direction of emergency operations; the system is also referred to as an "incident command system" (ICS).

"*Incipient stage fire*" – a fire, in the initial or beginning stage, which can be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

"*Inerting*" – the displacement of the atmosphere in a permit space by noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. This procedure produces an IDLH oxygen-deficient atmosphere.

"*Interior structural firefighting operations*" – the physical activity of fire response, rescue, or both involving a fire beyond the incipient stage inside of buildings, enclosed structures, vessels, and vessel sections.

"*Multi-employer workplace*" – a workplace where there is a host employer and at least one contract employer.

"*Personal Alert Safety System (PASS)*" – a device that sounds a loud signal if the wearer becomes immobilized or is motionless for 30 seconds or more.

"*Physical isolation*" – the elimination of a fire hazard by removing the hazard from the work area (at least 35 feet for combustibles), by covering or shielding the hazard with a fire-resistant material, or physically preventing the hazard from entering the work area.

"*Physically isolated*" – positive isolation of the supply from the distribution piping of a fixed extinguishing system. Examples of ways to physically isolate include: removing a spool piece and installing a blank flange; providing a double block and bleed valve system; or completely disconnecting valves and piping from all cylinders or other pressure vessels containing extinguishing agents.

"*Protected space*" – any space into which a fixed extinguishing system can discharge.

"*Proximity firefighting*" – specialized fire-fighting operations that require specialized thermal protection and may include the activities of rescue, fire suppression, and property conservation at incidents involving fires producing very high levels of conductive, convective, and radiant heat such as aircraft fires, bulk flammable gas fires, and bulk flammable liquid fires. Proximity firefighting operations usually are exterior operations but may be combined with structural firefighting operations. Proximity firefighting is not entry firefighting.

"*Qualified instructor*" – a person with specific knowledge, training, and experience in fire response or fire watch activities to cover the material found in §1915.508(b) or (c).

"*Rescue*" – locating endangered persons at an emergency incident, removing those persons from danger, treating the injured, and transporting the injured to an appropriate healthcare facility.

"*Shipyard firefighting*" – the activity of rescue, fire suppression, and property conservation involving buildings, enclosed structures, vehicles, vessels, aircraft, or similar properties involved in a fire or emergency situation.

"*Small hose system*" – a system of hoses ranging in diameter from 5/8" (1.6 cm) up to 1 1/2" (3.8 cm) which is for the use of employees and which provides a means for the control and extinguishment of incipient stage fires.

"*Standpipe*" – a fixed fire protection system consisting of piping and hose connections used to supply water to approved hose lines or sprinkler systems. The hose may or may not be connected to the system.

APPENDIX A TO SUBPART P TO PART 1915—MODEL FIRE SAFETY PLAN (NON-MANDATORY)

Subpart Q – Y [Reserved]

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) **Substances with limits preceded by "C" – Ceiling values.**

(1) 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.

(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.

(b) [Reserved]

(c) [Reserved]

(d) **Computation formula**. The computation formula which shall apply to employee exposure to more than one substance for which 8-hour time weighted averages are listed in Subpart Z of 29 CFR part 1915 in order to determine whether an employee is exposed over the regulatory limit is as follows:

(1)(i) The cumulative exposure for an 8-hour work shift shall be computed as follows:

$$E = (C_aT_a + C_bT_b + \ldots C_nT_n) \div 8$$

Where:

E is the equivalent exposure for the working shift.

C is the concentration during any period of time T where the concentration remains constant.

T is the duration in hours of the exposure at the concentration C.

The value of E shall not exceed the 8-hour time weighted average specified in Subpart Z of 29 CFR Part 1915 for the material involved.

(ii) To illustrate the formula prescribed in paragraph (d)(1)(i) of this section, assume that Substance A has an 8-hour time weighted average limit of 100 ppm noted in Table Z – Shipyards. Assume that an employee is subject to the following exposure:

Two hours exposure at 150 ppm

Two hours exposure at 75 ppm

Four hours exposure at 50 ppm

Substituting this information in the formula, we have

$(2 \times 150 + 2 \times 75 + 4 \times 50) \div 8 = 81.25$ ppm

Since 81.25 ppm is less than 100 ppm, the 8-hour time weighted average limit, the exposure is acceptable.

(2)(i) in case of a mixture of air contaminants an employer shall compute the equivalent exposure as follows:

$$E_m = (C_1 \div L_1 + C_2 \div L_2) + \ldots (C_n \div L_n)$$

Where:

E_m is the equivalent exposure for the mixture.

C is the concentration of a particular contaminant.

L is the exposure limit for that substance specified in Subpart Z of 29 CFR Part 1915.

The value of E_m shall not exceed unity (1).

(ii) To illustrate the formula prescribed in paragraph (d)(2)(i) of this section, consider the following exposures:

Substance	Actual concentration of 8 hour exposure (ppm)	8 hr. TWA PEL (ppm)
B	500	1000
C	45	200
D	40	200

Substituting in the formula, we have:

$E_m = 500 \div 1{,}000 + 45 \div 200 + 40 \div 200$

$E_m = 0.500 + 0.225 + 0.200$

$E_m = 0.925$

Since E_m is less than unity (1), the exposure combination is within acceptable limits.

Table Z – Shipyards

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin 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; see1, 2-Dichloroethylene				
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
Allyl chloride	107-05-1	1	3	
Allyl glycidyl ether (AGE)	106-92-3	(C)10	(C)45	
Allyl propyl 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	
Ammonium sulfamate	7773-06-0			
Total dust			15	
Respirable fraction			5	
n-Amyl acetate	628-63-7	100	525	
sec-Amyl acetate	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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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				
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 Coal tar pitch volatiles				
Benzoyl peroxide	94-36-0		5	
Benzyl chloride	100-44-7	1	5	
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 Diglycidyl ether				
Boron oxide	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(l)	106-99-0	1 ppm/ 5 ppm STEL		

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
2-Butanone (Methyl ethyl ketone)	78-93-3	200	590	
2-Butoxyethanol	111-76-2	50	240	X
n-Butyl-acetate	123-86-4	150	710	
sec-Butyl acetate	105-46-4	200	950	
tert-Butyl-acetate	540-88-5	200	950	
n-Butyl alcohol	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-Butyl chromate (as CrO_3); see 1915.1026[n]	1189-85-1			
n-Butyl glycidyl ether(BGE)	2426-08-6	50	270	
Butyl mercaptan	109-79-5	0.5	1.5	
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 disulfide	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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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			
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	
Chromium (II) compounds (as Cr)	7440-47-3		0.5	
Chromium (III) compounds (as Cr)	7440-47-3		0.5	
Chromium (VI) compounds; see 1915.1026[o]				
Chromium metal and insol. salts (as Cr)	7440-47-3		1	
Chrysene; see Coal tar 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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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; 4170-30-3	2	6	
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 (Dichlorophenoxyacetic acid)	94-75-7		10	
Decaborane	17702-41-9	0.05	0.3	X
Demeton (Systox)	8065-48-3		0.1	X
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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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	
Dichloroethyl ether	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
Diethyl ether; see Ethyl ether				
Difluorodibromomethane	75-61-6	100	860	
Diglycidyl ether (DGE)	2238-07-5	(C)0.5	(C)2.8	
Dihydroxybenzene; see Hydroquinone				
Diisobutyl ketone	108-83-8	50	290	
Diisopropylamine	108-18-9	5	20	X
4-Dimethylaminoazobenzene; 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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
Dimethylformamide	68-12-2	10	30	X
2,6-Dimethyl-4-heptanone; see Diisobutyl ketone				
1,1-Dimethylhydrazine	57-14-7	0.5	1	X
Dimethylphthalate	131-11-3		5	
Dimethyl sulfate	77-78-3	1	5	X
Dinitrobenzene (all isomers)			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				
Dipropylene glycol methyl ether	34590-94-8	100	600	X
Di-sec octyl 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 oxide				
2,3-Epoxy-1-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
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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
Ethylamine	75-04-7	10	18	
Ethyl amyl ketone (5-Methyl-3-heptanone)	541-85-5	25	130	
Ethyl benzene	100-41-4	100	435	
Ethyl bromide	74-96-4	200	890	
Ethyl butyl ketone (3-Heptanone)	106-35-4	50	230	
Ethyl chloride	75-00-3	1000	2600	
Ethyl ether	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 (Trichlorofluoromethane)	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)	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
Glycerin (mist)	56-81-5			
Total dust			15	
Respirable fraction			5	
Glycidol	556-52-5	50	150	
Glycol monoethyl ether; 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-butyl ketone)	591-78-6	100	410	
Hexone (Methyl isobutyl ketone)	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 (as F)	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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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	
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			15	
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				

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
Methoxychlor Total dust	72-43-5		15	
2-Methoxyethanol; (Methyl cellosolve)	109-86-4	25	80	X
2-Methoxyethyl acetate (Methyl cellosolve 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	
Methyl amyl alcohol; see Methyl Isobutyl carbinol				
Methyl n-amyl ketone	110-43-0	100	465	
Methyl bromide	74-83-9	(C)20	(C)80	X
Methyl butyl ketone; see 2-Hexanone				
Methyl cellosolve; see 2-Methoxyethanol				
Methyl cellosolve acetate; see 2-Methoxyethyl acetate				
Methyl chloride	74-87-3	100	210	
Methyl chloroform (1,1,1-Trichloroethane)	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				
Methyl ethyl ketone (MEK); see 2-Butanone				
Methyl formate	107-31-3	100	250	
Methyl hydrazine (Monomethyl hydrazine)	60-34-4	(C)0.2	(C)0.35	X
Methyl iodide	74-88-4	5	28	X
Methyl isoamyl ketone	110-12-3	100	475	
Methyl isobutyl carbinol	108-11-2	25	100	X
Methyl isobutyl ketone; see Hexone Methyl isocyanate	624-83-9	0.02	0.05	X
Methyl mercaptan	74-93-1	0.5	1	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
Methyl methacrylate	80-62-6	100	410	100
Methyl propyl ketone; see 2-Pentanone				
Methyl silicate	681-84-5	5	30	
alpha-Methyl styrene	98-83-9	(C)100	(C)480	
Methylene bisphenyl 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	
Monomethyl aniline	100-61-8	2	9	X
Monomethyl hydrazine; see Methyl hydrazine				
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			
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	
Nickel, metal and insoluble compounds (as Ni)	7440-02-0		1	
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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
2-Nitropropane	79-46-9	25	90	
N-Nitrosodimethylamine see §1915.1016	62-79-9			
Nitrotoluene (all isomers)		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	
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)	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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)	7440-06-4			
Metal				
Soluble Salts			0.002	
Polytetrafluoro-ethylene 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			

Subpart Z

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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	
Propylene imine	75-55-8	2	5	X
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 and gel	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)				

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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	
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-tri-chloro-phenoxyacetic 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

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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-Tetrachloro-ethane	79-34-5	5	35	X
Tetrachoroethylene; see Perchloroethylene				
Tetrachloromethane; see Carbon tetrachloride				
Tetrachloro-naphthalene	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
Tetramethyl succinonitrile	3333-52-6	0.5	3	X
Tetranitromethane	509-14-8	1	8	
Tetryl (2,4,6-Trinitro-phenylmethylnitramine)	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	

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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 Methyl chloroform				
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-Trinitrophenylmethylnitramin; 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	
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_2O_5)			(C)0.5	
Fume (as V_2O_5)			(C)0.1	
Vegetable oil mist				
Total dust			15	
Respirable fraction			5	
Vinyl benzene; see Styrene				

Substance	CAS No.[d]	ppm [a,*]	mg/m³ [b,*,h]	Skin Designation
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	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 15 mg/m³ whichever is the smaller) of total dust <1%SiO_2
Conversion factors mppcf X 35.3 = million particles per cubic meter = particles per c.c.	

NOTE: Because of the length of the table, explanatory Footnotes applicable to all substances are given below as well as at the end of the table. Footnotes specific only to a limited number of substances are also shown within the table.

Footnote (1) [Reserved]

Footnote (2) See Mineral Dusts Table.

Footnote (3) Use Asbestos Limit 1915.1001.

Footnote (4) See 1915.1001

Footnote (*) The PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit. They are to be determined from breathing-zone air samples.

Footnote (a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees C and 760 torr.

Footnote (b) Milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.

Footnote (c) [Reserved]

Footnote (d) The CAS number is for information only. Enforcement is based on the substance name. For an entry covering more than one metal compound, measured as the metal, the CAS number for the metal is given - not CAS numbers for the individual compounds.

Footnote (e) [Reserved]

Footnote (f) [Reserved]

Footnote (g) For sectors excluded from 1915.1028 the limit is 10 ppm TWA.

Footnote (h) Where OSHA has published a proposal for a substance but has not issued a Final Rule, the proposal is referenced and the existing limit is published.

Footnote (i) [Reserved]

Footnote (j) Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.

Footnote (k) The percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods have been shown to be applicable.

Footnote (l) [Reserved]

Footnote (m) Covers all organic and inorganic particulates not otherwise regulated. Same as Particulates Not Otherwise Regulated.

Footnote (n) If the exposure limit in §1915.1026 is stayed or is otherwise not in effect, the exposure limit is a ceiling of 0.1 $mg/m^{3.}$

Footnote (o) If the exposure limit in §1915.1026 is stayed or otherwise not in effect, the exposure limit is 0.1 mg/m^3 (CrO_3) as an 8-hour TWA.

The 1970 TLV uses letter designations instead of a numerical value as follows:

Footnote (A(1)) [Reserved]

Footnote (A(2)) Polytetrafluoroethylene decomposition products. Because these products decompose in part by hydrolysis in alkaline solution, they can be quantitatively determined in air as fluoride to provide an index of exposure. No TLV is recommended pending determination of the toxicity of the products, but air concentrations should be minimal.

Footnote (A(3)) Gasoline and/or Petroleum distillates. The composition of these materials varies greatly and thus a single TLV for all types of these materials is no longer applicable. The content of benzene, other aromatics and additives should be determined to arrive at the appropriate TLV.

Footnote (E) Simple asphyxiants. The limiting factor is the available oxygen which shall be at least 18 percent and be within the requirements addressing explosion in Subpart B of part 1915.

§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.

(8) This section does not apply to asbestos-containing asphalt roof cements, coatings and mastics.

(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 60 inches in length and width.

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

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

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

"*Glovebag*" means not more than a 60 x 60 inch 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 Accreditation Plan (40 CFR Part 763) for supervisor, or its equivalent, and for Class III and Class IV work, who is trained in a manner consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(2).

"*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 percent 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 percent asbestos.

(c) **Permissible exposure limits (PELs)**.

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

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

(d) **Multi-employer worksites**.

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

(2) Asbestos hazards at a multi-employer worksite 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 worksite 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) and (3), and (f)(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*. The employer must, as soon as possible but no later than 5 days after the receipt of the results of any monitoring performed under this section, notify each affected employee of these results either individually in writing or by posting the results in an appropriate location that is accessible to 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 linear or 10 square feet 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 shall 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 may be used where the configuration of the work area does not make the erection of the enclosure infeasible, with the following specifications and work practices.

(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 pipes or other structures 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° 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 a system uses an attached waste bag, such bag shall be connected to a collection bag using hose or other material which shall withstand the pressure of ACM waste and water without losing its integrity.

(8) A sliding valve or other device shall separate the waste bag from the hose to ensure no exposure when the 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 the specifications for glove bag systems above, negative pressure glove bag systems shall attach the HEPA vacuum system or other device to the 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 (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 or 10 square feet 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.

(7) *Work practices and engineering controls for Class II work.*

(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.

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

(iii) [Reserved]

(iv) All Class II asbestos work shall be performed using the work practices and requirements set out above in paragraph (g)(1)(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 not 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 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, 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 a covered dust-tight chute, crane or hoist, or be 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.

(B) [Reserved]

(C) The gasket shall be immediately placed in a disposal 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 the exposure 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 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*. For employees who use respirators required by this section, the employer must provide each employee an appropriate respirator that complies with the requirements of this paragraph. 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) Employers must select, and provide to employees at no cost, the appropriate respirators specified in paragraph (d)(3)(i)(A) of 29 CFR 1910.134; however, employers must not select or use filtering facepiece respirators for use against asbestos fibers.

(ii) Employers are to provide HEPA filters for powered and non-powered air-purifying respirators.

(iii) Employers must:

(A) Inform employees that they may require the employer to provide a tight-fitting, powered air-purifying respirator (PAPR) permitted for use under paragraph (h)(2)(i) of this standard instead of a negative pressure respirator.

(B) Provide employees with a tight-fitting PAPR instead of a negative pressure respirator when the employees choose to use a tight-fitting PAPR and it provides them with the required protection against asbestos.

(iv) Employers must provide employees with an air-purifying, half mask respirator, other than a filtering facepiece respirator, whenever the employees perform:

(A) Class II or Class III asbestos work for which no negative exposure assessment is available.

(B) Class III asbestos work involving disturbance of TSI or surfacing ACM or PACM.

(v) Employers must provide employees with:

(A) A tight-fitting, powered air-purifying respirator or a full facepiece, supplied-air respirator operated in the pressure-demand mode and equipped with either HEPA egress cartridges or an auxiliary positive-pressure, self-contained breathing apparatus (SCBA) whenever the employees are in a regulated area performing Class I asbestos work for which a negative exposure assessment is not available and the exposure assessment indicates that the exposure level will be at or below 1 f/cc as an 8-hour time-weighted average (TWA).

(B) A full facepiece, supplied-air respirator operated in the pressure-demand mode and equipped with an auxiliary positive-pressure SCBA whenever the employees are in a regulated area performing Class I asbestos work for which a negative exposure assessment is not available and the exposure assessment indicates that the exposure level will be above 1 f/cc as an 8-hour TWA.

(3) *Respirator program*.

(i) When respiratory protection is used, the employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134(b) through (d) (except paragraph (d)(1)(iii)), and (f) through (m) which covers each employee required by this section to use a respirator.

(ii) No employee shall be assigned to tasks requiring the 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.

(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 or 10 square feet 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) The employer shall ensure that contaminated clothing is transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (k) of this section.

(4) *Inspection of protective clothing*.

(i) The qualified person shall examine worksuits worn by employees at least once per workshift for rips or tears that may occur during the 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 or 10 square feet of TSI or surfacing ACM and PACM*.

(i) Decontamination areas: For all Class I jobs involving over 25 linear or 10 square feet 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) Decontamination 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; and

(C) Put on protective clothing and respiratory protection before leaving the clean room.

(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.

(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 or 10 square feet 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 a 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 practice required of employees performing work which has a higher classification within that regulated area. Otherwise employers of employees cleaning up debris and material which is TSI or surfacing ACM or identified as PACM shall provide decontamination facilities for such employees which are required by 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 worksite and the precautions to be taken to ensure that airborne asbestos is confined to the area.

(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 completed an inspection conducted pursuant to the requirements of AHERA (40 CFR part 763, Subpart E) which demonstrates that the material is not ACM; or

(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) *Hazard communication.*

(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) *General.* The employer shall include asbestos in the program established to comply with the Hazard Communication Standard (HCS) (§1910.1200). The employer shall ensure that each employee has access to labels on containers of asbestos and safety data sheets, and is trained in accordance with the provisions of the HCS and paragraph (k)(9) of this section. The employer shall ensure that at least the following hazards are addressed: Cancer and lung effects.

(iii) *Labels.*

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

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

(B)(1) Prior to June 1, 2015, employers may include the following information on raw materials, mixtures or labels of bags or containers of protective clothing

and equipment, scrap, waste, and debris containing asbestos fibers in lieu of the labeling requirements in paragraphs (k)(7)(ii) and (k)(7)(iii)(A) of this section:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(B)(2) Labels shall also contain a warning statement against breathing asbestos fibers.

(iv) The provisions for labels required in paragraph (k)(7) 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.

(8) 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) The warning signs required by this paragraph (k)(8) shall bear the following legend:

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

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

WEAR RESPIRATORY PROTECTION
AND PROTECTIVE CLOTHING IN THIS AREA

(iv) The employer shall ensure that employees working in and contiguous to regulated areas comprehend the warning signs required to be posted by paragraph (k)(8) of this section. Means to ensure employee comprehension may include the use of foreign languages, pictographs, and graphics.

(v) 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 labeling. The employer shall ensure, to the extent feasible, that employees who come in contact with these signs or labels can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

(vi) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (k)(8)(ii) of this section:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

(vii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (k)(8)(iii) of this section:

RESPIRATORS AND PROTECTIVE CLOTHING ARE
REQUIRED IN THIS AREA

(9) *Employee information and training.*

(i) The employer shall train each employee who is likely to be exposed in excess of a PEL and each employee who performs Class I through IV asbestos operations in accordance with the requirements of this section. Training shall

be provided at no cost to the employee. The employer shall institute a training program and ensure employee 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 maintenance and custodial staff as set forth at 40 CFR 763.92(a)(1). Such a course shall include available information concerning the locations of thermal system insulation and surfacing ACM/PACM, and asbestos-containing flooring material, or flooring material where the absence of asbestos has not yet been certified; and instruction in the recognition of damage, deterioration, and delamination of asbestos containing building materials. Such a 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 the 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)(l) 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; and

(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.

(D) A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure.

(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 thirty (30) years, in accordance with 29 CFR 1910.1020.

(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 1910.1020.

(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 thirty (30) years, in accordance with 29 CFR 1910.1020.

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

(5) *Data to rebut PACM*.

(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.

(ii) [Reserved]

(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.

(ii) [Reserved]

(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 1910.1020(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 1910.1020.

(8) *Transfer of records*.

(i) The employer shall comply with the requirements concerning transfer of records set forth in 29 CFR 1910.1020 (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

authority 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*. §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, E and L to this section are incorporated as part of this section and the contents of these appendices are mandatory.

Appendix A to §1915.1001 – OSHA Reference Method. Mandatory

Appendix C to §1915.1001 – Qualitative and Quantitative Fit Testing Procedures. Mandatory

Appendix D to §1915.1001 – Medical Questionnaires. Mandatory

Appendix E to §1915.1001 – Interpretation and Classification of Chest Roentgenograms. Mandatory

Appendix L §1915.1001 – Work Practices and Engineering Controls for Automotive Brake and Clutch Inspection, Disassembly, Repair and Assembly. Mandatory

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

Appendix B to §1915.1001 – Detailed Procedures for Asbestos Sampling and Analysis. Non-Mandatory

Appendix F to §1915.1001 – Work Practices and Engineering Controls for Class I Asbestos Operations. Non-Mandatory

Appendix G to §1915.1001 – Reserved

Appendix H to §1915.1001 – Substance Technical Information for Asbestos. Non-Mandatory

Appendix I to §1915.1001 – Medical Surveillance Guidelines for Asbestos. Non-Mandatory

Appendix J to §1915.1001 – Smoking Cessation Program Information for Asbestos. Non-Mandatory

Appendix K to §1915.1001 – Polarized Light Microscopy of Asbestos. Non-Mandatory

§1915.1002 thru §1915.1025

Note: The requirements applicable to shipyard employment under these sections, 1915.1002 through 1915.1025, are identical to those set forth in sections of chapter 1910 listed below:

1915.1002	**Coal Tar Pitch Volatiles; Interpretation of Term**	**1910.1002**
1915.1003	**13 Carcinogens (4-Nitrobiphenyl, etc.)**	**1910.1003**
1915.1004	**alpha-Naphthylamine**	**1910.1003**
1915.1005	**[Reserved]**	
1915.1006	**Methyl Chloromethyl Ether**	**1910.1003**
1915.1007	**3,3′-Dichlorobenzidine (and its Salts)**	**1910.1003**
1915.1008	**bis-Chloromethyl Ether**	**1910.1003**
1915.1009	**beta-Naphthylamine**	**1910.1003**
1915.1010	**Benzidine**	**1910.1003**
1915.1011	**4-Aminodiphenyl**	**1910.1003**
1915.1012	**Ethyleneimine**	**1910.1003**
1915.1013	**beta-Propiolactone**	**1910.1003**
1915.1014	**2-Acetylaminofluorene**	**1910.1003**
1915.1015	**4-Dimethylaminoazobenzene**	**1910.1003**
1915.1016	**N-Nitrosodimethylamine**	**1910.1003**
1915.1017	**Vinyl Chloride**	**1910.1017**
1915.1018	**Inorganic Arsenic**	**1910.1018**
1915.1020	**Access to Employee Exposure and Medical Records**	**1910.1020**
1915.1025	**Lead**	**1910.1025**

§1915.1026—Chromium (VI)

(a) **Scope.**

(1) This standard applies to occupational exposures to chromium (VI) in all forms and compounds in shipyards, marine terminals, and longshoring, except:

(2) Exposures that occur in the application of pesticides regulated by the Environmental Protection Agency or another Federal government agency (e.g., the treatment of wood with preservatives);

(3) Exposures to portland cement; or

(4) Where the employer has objective data demonstrating that a material containing chromium or a specific process, operation, or activity involving

chromium cannot release dusts, fumes, or mists of chromium (VI) in concentrations at or above 0.5 μg/m³ as an 8-hour time-weighted average (TWA) under any expected conditions of use.

(b) **Definitions**.

For the purposes of this section the following definitions apply:

"*Action level*" means a concentration of airborne chromium (VI) of 2.5 micrograms per cubic meter of air (2.5 μg/m³) calculated as an 8-hour time-weighted average (TWA).

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

"*Chromium (VI) [hexavalent chromium or Cr(VI)]*" means chromium with a valence of positive six, in any form and in any compound.

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

"*Emergency*" means any occurrence that results, or is likely to result, in an uncontrolled release of chromium (VI). If an incidental release of chromium (VI) can be controlled at the time of release by employees in the immediate release area, or by maintenance personnel, it is not an emergency.

"*Employee exposure*" means the exposure to airborne chromium (VI) that would occur if the employee were not using a respirator.

"*High-efficiency particulate air [HEPA] filter*" means a filter that is at least 99.97 percent efficient in removing mono-dispersed particles of 0.3 micrometers in diameter or larger.

"*Historical monitoring data*" means data from chromium (VI) monitoring conducted prior to May 30, 2006, obtained during work operations conducted under workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

"*Objective data*" means information such as air monitoring data from industry-wide surveys or calculations based on the composition or chemical and physical properties of a substance demonstrating the employee exposure to chromium (VI) associated with a particular product or material or a specific process, operation, or activity. The data must reflect workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

"*Physician or other licensed healthcare professional [PLHCP]*" is an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular healthcare services required by paragraph (i) of this section.

"*This section*" means this §1915.1026 chromium (VI) standard.

(c) **Permissible exposure limit (PEL)**. The employer shall ensure that no employee is exposed to an airborne concentration of chromium (VI) in excess of 5 micrograms per cubic meter of air (5 $\mu g/m^3$), calculated as an 8-hour time-weighted average (TWA).

(d) **Exposure determination**.

(1) *General*. Each employer who has a workplace or work operation covered by this section shall determine the 8-hour TWA exposure for each employee exposed to chromium (VI). This determination shall be made in accordance with either paragraph (d)(2) or paragraph (d)(3) of this section.

(2) *Scheduled monitoring option*.

(i) The employer shall perform initial monitoring to determine the 8-hour TWA exposure for each employee on the basis of a sufficient number of personal breathing zone air samples to accurately characterize full shift exposure on each shift, for each job classification, in each work area. Where an employer does representative sampling instead of sampling all

employees in order to meet this requirement, the employer shall sample the employee(s) expected to have the highest chromium (VI) exposures.

(ii) If initial monitoring indicates that employee exposures are below the action level, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

(iii) If monitoring reveals employee exposures to be at or above the action level, the employer shall perform periodic monitoring at least every six months.

(iv) If monitoring reveals employee exposures to be above the PEL, the employer shall perform periodic monitoring at least every three months.

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

(vi) The employer shall perform additional monitoring when there has been any change in the production process, raw materials, equipment, personnel, work practices, or control methods that may result in new or additional exposures to chromium (VI), or when the employer has any reason to believe that new or additional exposures have occurred.

(3) *Performance-oriented option*. The employer shall determine the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data, historical monitoring data, or objective data sufficient to accurately characterize employee exposure to chromium (VI).

(4) *Employee notification of determination results*.

(i) Within 5 work days after making an exposure determination in accordance with paragraph (d)(2) or paragraph (d)(3) of this section, the employer shall individually notify each affected employee in writing of the results of that determination or post the results in an appropriate location accessible to all affected employees.

(ii) Whenever the exposure determination indicates that employee exposure is above the PEL, the employer shall describe in the written notification the corrective action being taken to reduce employee exposure to or below the PEL.

(5) *Accuracy of measurement*. Where air monitoring is performed to comply with the requirements of this section, the employer shall use a method of monitoring and analysis that can measure chromium (VI) to within an accuracy of plus or minus 25 percent (+/-25%) and can produce accurate measurements to within a statistical confidence level of 95 percent for airborne concentrations at or above the action level.

(6) *Observation of monitoring*.

(i) Where air monitoring is performed to comply with the requirements of this section, the employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to chromium (VI).

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

(e) **Methods of compliance**.

(1) *Engineering and work practice controls*.

(i) Except as permitted in paragraph (e)(1)(ii) of this section, the employer shall use engineering and work practice controls to reduce and maintain employee exposure to chromium (VI) to or below the PEL unless the employer can demonstrate that such controls are not feasible. Wherever feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, the employer shall use them to reduce employee exposure to the lowest levels achievable, and shall supplement them by the use of respiratory protection that complies with the requirements of paragraph (f) of this section.

(ii) Where the employer can demonstrate that a process or task does not result in any employee exposure to chromium (VI) above the PEL for 30 or more days per year (12 consecutive months), the requirement to implement engineering and work practice controls to achieve the PEL does not apply to that process or task.

(2) *Prohibition of rotation*. The employer shall not rotate employees to different jobs to achieve compliance with the PEL.

(f) **Respiratory protection**.

(1) *General*. Where respiratory protection is required by this section, the employer must provide each employee an appropriate respirator that complies with the requirements of this paragraph. Respiratory protection is required during:

(i) Periods necessary to install or implement feasible engineering and work practice controls;

(ii) Work operations, such as maintenance and repair activities, for which engineering and work practice controls are not feasible;

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

(iv) Work operations where employees are exposed above the PEL for fewer than 30 days per year, and the employer has elected not to implement engineering and work practice controls to achieve the PEL; or

(v) Emergencies.

(2) *Respiratory protection program*. Where respirator use is required by this section, the employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134, which covers each employee required to use a respirator.

(g) **Protective work clothing and equipment**.

(1) *Provision and use*. Where a hazard is present or is likely to be present from skin or eye contact with chromium (VI), the employer shall provide appropriate personal protective clothing and

equipment at no cost to employees, and shall ensure that employees use such clothing and equipment.

(2) *Removal and storage*.

(i) The employer shall ensure that employees remove all protective clothing and equipment contaminated with chromium (VI) at the end of the work shift or at the completion of their tasks involving chromium (VI) exposure, whichever comes first.

(ii) The employer shall ensure that no employee removes chromium (VI)-contaminated protective clothing or equipment from the workplace, except for those employees whose job it is to launder, clean, maintain, or dispose of such clothing or equipment.

(iii) When contaminated protective clothing or equipment is removed for laundering, cleaning, maintenance, or disposal, the employer shall ensure that it is stored and transported in sealed, impermeable bags or other closed, impermeable containers.

(iv) Bags or containers of contaminated protective clothing or equipment that are removed from change rooms for laundering, cleaning, maintenance, or disposal shall be labeled in accordance with the requirements of the Hazard Communication Standard, 29 CFR 1910.1200.

(3) *Cleaning and replacement*.

(i) The employer shall clean, launder, repair and replace all protective clothing and equipment required by this section as needed to maintain its effectiveness.

(ii) The employer shall prohibit the removal of chromium (VI) from protective clothing and equipment by blowing, shaking, or any other means that disperses chromium (VI) into the air or onto an employee's body.

(iii) The employer shall inform any person who launders or cleans protective clothing or equipment contaminated with chromium (VI) of the potentially harmful effects of exposure to chromium (VI) and that the clothing and equipment should be laundered or cleaned in a

manner that minimizes skin or eye contact with chromium (VI) and effectively prevents the release of airborne chromium (VI) in excess of the PEL.

(h) **Hygiene areas and practices**.

(1) *General*. Where protective clothing and equipment is required, the employer shall provide change rooms in conformance with 29 CFR 1910.141. Where skin contact with chromium (VI) occurs, the employer shall provide washing facilities in conformance with 29 CFR 1915.97. Eating and drinking areas provided by the employer shall also be in conformance with §1915.97.

(2) *Change rooms*. The employer shall assure that change rooms are equipped with separate storage facilities for protective clothing and equipment and for street clothes, and that these facilities prevent cross-contamination.

(3) *Washing facilities*.

(i) The employer shall provide readily accessible washing facilities capable of removing chromium (VI) from the skin, and shall ensure that affected employees use these facilities when necessary.

(ii) The employer shall ensure that employees who have skin contact with chromium (VI) wash their hands and faces at the end of the work shift and prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics, or using the toilet.

(4) *Eating and drinking areas*.

(i) Whenever the employer allows employees to consume food or beverages at a worksite where chromium (VI) is present, the employer shall ensure that eating and drinking areas and surfaces are maintained as free as practicable of chromium (VI).

(ii) The employer shall ensure that employees do not enter eating and drinking areas with protective work clothing or equipment unless surface chromium (VI) has been removed from the clothing and equipment by methods that do not disperse chromium (VI) into the air or onto an employee's body.

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

skin or eye contact with chromium (VI) occurs; or carry the products associated with these activities, or store such products in these areas.

(i) **Medical surveillance**.

(1) *General*.

(i) The employer shall make medical surveillance available at no cost to the employee, and at a reasonable time and place, for all employees:

(A) Who are or may be occupationally exposed to chromium (VI) at or above the action level for 30 or more days a year;

(B) Experiencing signs or symptoms of the adverse health effects associated with chromium (VI) exposure; or

(C) Exposed in an emergency.

(ii) The employer shall assure that all medical examinations and procedures required by this section are performed by or under the supervision of a PLHCP.

(2) *Frequency*. The employer shall provide a medical examination:

(i) Within 30 days after initial assignment, unless the employee has received a chromium (VI) related medical examination that meets the requirements of this paragraph within the last twelve months;

(ii) Annually;

(iii) Within 30 days after a PLHCP's written medical opinion recommends an additional examination;

(iv) Whenever an employee shows signs or symptoms of the adverse health effects associated with chromium (VI) exposure;

(v) Within 30 days after exposure during an emergency which results in an uncontrolled release of chromium (VI); or

(vi) At the termination of employment, unless the last examination that satisfied the requirements of paragraph (i) of this section was less than six months prior to the date of termination.

(3) *Contents of examination*. A medical examination consists of:

(i) A medical and work history, with emphasis on: past, present, and anticipated future exposure to chromium (VI); any history of respiratory system dysfunction; any history of asthma, dermatitis, skin ulceration, or nasal septum perforation; and smoking status and history;

(ii) A physical examination of the skin and respiratory tract; and

(iii) Any additional tests deemed appropriate by the examining PLHCP.

(4) *Information provided to the PLHCP*. The employer shall ensure that the examining PLHCP has a copy of this standard, and shall provide the following information:

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

(ii) The employee's former, current, and anticipated levels of occupational exposure to chromium (VI);

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

(iv) Information from records of employment-related medical examinations previously provided to the affected employee, currently within the control of the employer.

(5) *PLHCP's written medical opinion*.

(i) The employer shall obtain a written medical opinion from the PLHCP, within 30 days for each medical examination performed on each employee, which contains:

(A) The PLHCP's opinion as to whether the employee has any detected medical condition(s) that would place the employee at increased risk of material impairment to health from further exposure to chromium (VI);

(B) Any recommended limitations upon the employee's exposure to chromium (VI) or upon the use of personal protective equipment such as respirators;

(C) A statement that the PLHCP has explained to the employee the results of the medical examination, including any medical conditions related to chromium (VI) exposure that require further evaluation or treatment, and any special provisions for use of protective clothing or equipment.

(ii) The PLHCP shall not reveal to the employer specific findings or diagnoses unrelated to occupational exposure to chromium (VI).

(iii) The employer shall provide a copy of the PLHCP's written medical opinion to the examined employee within two weeks after receiving it.

(j) **Communication of chromium (VI) hazards to employees**.

(1) *Hazard communication*. The employer shall include chromium (VI) in the program established to comply with the Hazard Communication Standard (HCS) (§1910.1200). The employer shall ensure that each employee has access to labels on containers of chromium (VI) and safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (j)(2) of this section. The employer shall ensure that at least the following hazards are addressed: Cancer; skin sensitization; and eye irritation.

(2) *Employee information and training*.

(i) The employer shall ensure that each employee can demonstrate knowledge of at least the following:

(A) The contents of this section; and

(B) The purpose and a description of the medical surveillance program required by paragraph (i) of this section.

(ii) The employer shall make a copy of this section readily available without cost to all affected employees.

(k) **Recordkeeping**.

(1) *Air monitoring data*.

(i) The employer shall maintain an accurate record of all air monitoring conducted to comply with the requirements of this section.

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

(A) The date of measurement for each sample taken;

(B) The operation involving exposure to chromium (VI) that is being monitored;

(C) Sampling and analytical methods used and evidence of their accuracy;

(D) Number, duration, and the results of samples taken;

(E) Type of personal protective equipment, such as respirators worn; and

(F) Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.

(iii) The employer shall ensure that exposure records are maintained and made available in accordance with 29 CFR 1910.1020.

(2) *Historical monitoring data*.

(i) Where the employer has relied on historical monitoring data to determine exposure to chromium (VI), the employer shall establish and maintain an accurate record of the historical monitoring data relied upon.

(ii) The record shall include information that reflects the following conditions:

(A) The data were collected using methods that meet the accuracy requirements of paragraph (d)(5) of this section;

(B) The processes and work practices that were in use when the historical monitoring data were obtained are essentially the same as those to be used during the job for which exposure is being determined;

(C) The characteristics of the chromium (VI) containing material being handled when the historical monitoring data were obtained are the same as those on the job for which exposure is being determined;

(D) Environmental conditions prevailing when the historical monitoring data were obtained are the same as those on the job for which exposure is being determined; and

(E) Other data relevant to the operations, materials, processing, or employee exposures covered by the exception.

(iii) The employer shall ensure that historical exposure records are maintained and made available in accordance with 29 CFR 1910.1020.

(3) *Objective data*.

(i) The employer shall maintain an accurate record of all objective data relied upon to comply with the requirements of this section.

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

(A) The chromium containing material in question;

(B) The source of the objective data;

(C) The testing protocol and results of testing, or analysis of the material for the release of chromium (VI);

(D) A description of the process, operation, or activity and how the data support the determination; and

(E) Other data relevant to the process, operation, activity, material, or employee exposures.

(iii) The employer shall ensure that objective data are maintained and made available in accordance with 29 CFR 1910.1020.

(4) *Medical surveillance*.

(i) The employer shall establish and maintain an accurate record for each employee covered by medical surveillance under paragraph (i) of this section.

(ii) The record shall include the following information about the employee:

(A) Name and social security number;

(B) A copy of the PLHCP's written opinions;

(C) A copy of the information provided to the PLHCP as required by paragraph (i)(4) of this section.

(iii) The employer shall ensure that medical records are maintained and made available in accordance with 29 CFR 1910.1020.

(l) **Dates.**

(1) For employers with 20 or more employees, all obligations of this section, except engineering controls required by paragraph (e) of this section, commence November 27, 2006.

(2) For employers with 19 or fewer employees, all obligations of this section, except engineering controls required by paragraph (e) of this section, commence May 30, 2007.

(3) For all employers, engineering controls required by paragraph (e) of this section shall be implemented no later than May 31, 2010.

§1915.1027 thru §1915.1450

Note: The requirements applicable to shipyard employment under these sections, 1915.1027 through 1915.1450, are identical to those set forth in sections of chapter 1910 listed below:

1915.1027	**Cadmium**	**1910.1027**
1915.1028	**Benzene**	**1910.1028**
1915.1030	**Bloodborne Pathogens**	**1910.1030**
1915.1044	**1,2-Dibromo-3-Chloropropane**	**1910.1044**
1915.1045	**Acrylonitrile**	**1910.1045**
1915.1047	**Ethylene Oxide**	**1910.1047**
1915.1048	**Formaldehyde**	**1910.1048**
1915.1050	**Methylenedianiline**	**1910.1050**
1915.1052	**Methylene Chloride**	**1910.1052**
1915.1120	**[Redesignated as 1915.1020]**	**1910.1020**
1915.1200	**Hazard Communication**	**1910.1200**
1915.1450	**Occupational Exposure to Hazardous Chemicals in Laboratories**	**1910.1450**

Workers' Rights

Under OSHA law, workers are entitled to working conditions that do not pose a risk of serious harm. To help assure a safe and healthful workplace, the law provides workers with the right to:

- File a confidential complaint with OSHA to have their workplace inspected.
- Receive information and training about hazards, methods to prevent harm, and the OSHA standards that apply to their workplace. The training must be done in a language and vocabulary workers can understand.
- Receive copies of records of work-related injuries and illnesses that occur in their workplace.
- Receive copies of the results from tests and monitoring done to find and measure hazards in their workplace.
- Receive copies of their workplace medical records.
- Participate in an OSHA inspection and speak in private with the inspector.
- File a complaint with OSHA if they have been retaliated against by their employer as the result of requesting an inspection or using any of their other rights under the OSH Act.
- File a complaint if punished or retaliated against for acting as a "whistleblower" under the 21 additional federal laws for which OSHA has jurisdiction.

For more information, visit OSHA's Workers' Rights page at www.osha.gov/workers.html.

OSHA Assistance, Services and Programs

OSHA has a great deal of information to assist employers in complying with their responsibilities under OSHA law. Several OSHA programs and services can help employers identify and correct job hazards, as well as improve their injury and illness prevention program.

Establishing an Injury and Illness Prevention Program

The key to a safe and healthful work environment is a comprehensive injury and illness prevention program.

Injury and illness prevention programs are systems that can substantially reduce the number and severity of workplace injuries and illnesses, while reducing costs to employers. Thousands of employers across the United States already manage safety using injury and illness prevention programs, and OSHA believes that all employers can and should do the same. Thirty-four states have requirements or voluntary guidelines for workplace injury and illness prevention programs. Most successful injury and illness prevention programs are based on a common set of key elements. These include management leadership, worker participation, hazard identification, hazard prevention and control, education and training, and program evaluation and improvement. Visit OSHA's Injury and Illness Prevention Programs web page at www.osha.gov/dsg/topics/safetyhealth for more information.

Compliance Assistance Specialists

OSHA has compliance assistance specialists throughout the nation located in most OSHA offices. Compliance assistance specialists can provide information to employers and workers about OSHA standards, short educational programs on specific hazards or OSHA rights and responsibilities, and information on additional compliance assistance resources. For more details, visit www.osha.gov/dcsp/compliance_assistance/cas.html or call 1-800-321-OSHA (6742) to contact your local OSHA office.

Free On-site Safety and Health Consultation Services for Small Business

OSHA's On-site Consultation Program offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites. Each year, responding to requests from small employers looking to create or improve their safety and health management programs, OSHA's On-site Consultation Program conducts over 29,000 visits to small business worksites covering over 1.5 million workers across the nation.

On-site consultation services are separate from enforcement and do not result in penalties or citations. Consultants from state agencies or

universities work with employers to identify workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing safety and health management programs.

For more information, to find the local On-site Consultation office in your state, or to request a brochure on Consultation Services, visit www.osha.gov/consultation, or call 1-800-321-OSHA (6742).

Under the consultation program, certain exemplary employers may request participation in OSHA's **Safety and Health Achievement Recognition Program (SHARP)**. Eligibility for participation includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards and developing an effective safety and health management program. Worksites that receive SHARP recognition are exempt from programmed inspections during the period that the SHARP certification is valid.

Cooperative Programs

OSHA offers cooperative programs under which businesses, labor groups and other organizations can work cooperatively with OSHA. To find out more about any of the following programs, visit www.osha.gov/cooperativeprograms.

Strategic Partnerships and Alliances

The OSHA Strategic Partnerships (OSP) provide the opportunity for OSHA to partner with employers, workers, professional or trade associations, labor organizations, and/or other interested stakeholders. OSHA Partnerships are formalized through unique agreements designed to encourage, assist, and recognize partner efforts to eliminate serious hazards and achieve model workplace safety and health practices. Through the Alliance Program, OSHA works with groups committed to worker safety and health to prevent workplace fatalities, injuries and illnesses by developing compliance assistance tools and resources to share with workers and employers, and educate workers and employers about their rights and responsibilities.

Voluntary Protection Programs (VPP)

The VPP recognize employers and workers in private industry and federal agencies who have implemented effective safety and health management programs and maintain injury and illness rates below the national average for their respective industries. In VPP, management, labor, and OSHA work cooperatively and proactively to prevent fatalities, injuries, and illnesses through a system focused on: hazard prevention and control, worksite analysis, training, and management commitment and worker involvement.

Occupational Safety and Health Training

The OSHA Training Institute in Arlington Heights, Illinois, provides basic and advanced training and education in safety and health for federal and state compliance officers, state consultants, other federal agency personnel and private sector employers, workers, and their representatives. In addition, 27 OSHA Training Institute Education Centers at 42 locations throughout the United States deliver courses on OSHA standards and occupational safety and health issues to thousands of students a year.

For more information on training, contact the OSHA Directorate of Training and Education, 2020 Arlington Heights Road, Arlington Heights, IL 60005; call 1-847-297-4810; or visit www.osha.gov/otiec.

OSHA Educational Materials

OSHA has many types of educational materials in English, Spanish, Vietnamese and other languages available in print or online. These include:

- Brochures/booklets that cover a wide variety of job hazards and other topics;
- Fact Sheets, which contain basic background information on safety and health hazards;
- Guidance documents that provide detailed examinations of specific safety and health issues;
- Online Safety and Health Topics pages;
- Posters;
- Small, laminated QuickCards™ that provide brief safety and health information; and

- *QuickTakes*, OSHA's free, twice-monthly online newsletter with the latest news about OSHA initiatives and products to assist employers and workers in finding and preventing workplace hazards. To sign up for *QuickTakes* visit www.osha.gov/quicktakes.

To view materials available online or for a listing of free publications, visit www.osha.gov/publications. You can also call 1-800-321-OSHA (6742) to order publications.

OSHA's web site also has a variety of eTools. These include utilities such as expert advisors, electronic compliance assistance, videos and other information for employers and workers. To learn more about OSHA's safety and health tools online, visit www.osha.gov.

NIOSH Health Hazard Evaluation Program

Getting Help with Health Hazards

The National Institute for Occupational Safety and Health (NIOSH) is a federal agency that conducts scientific and medical research on workers' safety and health. At no cost to employers or workers, NIOSH can help identify health hazards and recommend ways to reduce or eliminate those hazards in the workplace through its Health Hazard Evaluation (HHE) Program.

Workers, union representatives and employers can request a NIOSH HHE. An HHE is often requested when there is a higher than expected rate of a disease or injury in a group of workers. These situations may be the result of an unknown cause, a new hazard, or a mixture of sources. To request a NIOSH Health Hazard Evaluation go to www.cdc.gov/niosh/hhe/request.html. To find out more about the Health Hazard Evaluation Program:

- Call (513) 841-4382, or to talk to a staff member in Spanish, call (513) 841-4439; or
- Send an email to HHERequestHelp@cdc.gov.

OSHA Regional Offices

Region I
Boston Regional Office
(CT*, ME, MA, NH, RI, VT*)
JFK Federal Building, Room E340
Boston, MA 02203
(617) 565-9860 (617) 565-9827 Fax

Region II
New York Regional Office
(NJ*, NY*, PR*, VI*)
201 Varick Street, Room 670
New York, NY 10014
(212) 337-2378 (212) 337-2371 Fax

Region III
Philadelphia Regional Office
(DE, DC, MD*, PA, VA*, WV)
The Curtis Center
170 S. Independence Mall West
Suite 740 West
Philadelphia, PA 19106-3309
(215) 861-4900 (215) 861-4904 Fax

Region IV
Atlanta Regional Office
(AL, FL, GA, KY*, MS, NC*, SC*, TN*)
61 Forsyth Street, SW, Room 6T50
Atlanta, GA 30303
(678) 237-0400 (678) 237-0447 Fax

Region V
Chicago Regional Office
(IL*, IN*, MI*, MN*, OH, WI)
230 South Dearborn Street
Room 3244
Chicago, IL 60604
(312) 353-2220 (312) 353-7774 Fax

Region VI
Dallas Regional Office
(AR, LA, NM*, OK, TX)
525 Griffin Street, Room 602
Dallas, TX 75202
(972) 850-4145 (972) 850-4149 Fax
(972) 850-4150 FSO Fax

Region VII
Kansas City Regional Office
(IA*, KS, MO, NE)
Two Pershing Square Building
2300 Main Street, Suite 1010
Kansas City, MO 64108-2416
(816) 283-8745 (816) 283-0547 Fax

Region VIII
Denver Regional Office
(CO, MT, ND, SD, UT*, WY*)
Cesar Chavez Memorial Building
1244 Speer Boulevard, Suite 551
Denver, CO 80204
(720) 264-6550 (720) 264-6585 Fax

Region IX
San Francisco Regional Office
(AZ*, CA*, HI*, NV*, and American Samoa,
Guam and the Northern Mariana Islands)
90 7th Street, Suite 18100
San Francisco, CA 94103
(415) 625-2547 (415) 625-2534 Fax

Region X
Seattle Regional Office
(AK*, ID, OR*, WA*)
300 Fifth Avenue, Suite 1280
Seattle, WA 98104
(206) 757-6700 (206) 757-6705 Fax

* These states and territories operate their own OSHA-approved job safety and health plans and cover state and local government employees as well as private sector employees. The Connecticut, Illinois, New Jersey, New York and Virgin Islands programs cover public employees only. (Private sector workers in these states are covered by Federal OSHA). States with approved programs must have standards that are identical to, or at least as effective as, the Federal OSHA standards.

Note: To get contact information for OSHA area offices, OSHA-approved state plans and OSHA consultation projects, please visit us online at www.osha.gov or call us at 1-800-321-OSHA (6742).

How to Contact OSHA

For questions or to get information or advice, to report an emergency, report a fatality or catastrophe, order publications, sign up for OSHA's e-newsletter *QuickTakes*, or to file a confidential complaint, contact your nearest OSHA office, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

For assistance, contact us.
We are OSHA. We can help.

OSHA®
www.osha.gov

U.S. Department of Labor

For more information:

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)