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Occupational Safety and Health Administration

29 CFR Part 1910, et al.

Longshoring and Marine Terminals; Final Rule

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910, 1917, and 1918

[Docket No. S–025]

RIN 1218–AA56

Longshoring and Marine Terminals

AGENCY: Occupational Safety and Health Administration (OSHA), Labor.

ACTION: Final rule.

SUMMARY: The Occupational Safety and Health Administration (OSHA) is revising its Safety and Health Regulations for Longshoring and those parallel sections of its Marine Terminals Standard. These rules address cargo handling and related activities conducted aboard vessels (the Longshoring Standard) and landside operations at marine terminals (the Marine Terminals Standard). The comprehensive revisions to the Longshoring Standard essentially rewrite that standard for the first time since it was adopted in 1971 under Section 6(a) of the Occupational Safety and Health Act, while the amendments being made to the Marine Terminals Standard will provide consistency with the language of the new Longshoring Standard. The changes that OSHA is making to both standards are part of OSHA's continuing efforts to reinvent its workplace regulations to keep them current with evolving work practices and to reduce inconsistencies in regulatory requirements. Although the longshoring and marine terminal rules are ''vertical'' standards that apply only to longshoring and marine terminal activities, OSHA has also made minor changes to some of the general industry provisions referenced within these rules. These changes, which are non-substantive, have been made to conform the general industry requirements to the terminology used in the marine cargo-handling environment.

This final document contains requirements for the testing and certification of specific types of cargo lifting appliances and associated auxiliary gear and other cargo handling equipment such as conveyors and industrial trucks; access to vessels; entry into hazardous atmospheres; working surfaces; and use of personal protective equipment. Additionally, OSHA addresses specialized longshoring operations such as containerized cargo, logging, and roll-on/roll-off (Ro-Ro) operations.

The principal hazards this rule addresses are injuries and fatalities associated with cargo lifting gear, transfer of vehicular cargo, manual cargo handling, and exposure to hazardous atmospheres. OSHA also addresses those hazards posed by more modern and sophisticated cargo handling methods, such as intermodalism.

DATES: Effective Dates: This rule becomes effective on January 21, 1998. The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of January 21, 1998.

Compliance: Start-up dates for specific provisions are set in §§ 1917.43(f)(3), 1917.71(f)(4), 1918.11(a) (1) and (2), 1918.24(d), (f)(1), and (g), 1918.62 (h)(5)(ii), 1918.65(d)(4) and (g), 1918.85(j)(1)(1) and (ii), 1918.86(g), and 1918.98(b)(1). However, affected parties do not have to comply with the information collection requirements in § 1917.25 (g) warranty of fumigated tobacco, § 1917.26(d)(7) labelling of stretcher closets, § 1917.50(i)(2) labelling of cargo handling gear, § 1917.71(f)(4) marking of trailers, § 1918.22(g) labelling gangway hazards, § 1918.74(i)(1) tagging ladders, § 1918.61(b)(2) labelling gear, § 1918.86(g) labelling trailers, and § 1918.94(b)(3) maintenance of air sampling results, until the Department of Labor publishes in the **Federal Register** the control numbers assigned by the Office of Management and Budget (OMB). Publication of the control numbers notifies the public that OMB has approved these information collection requirements under the Paperwork Reduction Act of 1995.

Comments: Interested parties may submit comments on the information collection requirements for this standard until September 23, 1997.

ADDRESSES: In compliance with 28 U.S.C. 2112(a), the Agency designates the Associate Solicitor for Occupational Safety and Health, Office of the Solicitor, Room S–4004, U.S. Department of Labor, 200 Constitution Ave., N.W., Washington, D.C. 20210, as the recipient of petitions for review of the standard.

Comments on the paperwork requirements of this final rule are to be submitted to the Docket Office, Docket No. ICR97–3, U.S. Department of Labor, Room N–2625, 200 Constitution Ave., N.W., Washington, D.C. 20210, telephone (202) 219–7894. Written comments limited to 10 pages or less in length may also be transmitted by facsimile to (202) 219–5046.

Copies of the referenced information collection request are available for inspection and copying in the Docket Office and will be mailed immediately to persons who request copies by telephoning Vivian Allen at (202) 219–8076. For electronic copies of the final Longshoring and Marine Terminals Standards and Information Collection Request, contact OSHA's WebPage on Internet at http://www.osha.gov/ under Standards.

FOR FURTHER INFORMATION CONTACT: Mr. Larry Liberatore, Director of the Office of Maritime Safety Standards, or Paul Rossi, Project Officer, Office of Maritime Safety Standards, Occupational Safety and Health Administration, Room N–3609, U.S. Department of Labor, 200 Constitution Avenue, NW, Washington, D.C. 20210, (202) 219–7234.

SUPPLEMENTARY INFORMATION: The principal author of this final rule is Paul Rossi, Directorate of Safety Standards Programs, with editorial assistance from Joseph Daddura, Michael B. Moore and Odet Shaw of the Directorate of Safety Standards Programs and Paul Bolon of the Directorate of Policy; the economic analysis was developed by Paul Bolon and Clarinda Giddings of the Directorate of Policy; and James Estep of the Office of the Solicitor provided legal assistance.

General

The preamble to the final rule on the Longshoring and Marine Terminals Standards discusses the events leading to the final rule, the Summary of the Final Economic Analysis and Regulatory Flexibility Analysis, and the rationale behind the specific provisions set forth in the final Standard. The discussion follows this outline:

I. Background

Because of the high number and serious nature of accidents occurring to port employees in the United States, Congress, in 1958, amended the Longshore and Harbor Workers' Compensation Act (LHWCA) (33 U.S.C. 901 *et seq.*) to provide a large segment of port-based employees with a safer work environment. The amendments (Pub. L. 85–742, 72 Stat. 835)

significantly strengthened section 41 of the LHWCA (33 U.S.C. 941) by requiring employers covered by that Act to ''furnish, maintain and use'' equipment, and to establish safe working conditions, in accordance with regulations promulgated by the Secretary of Labor. Two years later, in 1960, the Labor Standards Bureau (LSB) of the Department of Labor issued the first set of safety and health regulations for longshoring activities as 29 CFR part 9 (25 FR 1565). LSB amended these standards several times between 1960 and 1971. Since 1971, there have been no substantive changes to these provisions.

The Occupational Safety and Health Act of 1970 (the Act) (29 U.S.C. 650 *et seq*.), which established the Occupational Safety and Health Administration (OSHA), granted the Secretary of Labor the authority for two years to adopt, under section 6(a) of the Act, ''any established Federal standard'' as an OSHA standard. OSHA adopted the Longshoring Standard, then codified as 29 CFR part 1504, under section 6(a) in 1971, and recodified the standard as 29 CFR part 1918.

The longshoring industry has changed dramatically since 1971. The methods of cargo handling and the equipment associated with those methods have undergone significant modification. Vessels designed specifically for the carriage of intermodal containers, vehicular rolling stock, and even barges, are now the most common types of ships calling at U.S. ports. By contrast, the existing Longshoring Standard was designed largely for activities using methods and equipment that have since been overshadowed or replaced by more modern methods of cargo handling. The final rule will modernize OSHA's regulatory approach to deal with these changes in the industry. However, because some older, more conventional vessel types, equipped with features and aspects addressed in the existing standard, continue to call at U.S. ports, the Agency will retain in this final rule several provisions whose utility, although diminished, continues on a more limited scale.

On July 5, 1983, OSHA published its final rule for Marine Terminals (48 FR 30886) (Ex. 1–101). OSHA issued the Marine Terminals rule to address the shoreside segment of marine cargo handling operations. Since the Marine Terminals Standard currently addresses equipment and situations (i.e., powered industrial trucks, conveyors, passage between levels and across openings, etc.) that have shipboard counterparts, appropriate provisions from the Marine Terminals Standard were incorporated into this rulemaking for shipboard cargo handling as well. Accordingly, the Agency relied upon background material and data used to support OSHA's Marine Terminals Standard and incorporated the docket (Docket No. S–506) developed in that rulemaking into the record of this rulemaking.

OSHA published a Notice of Proposed Rulemaking (NPRM) for Longshoring and Marine Terminals on June 2, 1994 (59 FR 28594). As part of the NPRM, OSHA announced three public hearings to be held in Charleston, SC on September 20, 1994; Seattle, WA on October 19, 1994; and in New Orleans, LA on November 15, 1994. Later, OSHA published a notice of correction changing the dates of the hearings and announcing the specific hearing sites. Hearings were held October 4–6, 1994 in Charleston, SC; October 19–21, 1994 in Seattle, WA; and November 15–17, 1994 in New Orleans, LA. Administrative Law Judge Stuart A. Levin presided at the hearings. After receipt of all evidence and testimony, the record was closed on May 15, 1995.

This final rule will provide continuity for the cargo handling industry because it addresses both the more conventional and time-proven methods of cargo handling and more modern and innovative approaches. In keeping with OSHA's commitment to clarity, flexibility, and in order to encourage employers to comply with these standards, OSHA has adopted the performance approach except in those cases in which employee safety would be enhanced by more specific requirements.

Longshoring Hazards

Traditionally, the longshore industry, which is classified within Standard Industrial Classification (SIC) 449, has been notable in terms of its accident experience. The work environment found in marine cargo handling exposes employees to a greater risk of injury than is true for most other industries. In fact, in 1993, the last calendar year for which full tables of industrial illnesses and accidents are currently available, this industrial sector had one of the highest rates of lost workdays in the nation. The following data, shown in Table A below, came from Bureau of Labor Statistics reports (Exs. 1–109, 1–110, 1–111, 1–112, 1–113, 1–154, and 1–155), and are useful in making a comparative assessment:

TABLE A—RATE OF TOTAL LOST WORKDAY CASES

Total lost workday cases (rate per 100 full time employees)	1989	1990	1991	1992	1993
Private sector overall	4.0	4.1	3.9	3.9	3.8
Construction	6.8	6.7	6.1	5.8	5.5
SIC 449	9.1	7.8	8.5	6.1	7.1

Thus, serious job-related injuries have continued to occur in the marine cargo handling industry at an unacceptably high rate. Based on this historical injury data, OSHA concludes that regulatory action is necessary to meet its mandate under the Act. The standards being published today, which were developed by OSHA with substantial input from labor and industry representatives from the marine cargo handling industry, have been developed specifically to address the principal causes of these illnesses, injuries, and fatalities.

II. Pertinent Legal Authority

The purpose of the Occupational Safety and Health Act, 29 U.S.C. 651 *et seq*. (''the Act'') is to ''assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources'' (29 U.S.C. 651(b)). To achieve this goal, Congress authorized the Secretary of Labor to promulgate and enforce occupational safety and health standards. (See 29 U.S.C. 655(a) (authorizing summary adoption of existing consensus and federal standards within two years of the Act's enactment), 655(b) (authorizing promulgation of standards pursuant to notice and comment), 654(b) (requiring employers to comply with OSHA standards).)

A safety or health standard is a standard ''which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment or places of employment.'' 29 U.S.C. 652(8).

A standard is reasonably necessary or appropriate within the meaning of section 652(8) if it substantially reduces or eliminates significant risk, and is economically feasible, technologically feasible, cost effective, consistent with prior Agency action or supported by a reasoned justification for departing from prior Agency actions, supported by substantial evidence, and is better able to effectuate the Act's purposes than any national consensus standard it supersedes. See 58 FR 16612–16616 (March 30, 1993).

The Supreme Court has noted that a reasonable person would consider a fatality risk of 1/1000 to be a significant risk, and would consider a risk of one in one billion to be insignificant. *Industrial Union Department* v. *American Petroleum Institute,* 448 U.S. 607, 646 (1980) (the ''Benzene decision''). So a risk of 1/1000 (10^{-3}) represents the uppermost end of a million-fold range suggested by the Supreme Court, somewhere below which the boundary of acceptable versus unacceptable risk must fall. The Court further stated that ''while the Agency must support its findings that a certain level of risk exists with substantial evidence, we recognize that its determination that a particular level of risk is significant will be based largely on policy considerations.'' See, e.g. *International Union, UAW* v. *Pendergrass,* 878 F.2d 389 (D.C. Cir. 1989) (formaldehyde standard); *Building and Constr. Trades Department, AFL–CIO* v. *Brock,* 838 F.2d 1258, 1265 (D.C. Cir. 1988) (asbestos standard).

A standard is technologically feasible if the protective measures it requires already exist, can be brought into existence with available technology, or can be created with technology that can reasonably be expected to be developed. *American Textile Mfrs. Institute* v. *OSHA* 452 U.S. 490, 513 (1981) (''*ATMI*''), *American Iron and Steel Institute* v. *OSHA,* 939 F.2d 975, 980 (D.C. Cir 1991) (''*AISI*'').

A standard is economically feasible if industry can absorb or pass on the cost of compliance without threatening its long term profitability or competitive structure. See *ATMI,* 452 U.S. at 530 n. 55; *AISI,* 939 F.2d at 980.

A standard is cost effective if the protective measures it requires are the least costly of the available alternatives that achieve the same level of protection. *ATMI,* 453 U.S. at 514 n. 32; *International Union, UAW* v. *OSHA,* 37 F.3d 665, 668 (D.C. Cir. 1994) (''*LOTO III*'').

All standards must be highly protective. See 58 FR 16614–16615; *LOTO III,* 37 F.3d at 668. However, health standards must also meet the ''feasibility mandate'' of section 6(b)(5) of the Act, 29 U.S.C. 655(b)(5). Section 6(b)(5) requires OSHA to select ''the most protective standard consistent with feasibility'' that is needed to reduce significant risk when regulating health hazards. *ATMI,* 452 U.S. at 509.

Section 6(b)(5) also directs OSHA to base health standards on ''the best available evidence,'' including research, demonstrations, and experiments (29 U.S.C. 655(b)(5)). OSHA shall consider ''in addition to the attainment of the highest degree of health and safety protection * * * the latest scientific data * * * feasibility and experience gained under this and other health and safety laws.'' *Id.*

Section 6(b)(7) of the Act authorizes OSHA to include among a standard's requirements labeling, monitoring, medical testing and other information gathering and transmittal provisions (29 U.S.C. 655(b)(7)).

III. Review of General Industry Standards for Applicability to Longshoring Operations

Among the work environments OSHA regulates, the marine cargo handling industry ranks high in terms of the number of hazards that are not adequately addressed by OSHA's general industry regulations (29 CFR part 1910). Longshoring is essentially a transport industry and, as such, is free from some of the hazards found in general industry such as those associated with woodworking machinery, spray painting, power presses, and so on. On the other hand, many hazards that are common in longshoring, such as those posed by falling loads and working on the top of intermodal containers, are less common in other types of workplaces.

The Longshoring Standards (part 1918) were designed to deal with these and other unique hazards encountered in marine cargo handling. Where the standards in part 1918 did not provide coverage of hazards encountered in longshoring they were supplemented by the applicable General Industry Standards. This final rule updates and revises OSHA's existing Longshoring Standard (29 CFR part 1918) but continues to rely on OSHA's General Industry Standards (29 CFR part 1910) to address a number of hazards and operations that are not unique to longshoring. The applicable standards from part 1910 are cross-referenced in the final rule. Examples of such provisions are the toxic and hazardous substances requirements from subpart Z of 29 CFR part 1910 (with an exception for intact or sealed cargo and the Bloodborne Pathogens Standard), and 29 CFR part 1910 subpart T, which addresses commercial diving operations. In other instances, such as when addressing container and roll-on roll-off (Ro-Ro) operations, OSHA has developed new regulatory language specifically to address the hazards posed by these specialized operational aspects of modern stevedoring. This approach is similar to the one followed by OSHA in developing its Marine Terminals Standard (part 1917) for shoreside cargo handling promulgated in 1983.

In many situations, shipside cargo handling (i.e. longshoring) hazards are directly parallel to those encountered in shoreside cargo handling (i.e. marine terminals), such as hazards requiring the use of personal protective equipment and risks associated with the handling of intermodal containers. One of the goals of this rulemaking effort has been to provide consistent coverage of these hazards, regardless of whether the cargo handling is shipside or shoreside. Accordingly, in drafting its revised provisions for longshoring (part 1918), OSHA incorporated similar language into the Marine Terminals Standard (part 1917).

IV. Summary and Explanation of the Final Rule

This section discusses the important elements of the final standard, explains the purpose of the individual requirements, and explains differences between the final rule, the proposed rule, and existing standard. Issues raised in the public hearings and in written comments to the standard's docket are presented and summarized. The Agency also presents its discussion of the issues and its reasoning for specific determinations. References in parentheses are to exhibits and transcript [1] pages in the rulemaking record.

In developing the final rule the Agency actively worked with the marine cargo handling industry to build a consensus among labor and management with OSHA. This was possible because the marine cargo handling industry is relatively small and well-defined. In addition, a high percentage of employees are represented by labor unions. Employers are also well-organized into employer groups at each port and in each of the four major port regions of the country—East Coast,

[1] CH—Transcript of the hearings held in Charleston, SC, October 4, 5, 6, 1994.

SEA—Transcript of the hearings held in Seattle, WA, October 19, 20, 21, 1994.

NO—Transcript of the hearings held in New Orleans, LA, November 15, 16, 17, 1994.

West Coast, Gulf Coast, and Great Lakes and Inland Waterways. Drafts of the 1994 proposal were circulated to key stakeholders, and many issues were resolved before the proposed rule was published. As a result, there was considerable support for the proposed regulation.

General comments of support such as ''supports OSHA efforts to promote workplace safety'' or ''strongly supports revision'' were expressed by several commenters (Exs. 19, 6–20, 6–21, 6–35, and 6–44). Many commenters submitted statements to the effect that they ''wholeheartedly endorse'' the comments submitted by the National Maritime Safety Association (NMSA) in Ex. 8–20. These commenters, who wished to go on record as concurring with the views expressed by the NMSA in Ex. 8–20 are represented by Exs. 6–6, 6–7, 6–8, 6–9, 6–11, 6–12, 6–13, 6–14, 6–15, 6–16, 6–17, 6–27, 6–32, 6–34, 6–35, 6–36, 6–39, 6–40, and 6–43. Another group of commenters submitted statements to the effect that they concurred with the Pacific Maritime Association's (PMA's) written comments, which were submitted as Ex. 8–8. These commenters are represented by Exs. 6–7, 6–27, 6–32, 6–34, 6–40, and 6–43. Accordingly, throughout this preamble, whenever reference is made to ''Ex. NMSA *et al.*'', the citation reflects the written comments received from NMSA and those commenters listed above that supported NMSA. The same applies to exhibit ''Ex. PMA *et al.*'' which refers to PMA's comments and those of the commenters that supported the PMA. This condensed referencing technique streamlines the document.

A. 29 CFR Part 1910—General Industry

In the proposal (59 FR 28594 *et seq.*), OSHA proposed a number of editorial changes to several provisions of part 1910 (the General Industry Standards being incorporated by reference into the Longshoring Standard) to make the application of the General Industry Standards to the Longshoring and Marine Terminals Standards clearer. OSHA received no substantive comments on the proposed editorial changes to the General Industry Standards. Accordingly, these editorial revisions have been made in the final rule.

Paragraphs (a) and (b) of § 1910.16, *Longshoring and Marine Terminals*, have been updated and revised editorially. The definition of a ''marine terminal'' (§ 1910.16(b)(4)) has been amended to be consistent with the revised definition in § 1917.2(u). The Marine Terminals Standard preamble, which follows, has a detailed explanation of this definitional change.

B. 29 CFR Part 1917—Safety and Health Regulations for Marine Terminals

1. *Non-substantive changes.* In the proposal, OSHA proposed numerous revisions to provisions in OSHA's existing Marine Terminals Standard (29 CFR part 1917) that were considered non-substantive. These changes were widely supported by commenters. For the purposes of this final regulation, OSHA has divided these changes into two categories: correction of typographical errors [2] and changing the phrase ''shall be available at the terminal'' to ''shall be made available for inspection''.[3] The paragraphs affected by each type of change are identified in the appropriate footnote below.

OSHA had proposed deleting the introductory phrase ''the employer shall ensure'' from various requirements to correct technical drafting amendments from the final Marine Terminals Standard published on July 5,1983 (48 FR 30886). These paragraphs included: §§ 1917.18(a), 1917.43(e)(1)(i), 1917.44(o)(3)(ii), 1917.44(o)(4), 1917.126(b), 1917.152(f)(1), 1917.152(f)(2), and 1917.152(f)(3)(iv).

However, after the June 2, 1994, publication of the Longshore and Marine Terminals proposal, OSHA compliance staff reported that deletion of this phrase in other standards actions (e.g. 61 FR 19547) had caused difficulty in connection with the employer's obligation to have employees wear personal protective equipment (PPE). Therefore, OSHA is retaining this language in the current part 1917 paragraphs noted above. For the sake of clarity and consistency, the word ''required'' (which is used extensively in parts 1917 and 1918) and the word ''ensure'' shall be synonymous for compliance purposes.

In keeping with the Agency's efforts to develop regulatory language that is more ''user-friendly'' and easier to follow, the references to part 1910 (OSHA's General Industry Standards) in § 1917.1(a) have been renumbered and placed in alphabetical order.

2. *Substantive changes made in both parts 1917 and 1918.* OSHA proposed substantive, identical changes to OSHA's existing part 1917 (the Marine Terminals Standard) and part 1918 (the Longshoring Standard) to provide consistency between them. The rationale for these changes to part 1917 can be found in Section IV of this preamble, *Summary and Explanation of the Final Rule*, at the respective part 1918 section discussion. The following table (Table B, Parallel Changes in parts 1917 and 1918) lists the sections or paragraphs changed in part 1917, along with the sections or paragraphs in part 1918 in which parallel changes were made:

TABLE B—PARALLEL CHANGES IN PARTS 1917 & 1918

Part 1917 sections/paragraphs	Part 1918 sections/paragraphs
§ 1917.22 (hazardous cargo).	§ 1918.89
§ 1917.24(a) (carbon monoxide).	§ 1918.94(a)(1)(ii)
§ 1917.25(a) (fumigants).	§ 1918.94(d)
§ 1917.26(c) (first aid)	§ 1918.97(c)
§ 1917.26(d) (stretchers).	§ 1918.97(d)
§ 1917.27(a)(2) (personnel).	§ 1918.98(a)(2)
§ 1917.30 (emergency response).	§ 1918.99
§ 1917.42(g)(2)(vi) (slings criteria).	§ 1918.62(g)(2)(vi)
§ 1917.45(f)(5) (crane glass).	§ 1918.55(b)(1)
§ 1917.45(j)(2) (cranes).	§ 1918.66(c)(2)
§ 1917.45(j)(9) (riding the load).	§ 1918.85(h)
§ 1917.50(c)(5) (special gear).	§ 1918.61(f)
§ 1917.51 (hand tools)	§ 1918.69
§ 1917.71(f) (vertical lifts-containers).	§ 1918.85(f)(1)(i)
§ 1917.71(b)(6) (autos in containers).	§ 1918.85(b)(6)
§ 1917.73(a)(2) (menhaden).	§ 1918.94(f)(4)
§ 1917.91(a)(1) (eye protection).	§ 1918.101(a)(1)
§ 1917.93(b) (head protection).	§ 1918.103(b)
§ 1917.94(b) (foot protection).	§ 1918.104(b)
§ 1917.95(b)(2) (PFDs).	§ 1918.105(b)(2)
§ 1917.124(c)(5),(6) (dockboards).	§ 1918.25(a)(4)
§ 1917.124(d)(1),(5) (ramps).	§ 1918.25(b)(5)
§ 1917.127(a)(1) (sanitation).	§ 1918.95(a)(1)
§ 1917.151 (machine guarding).	§ 1918.96(e)

3. *Substantive changes only in part 1917.* OSHA also has made several substantive changes to the Marine Terminals Standard that have no

[2] Sections 1917.13(g); .17(i), (j), (k); .20; .23(b)(1), (d); .27(a)(2); .42(d)(2), (h)(4), (j)(1); .44(a), (i), (o)(3)(i); .45, (f)(4)(iii), (f)(5)(i), (f)(7), (f)(13)(ii), (i)(5), (j)(1)(iii)(D); .48(d)(2); .71(c); .112(a)(1); .118(d)(2)(i), (f)(2); .119(b)(1), (d)(2), (f)(4); .121(b)(3); .156(b)(3)(iii)(D); .157(n).

[3] Sections 1917.24(d), 1917.25.(c), 1917.42(b)(4), 1917.42(c)(1), 1917.42(d)(1), 1917.42(h)(4), and 1917.42(h)(5).

parallel in the Longshoring Standard. These changes are discussed in the following paragraphs. In final subpart A, Scope and Definitions of the Marine Terminals Standard, SHA has updated and clarified the scope, applicability, and definitions sections of the Marine Terminals Standard. The Marine Terminals Standard (part 1917) covers all shoreside activities taking place within a marine terminal (48 FR 30891) except those that are specifically exempted in §§ 1917.1(a)(1) and 1917.2(u). It is OSHA's intent that the marine cargo handling standards (part 1917 for shoreside and part 1918 for shipboard) apply to all functions that are associated with the movement of cargo. However, the current marine terminal definition (§ 1917.2(u)) includes a geographical as well as functional test to be applied when determining when the Marine Terminals Standard, rather than the General Industry Standards applies. Section 1917.1(a), entitled ''Scope and applicability,'' is worded as follows in OSHA's existing Marine Terminals Standard:

> The regulations of this part apply to employment *within* a marine terminal as defined in § 1917.2(u), including the loading, unloading, movement or other handling of cargo, ship's stores or gear within a marine terminal or into or out of any land carrier, holding or consolidation area, *or any other activity within and associated with the overall operation and functions of the terminal, such as the use and routine maintenance of facilities and equipment.* (Emphasis added)

The definition of ''marine terminal'' in the existing standard is as follows:

> ''Marine terminal'' means wharves, bulkheads, quays, piers, docks and other berthing locations and adjacent storage or contiguous areas and structures associated with the primary movements of cargo or materials from vessel to shore or shore to vessel including structures that are devoted to receiving, handling, holding, consolidation and loading or delivery of waterborne shipments or passengers, *including areas devoted to the maintenance of the terminal or equipment.* The term does not include production or manufacturing areas having their own docking facilities and located at a marine terminal nor does the term include storage facilities directly associated with those production or manufacturing areas. (Emphasis added)

OSHA received comments to the effect that the relationship of the work being performed to cargo handling operations should determine whether an activity is included within the scope of the Marine Terminals Standard, not the location where the work is being performed. For example, the National Maritime Safety Association (NMSA) stated,

> Additional language should be added to allow gear and maintenance shops located off-terminal to fall under the scope of 1917. Even though the same workers perform the same job tasks in both shop locations, the off-terminal shops must [currently] comply with the rules found in 1910. In many cases, the local Port Authority will not allow shops to be located on their terminal so the Stevedore or Marine Terminal operator has no choice but to locate off-terminal. As long as work performed in off-terminal shops is the same as work performed in shops located on-terminal and is primarily in support of Longshoring or Marine Terminal operations, the same rules should apply to both locations. (Ex. 8–20)

OSHA finds merit in this recommendation, and no views to the contrary were presented. There is no geographical limitation to maritime jurisdiction on shore other than the limitation of the Act itself, and it is not OSHA's intent to impose an artificial geographic boundary through the standards-setting process. The controlling test should be whether the operation is associated with the primary movement of cargo. If maintenance of terminal equipment is performed within the limitations of OSHA's marine cargo handling rules, then part 1917 applies regardless of where the ''terminal'' gate exists. In the final standard, OSHA has therefore relaxed the language suggesting a strict geographical test. In § 1917.1(a) of the final rule, the first sentence of the term ''marine terminal'' is changed to read: ''Marine Terminal means wharves, bulkheads, quays, piers, docks and other berthing locations and adjacent storage or adjacent areas and structures associated with the primary movement of cargo or materials from vessel to shore or shore to vessel including structures which are devoted to receiving, handling, holding, consolidation and loading or delivery of waterborne shipments or passengers, including areas devoted to the maintenance of the terminal or equipment * * *''. In addition, for purposes of clarity, the phrase, ''having their own docking facilities and located at a marine terminal,'' is deleted in the final rule. This deletion does not change the intended effect of this definition.

Another marine terminal-related scope issue was previously addressed by OSHA after publication of the final Marine Terminals Standard in 1983. In 1984, OSHA and the National Grain and Feed Association (NGFA) came to a settlement agreement that identified those provisions of the Marine Terminals Standard (part 1917) that are generally applicable and those that are not applicable at marine terminal grain elevators. (For a copy of the agreement, see Ex.1–156.) In the present rulemaking, OSHA has made no substantive changes to those sections of the Marine Terminals Standard that were part of this agreement. For information purposes, OSHA is providing the following excerpt (Table C) from the 1984 agreement that lists the provisions of the Marine Terminals Standard (part 1917) that are generally not applicable to marine terminal grain elevators:

TABLE C—PROVISIONS GENERALLY INAPPLICABLE TO MARINE TERMINAL GRAIN ELEVATORS

Part 1917 Section	Subject
.13	Slinging
.14	Stacking of Cargo and Pallets
.15	Coopering
.17(c),(d)(1), (f),(h)&(k)	Railroad Facilities
.18	Log Handling
.22	Hazardous Cargo
.23	Hazardous Atmospheres and Substances
.41	House Falls
.43(g)&(h)	Powered Industrial Trucks
.46	Crane Load and Limit Devices
.48(b),(c), (d)&(e)	Conveyors
.49(e)&(g)	Spouts, Chutes, Hoppers, Bins and Associated Equipment
.71	Terminals Handling Intermodal Containers or Roll On Roll Off Operations
.73	Terminals Handling Menhaden and Similar Species of Fish
.114	Cargo Doors

TABLE C—PROVISIONS GENERALLY INAPPLICABLE TO MARINE TERMINAL GRAIN ELEVATORS—Continued

Part 1917 Section	Subject
.115	Platforms and Skids
.124	Passage between Levels and across Openings
.153	Spray Painting

Proposed § 1917.25(g), which concerned tobacco that has been loaded into containers and then fumigated prior to loading the container onto a vessel, required that the contents of the container be aerated by opening the container doors for a 48-hour period after fumigation and before loading. The proposed requirement also stipulated that the aeration period be extended to 72 hours in cases where the bag liners of the cases in which the tobacco is shipped are made of polyethylene or similar material. The proposal required that employers obtain a warranty from the fumigator stating that the aeration period had been met. This requirement differs from the fumigated tobacco issue addressed in subpart I of part 1918, which applies to cargoes that are break-bulk such as bales or hogsheads (§ 1918.94(c)). Tobacco cargoes, both imported and exported, are shipped most typically in bales, in hogsheads, and in intermodal containers. Thus, § 1917.25(g) applies to tobacco that is fumigated while it is in containers but before it is loaded into the vessel.

In determining the appropriateness of required aeration intervals, OSHA is relying on documents from the U.S. Department of Agriculture and the Tobacco Association of the United States. The studies reported in these documents concluded that intermodal containers loaded with fumigated tobacco required an additional 48 to 72 hours of aeration to be free of hazardous fumigant levels, depending on whether or not the tobacco is within shipping cases having polyethylene or similar bag liners (Exs. 1–70, 1–95).

Comment was received on proposed § 1917.25(g); commenters asked OSHA to delete the proposed requirement for a 48-hour aeration period for fumigated tobacco that is loaded into containers before those containers are loaded on a vessel (Exs. 6–1, NMSA *et al.*):

> NMSA feels that the words ''and prior to loading'' should be deleted from the end of the first sentence. Aeration of fumigated containers aboard ship is a common practice that has been in effect for many years. Continuing this practice will result in a delay in cargo delivery and disrupt vessel sailing schedules. (NO Tr. p.150)

OSHA has determined that the studies and data supplied by the U.S. Department of Agriculture and the Tobacco Association which show that 48-and 72-hour aeration periods are necessary to reduce fumigant levels to non-hazardous levels in containers without and with polyethylene lined bags, respectively, are more compelling than the evidence submitted by these commenters. Accordingly, § 1917.25(g) of the final rule remains the same as proposed and requires employers to provide the appropriate aeration period for tobacco that is fumigated in a container prior to loading.

In § 1917.45(f)(5)(ii), OSHA proposed to require seat belts for the operators of high speed container gantry cranes.[4] This new proposed requirement would have allowed a 90-day phase-in period for the installation of the seat belts. Comment was received that supported the requirement for seat belts but requested that a 180-day phase-in period be given to allow more time to purchase and install the necessary equipment (Exs. 6–1, 6–16b, 6–31a). The majority of U.S. marine terminals are owned by quasi-governmental organizations (i.e., port authorities). Typically, major capital equipment such as container gantry cranes are owned and maintained by the aforementioned quasi-governmental organizations. In order to allow sufficient time to accommodate government budget cycles, OSHA has concluded that a 180-day phase-in period is appropriate and has written § 1917.45(f)(5)(ii) of the final rule accordingly.

Paragraph (a)(1) of § 1917.46 of the existing and proposed Marine Terminals Standard, crane load and limit devices, requires all cranes, except those specifically exempted, to be equipped with a load indicating device. OSHA received one comment (Ex. 82) requesting that overhead cranes used in marine terminals be included in the types of cranes exempted from this requirement. This commenter pointed out that overhead cranes are similar to bridge-type container gantry cranes, which are exempted from this requirement, in that the load capacity of the crane is the same regardless of the actual position of the load. In other words, the load capacity of the crane does not depend on a boom that can change radius (and thus the load capacity); it is this factor that makes a load indicating device necessary. OSHA agrees with this commenter, and final rule § 1917.46(a)(1)(viii)(A) specifically exempts overhead cranes from the requirement to have a load indicating device.

C. 29 CFR Part 1918—Safety and Health Regulations for Longshoring

Subpart A—Scope and Definitions

This subpart updates and clarifies the scope, applicability, and definition sections of the Longshoring Standard.

Section 1918.1 Scope and application

The Longshoring rules apply from the foot of the gangway up to the vessel and address all activities related to cargo handling aboard the vessel. This means that ship-to-shore/shore-to-ship cargo transfer operations using shore-based material handling devices and all lifting device-specific aspects of such transfers will be covered by the Marine Terminals Standard (29 CFR part 1917). When cargo handling is accomplished using ship's cargo gear, the Longshoring Standard (29 CFR part 1918) applies.

This final rule has been written to stand by itself, i.e., to be a ''vertical standard.'' Vertical standards are those that apply to a specific industry and address the hazards present in that industry. For industries such as longshoring, the vertical standards in part 1918 are intended to provide comprehensive coverage of the hazards in an industry and make it unnecessary for employers in that industry to refer to, or comply with, most other OSHA standards. However, in several areas of coverage, OSHA's General Industry Standards have been incorporated into the Longshoring Standard by reference, and these 29 CFR part 1910

OSHA's attention is directed to document number 1, earlier submitted into evidence by NMSA. This document contains a copy of a letter from the United States Environmental Protection Agency to Soil Chemicals Corporation, permitting containers under fumigation to be transferred onto and off of ships.

Also in the document is a letter from the California Department of Pesticides regulation accepting this practice.

[4] High speed container gantry cranes are those capable of hoist speeds of 360 feet per minute (110 m/min) (without a load) and trolley speeds of 500 feet per minute (152 m/min) or faster.

incorporations are listed in paragraph (b) of the final rule's scope and application section. This approach follows the approach taken by OSHA in its other marine cargo handling standard, the Marine Terminals Standard, 29 CFR part 1917 (48 FR 30886). The Agency is incorporating by reference the General Industry Standards (from 29 CFR part 1910) that are needed to supplement the specific marine cargo handling provisions in the Longshoring Standard. The incorporation-by-reference approach is an efficient means of providing coverage for those hazards that are not unique to the marine cargo handling industry. This idea was endorsed by many commenters (Ex. NMSA *et al.).* For example, in his testimony at the October 20, 1994, Seattle hearing, Mr. Hank Bynaker, manager of environmental safety and health for American President Lines, stated '' . . . I would like to recognize OSHA's efforts to modernize their approach and to support that effort.'' (SEA Tr. p. 295)

The following 29 CFR part 1910 General Industry Standard provisions will have application to longshoring operations, under § 1918.1:

(b)(1) Access to employee exposure and medical records. Subpart Z, § 1910.1020;

(b)(2) Commercial diving operations. Subpart T;

(b)(3) Electrical. Subpart S when shore-based electrical installations provide power for use aboard vessels;

(b)(4) Hazard communication. Subpart Z, § 1910.1200;

(b)(5) Ionizing radiation. Subpart Z, § 1910.1096;

(b)(6) Noise. Subpart G, § 1910.95;

(b)(7) Nonionizing radiation. Subpart G, § 1910.97; and

Note: Exposures to nonionizing radiation emissions from commercial vessel radar transmitters are considered hazardous under the following situations: (a) where the radar is transmitting, the scanner is stationary, and the exposure distance is 19 feet (6 m) or less; or (b) where the radar is transmitting, the scanner is rotating, and the exposure distance is 5 feet (1.8 m.) or less.

(b)(8) Respiratory protection. Subpart I, § 1910.134.

(b)(9) Toxic and hazardous substances. Subpart Z applies to marine cargo handling activities except for the following:

(A) when a substance or cargo is contained within a sealed, intact means of packaging or containment complying with Department of Transportation or International Maritime Organization requirements; [5]

(B) Bloodborne pathogens, § 1910.1030;

(C) Carbon monoxide, § 1910.1000 (See § 1918.94 (a)); and

(D) Hydrogen sulfide, § 1910.1000 (See § 1918.94 (f)).

These subparts and sections of OSHA's General Industry Standards are also incorporated into the Marine Terminals Standard (§ 1917.1(a)(2)) by reference along with several other part 1910 sections that have application only in a marine terminal. Incorporating the same General Industry Standards into the Longshoring and Marine Terminals Standards will make both of OSHA's marine cargo handling rules similar with respect to these issues, an approach that has long been advocated by the marine cargo handling industry and is supported by this record.

OSHA's Bloodborne Pathogens Standard (29 CFR 1910.1030) does not apply to marine cargo handling operations. OSHA will continue its past policy of applying the first aid requirements of §§ 1917.26 and 1918.97. In a letter dated July 31, 1992, to the National Maritime Safety Association, OSHA addressed the coverage of the Bloodborne Pathogen Standard to the marine cargo handling industry. It states, in pertinent part, as follows:

* * * the bloodborne pathogen standard primarily applies to general industry establishments and not the cargo handling industry that N.M.S.A. represents. (Ex. 6–158).

Bloodborne pathogens are most commonly encountered in the cargo-handling environment during a first aid response when an injured employee is bleeding. Under these circumstances, first aid, which encompasses universal precautions (procedures for handling human blood and certain human body fluids in a manner that prevents the transmission of infection), must be followed by first aid responders. For further guidance, particularly for small employers, OSHA has included a non-mandatory appendix, Appendix V, titled Basic Elements of a First Aid Training Program.

In addition, as was proposed, OSHA is exempting from subpart Z all sealed, intact packages or containers that meet the Department of Transportation (DOT) or International Maritime Organization (IMO) requirements. OSHA's existing Longshoring Standard contains no such exemption, although the existing Marine Terminals Standard (§ 1917.1(a)(2)(ii)) does. Packages and containers that are sealed present no exposure hazards to marine cargo handling employees, provided that such containment remains intact. In order for packages and containers to qualify for the exemption in § 1918.1(b)(9)(B), they must meet DOT or IMO requirements. This will ensure that exempted packages are properly packaged, and thus highly unlikely to expose workers to toxic or hazardous substances. Including the exemption for intact packages and containers in the final Longshoring Standard will thus make that standard consistent with the Marine Terminals Standard.

OSHA also proposed to incorporate various other provisions of the General Industry Standards into the Longshoring and Marine Terminals Standards. These included subpart P of 29 CFR part 1910, which covers hand and portable tools, 29 CFR 1910.120(q), which addresses emergency response to hazardous substance releases, and subpart O of 29 CFR part 1910, which covers machine guarding. At the time of the proposal, OSHA had made an initial determination that these general industry provisions provided more comprehensive coverage than the corresponding provisions of the Longshoring and Marine Terminals Standards. However, commenters did not support the incorporation of these general industry provisions, as discussed in detail below.

To ensure safe practices in the use of hand tools, in § 1918.1(b)(5), OSHA proposed deleting the current longshoring requirements for hand tools, § 1918.72, titled ''Tools,'' and replacing this section with the more comprehensive requirements of subpart P of 29 CFR part 1910, titled *Hand and Portable Powered Tools and Other Hand Held Equipment.* OSHA also proposed to incorporate the same general industry section into the Marine Terminals Standard (proposed § 1917.1(a)(2)(vii)). This approach was not supported by rulemaking participants, however. For example, the Pacific Maritime Association in their comments asserted that:

About the only hand tools used by longshoremen aboard vessels are hammer-hatchets, chain saws, hand saws, hydraulic wire cutters and manual wrenches. There is no need for OSHA to require the adoption of 1910 Subpart P that includes hand tools never used aboard vessels (Ex. 8–8).

This position was also voiced by several respondents (Ex. NMSA *et al.*). In addition, OSHA has re-examined its compliance history for marine cargo handling found in its Integrated Management Information System (which contains computerized data on all OSHA compliance inspection data,

[5] The International Maritime Organization publishes the International Maritime Dangerous Goods Code to aid compliance with the international legal requirements of the International Convention for the Safety of Life at Sea, 1960.

dating back to 1972). While citations were found for the provisions addressing the hazards associated with hand and portable power tools found in Parts 1917 and 1918, no such citations were found for Part 1910. After considering these comments and in light of the Agency's own enforcement data, OSHA has determined that the hand tool provisions in the Agency's existing Marine Terminals and Longshoring Standards do address the hand tool hazards present in marine cargo handling operations more effectively than would be the case if subpart P of the General Industry Standards were incorporated by reference. Accordingly, the final rule does not incorporate these general industry requirements.

OSHA proposed to include from the General Industry Standards a paragraph from Subpart H, *Hazardous waste operations and emergency response,* § 1910.120(q), to address the issue of appropriate coverage of emergency response to hazardous incidents. This paragraph, essentially, requires employers to develop and implement an emergency response plan to handle anticipated toxic substance emergencies prior to the commencement of emergency response operations. If employers decide to evacuate their employees from the danger area when an emergency occurs and do not permit their employees to assist in handling the emergency, they are exempt from the requirements of this paragraph if they have provided an emergency action plan and met other requirements in accordance with § 1910.38(a).

The existing longshore and marine terminals regulations address the issue of responding to hazardous cargo spills in § 1917.22 (marine terminals) and § 1918.86 (longshoring). In general, these sections require the employer to remove employees from the area that the cargo has been spilled in, to determine the hazard involved, and to instruct employees in proper clean-up procedures.

Many commenters felt that adding this general industry provision duplicated the existing marine terminal and longshoring regulations discussed in the last paragraph (Exs. 6–29a, 6–39, NMSA *et al.*).

Mr. Richard Buonocore, Director of Safety for Matson Terminals, Incorporated and Matson Navigation Company, Incorporated, and Shore Side Operations, stated at the Seattle hearings:

> I also direct the Committee's attention to proposed 1918.89(a) and (c). These sections would repeat in the marine terminals rules existing sections 1917.22(a) and (c) from the longshoring rules. We're still with preparation for receiving hazard cargo and for responding to hazard cargo spills.
>
> We believe these proposals, both of which deal with hazard materials, awareness, and responses to hazard material incidents, are unnecessary because these subjects are adequately and appropriately addressed by other existing provisions.
>
> Emergency response plans were addressed in 1910.38(a), preparing for receipt of hazard cargos and dealing with spills are addressed in 1918.86(a) and (c).
>
> Hazard communications issues are addressed in 1918.90, particularly subpart (h), as well as in the general OSHA hazard communication standard of 29 CFR 1910.1200.
>
> Ventilation risks for particular hazard commodities are addressed by 1918.93.
>
> Perhaps most importantly in this regard is DOT's HAZMAT employee training rules, 49 CFR 172.204, which was alluded to by John Pavelko but not by citation number, requiring training on hazard material, risk, and emergency response.
>
> Under the DOT rules, all employees, including longshore personnel working with hazardous materials and transportation must be given awareness and safety training and must know how to recognize potential dangers and how to take appropriate actions to protect their personal safety in the event of a hazardous release (SEA Tr. pp. 218–219).

Mr. John Pavelko, the Pacific Maritime Association Coast Director for Training and Accident Prevention testified to the issue that the marine cargo handling industry does not do hazardous material clean-up:

> Again, the PMA members on the West Coast have an agreement that if there is an emergency, the emergency will be responded to by a professional vendor. Longshoremen will not be called to respond to any emergency.
>
> Under the HAZWOPER, the HAZWOPER, as you know, was designed for hazardous waste generators. It was for big time corporations that generate a lot of hazardous waste. The maritime industry just kind of got sucked into this thing by that one little sentence in there that says if there's going to be an emergency, then you've got to have a plan.
>
> Then if you don't respond to an emergency, then you've got to refer to, what was it, 1910.38. So all of our members fall under 1910.38 and not under the HAZWOPER, but yet when a compliance officer, on several—I shouldn't say several—on at least two or three occasions when compliance officers have come to the waterfront, they try to cite our employers under the HAZWOPER.
>
> We're saying, it's not us, it doesn't apply, and there's back and forth, back and forth, and this is another issue that causes a lot of problems for employers. (SEA Tr. pp. 189–190)

Mr. Ron Signorino, Director of Regulatory Affairs, Universal Maritime Service Corporation, testified in the New Orleans hearings:

> The HAZWOPER rule was written by OSHA in response to a mandate by Congress to have rules in place, whereby employees responding to an emergency situation could be protected from the hazards that are associated with that response.
>
> Now, the position of the National Maritime Safety Association has been traditionally that when employees employed by members of NMSA are aware of the spill that those employees be directed to evacuate any area in a spill, so that a professional team can come in and respond to that emergency, the professional teams are outside contractors who have no affiliation with the work.
>
> Typically, they're specialists in performing these clean-ups of these hazard emergency responses.
>
> Then, as a consequence, the provisions of HAZWOPER, rightly should not apply to employees who have, in fact, no exposure (NO Tr. p. 202).

OSHA agrees with the commenters that the HAZWOPER regulations are for those employers and employees that are in the business of cleaning up spills of hazardous chemicals and hazardous waste generators. However, if a marine cargo handling employer decides to respond to an emergency that is beyond the scope of the Emergency Action Plan developed by the employer in accordance with the final rule (§§ 1917.30 and 1918.100), that employer ceases to be acting in a ''marine cargo handling'' capacity and the appropriate sections of OSHA's General Industry Standards (e.g., 29 CFR 1910.120(q), HAZWOPER) would apply. This is reflective of the application of § 1910.120(q)(1) which reads in relevant part:

> Employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan in accordance with § 1910.38(a) of this part.

In the final rule, OSHA has decided to address these hazards by adding a new section to each of the Longshoring and Marine Terminals Standards. These new sections, which are identical, will alleviate the duplication and confusion that would be caused by the proposed cross-referencing of paragraphs from the Hazardous Waste Operations and Emergency Response Standard, § 1910.120(q), and from the Emergency Action Plans Standard § 1910.38(a). These new sections, which are codified in subpart B, Marine Terminal Operations (§ 1917.30), and subpart I, General Working Conditions (§ 1918.100), require marine terminal and longshoring employers, respectively, to develop a written (if there are 10 or fewer employees, oral

communication of the emergency action plan is acceptable) emergency action plan to handle anticipated emergencies of all types, including those involving fires and toxic substances, before the commencement of emergency response operations. These sections identify the basic elements of an emergency action plan (escape route planning, accountability, employer contacts); an alarm system; evacuation procedures; and training requirements. OSHA believes that, as a practical matter, the emergency action plan can be adequately communicated to a small group of employees of 10 or fewer when the requirements of the plan are orally explained; a written plan is therefore unnecessary in this circumstance.

OSHA proposed to protect marine cargo handling employees from the hazards of fixed machines by referencing the comprehensive list of machine guarding provisions contained in OSHA's General Industry Machine Guarding Standards (29 CFR 1910 subpart O) into the scope of both the Marine Terminals and Longshoring Standards.

The existing regulations address machine guarding in different ways. In the Longshoring Standard, machine guarding is addressed in several areas such as cargo winches (''When moving parts of winches or other deck machinery present a hazard, they shall be guarded,'' § 1918.53(a)(1)) and in powered conveyors (''All conveyor and trimmer drives which create a hazard shall be adequately guarded,'' § 1918.69(c)). In the Marine Terminals Standard, the existing regulations on machine guarding center around the ''danger zone'' concept. A ''danger zone'' is defined in the Marine Terminals Standard as any place in or about a machine or piece of equipment where an employee may be struck by or caught between moving parts, caught between moving and stationary objects or parts of the machine, caught between the material and a moving part of the machine, burned by hot surfaces or exposed to electric shock. The danger zone performance approach to machine guarding provides coverage of all hazards within the danger zone without the need to address each hazard separately. This approach also requires employers to use their judgment about which machine parts or areas at or near a machine do in fact expose employees to workplace hazards.

Several commenters noted that the existing danger zone concept used in the Marine Terminals Standard provided the necessary employee protection and that the proposed machine guarding provisions were unnecessary (Exs. 6–29a, 6–31a, 6–35). Other commenters favored the danger zone approach and stated that the machine guarding provisions in the General Industry Standards were voluminous and addressed several types of machinery that were not found in marine cargo handling operations (Ex. NMSA *et al.*).

Mr. Signorino addressed this issue during the hearings in New Orleans, testifying as part of a panel representing the National Maritime Safety Association:

> We adopt the approach that was originated by OSHA, implemented by that agency in the promulgation of the 1917 standards; and, in the space of time since the promulgation of those standards, has borne significance in terms of lack of accident experience, in terms of moving parts of machinery. That concept is, of course, the dangers [*zone*] (NO Tr. p. 413).

OSHA agrees with the above comments and testimony and in the final rule has decided that the same danger zone approach to machine guarding hazards pioneered in the Marine Terminals Standard (§§ 917.2(g) and 1917.151) will provide appropriate protection from machine guarding hazards in marine cargo handling operations regardless of location, i.e., in both marine terminal and longshoring operations. In addition, using the danger zone concept will allow employers some compliance flexibility. For example, although an unguarded nip point near an employee's work station will usually present a significant caught-in hazard, a nip point located 10 feet above the working surface is far less likely to present such a hazard.

Accordingly, the final rule does not incorporate subpart O of the General Industry Standards into the scope of the Marine Terminals and Longshoring Standards as proposed. Instead the final rule retains the existing machine guarding protections provided by § 1917.151 of the Marine Terminals Standard and brings these provisions into the final Longshoring Standard as § 1918.96(e). (Guidance on a wide range of machine guarding techniques and background information may be found in the OSHA pamphlet ''Concepts and Techniques of Machine Guarding'' (OSHA 3067–1992) or the American National Standards Institute (ANSI) publication ''American National Standard for Machine Tools'' (ANSI Bll.l9–1990).)

In keeping with the Agency's efforts to develop regulatory language that is easier to follow, the references to part 1910, OSHA's General Industry Standards in § 1918.1(b) have been renumbered and placed in alphabetical order.

Section 1918.2 Definitions

Final rule § 1918.2 carries over many definitions from the proposed and existing Longshoring Standards because those definitions are still relevant and are used in the final rule. However, some new definitions and modifications to existing definitions were proposed and have been added or made to reflect changes in current custom and practice in the longshore industry.

The existing rule's references to ''Federal maritime jurisdiction'' and ''navigable waters'' in the definitions of ''employee'' in § 1918.2 paragraph (e) and ''employer'' in paragraph (f) were not included in the proposal. The existing rules were originally promulgated under the Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941), whose jurisdiction was limited to navigable waters. The promulgation of the OSH Act, which applies to private sector employment in covered workplaces, no longer uses navigable waters to establish jurisdiction. The final rule does not include these references.

New definitions or definitions that OSHA has revised substantially in the proposal or final are described below.

The definition of ''danger zone'' in the final rule is taken from OSHA's existing Marine Terminals Standard, as discussed above. This definition exists in the existing Marine Terminals Standard and is being added to the final Longshore Standard. OSHA finds it appropriate to include identical definitions of this term in the Marine Terminals and Longshoring Standards because various kinds of equipment that pose similar hazards to employees are present in both marine cargo handling environments.

OSHA proposed a new definition for ''designated person,'' which received considerable support (Ex. NMSA *et al.*, Ex. 6–22). This term has been incorporated in the final rule, and is defined to mean a person who has a special skill in a particular area and has been assigned by the employer to do a specific task in that area. Examples of the use of this term in the final Longshoring Standard are: § 1918.51(b) which requires that a designated person inspect a vessel's cargo gear before use and at intervals during use; and § 1918.55(c)(7) which requires that a designated person supervise tandem lifting operations.

The definitions for ''enclosed space'' and ''fumigant'' in the final are essentially unchanged from those proposed in the Longshore Standard. In

addition, these definitions are essentially identical to those found in the Marine Terminals Standard.

A definition for ''fall hazard'' has been added to the final rule in § 1918.2. According to the final rule, a fall hazard exists when employees are working within 3 feet of the unprotected edge of a work surface that is 8 or more feet above the adjoining surface and 12 inches or more horizontally from the adjacent surface, or when weather conditions are such as to impair the vision or footing of employees working on top of containers. This definition was proposed as a footnote to the container top fall protection section; however, because it has application in several other sections of the Longshoring Standard (§§ 1918.32, 1918.85, and 1918.87), it has been placed in the definitions section. The definition makes it clear that it is the unprotected edge that poses a fall hazard and not necessarily the entire work surface (except in bad weather or when ice, grease etc. is present so the entire surface may be slippery). Additionally, any gap of 12 inches (.31 m) or more on a horizontal surface formed by containers is considered an unprotected edge and would constitute a fall hazard under this definition. OSHA believes that any work within 3 feet (.92 m) of an unprotected edge constitutes a hazard (Ex. 1–139), providing that the second essential element of this definition exists, i.e. that the vertical distance is such as to constitute a fall hazard. In proposed § 1918.85(j), the Agency defined the fall height trigger at 10 or more feet above the adjoining surface. The final rule, however, sets the vertical height for fall hazards at 8 or more feet above the adjoining surface; this fall height is consistent with the fall height established in the final rule for non-containerized cargo (see § 1918.32(b)). The final trigger height of 8 feet is identical to the existing requirement for fall protection found in § 1918.32(b). OSHA believes that this height was originally adapted from an industry practice that pre-dated containerization. At that time, cargo was usually palletized into a standard 4 foot high pallet. It became an industry practice that whenever pallets were stacked two or more, the top working surface would be considered a fall hazard, thus requiring nets or other equivalent protection.

The definition of ''Hazardous cargo, materials, substance or atmosphere'' in the final longshore rule has been expanded to reflect the Marine Terminal Standard's definition of hazardous cargo. This definition goes beyond the existing part 1918 definition by including references to subpart Z of part 1910 and oxygen-deficient atmospheres.

The definition for ''intermodal container,'' which remains unchanged from the definition in the proposal, reflects a combination of definitions found both in the International Labor Organization (ILO) Code of Practice for *Safety and Health in Dock Work* (Ex.1–135) and the definition found in the International Standards Organization (ISO) Standard 830, Freight Containers-Terminology (Ex.1–134). The definition in the final rule more accurately describes an intermodal container than the definition that is in the existing rule. This updated definition is also in the Marine Terminals Standard at § 1917.2.

The definitions of ''dockboards'' and ''ramps,'' found in the existing Marine Terminals Standard, have been brought into the Longshoring Standard with minor editorial modifications.

The extensive list of definitions that were included in § 1918.3(r) of the existing Longshoring Standard that specifically refers to existing § 1918.13, ''Certification of shore-based material handling devices,'' has been deleted in the final rule. These definitions are no longer needed in the Longshoring Standard because part 1917, the Marine Terminals Standard, now contains OSHA's regulations for the certification of shore-based material handling devices.

The proposed definition for ''vessel's cargo handling gear'' had been modified by adding language to reflect cargo gear included under the ILO Convention 152. The final definition gives examples of the kinds of cargo handling gear that are included in this newer definition to reflect comments received that requested a more descriptive definition (Ex. 6–22).

For the sake of clarity and consistency, the word ''required'' (which is used extensively in parts 1917 and 1918) and the word ''ensure'' shall be synonymous for compliance purposes.

Subpart B—Gear Certification

Section 1918.11 Gear Certification

In OSHA's current Longshoring Standard, subpart B includes requirements for vessels' cargo gear certification, the certification of shore-based material handling equipment, and some provisions for gangways. The final rule's requirements for the certification of shore-based material handling equipment and for gangways are essentially unchanged from those in the current Longshoring Standard, although they have been moved from this subpart to the Marine Terminals Standard and to subpart C of the Longshoring Standard, respectively, as explained below. The final rule's requirements relating specifically to vessels' cargo gear certification, entitled ''Gear Certification,'' have been streamlined and are now consolidated in subpart B of the Longshoring Standard. The gangway requirements in subparts B and C of OSHA's existing Longshoring Standard have, in the final rule, been moved to subpart C ''Gangways and Other Means of Access'' (§ 1918.21). Furthermore, existing §§ 1918.13 through 1918.15, which covered shore-based material handling devices and container cranes, have been removed from part 1918 because shore-based handling devices are currently covered exclusively under part 1917, the Marine Terminals Standard. In the existing definitions section, § 1918.3(r)(5) (i) to (vi) listed material handling devices that were exempted from the certification requirements of existing § 1918.13. Section 1918.13 required that shore-based material handling devices be certified in accordance with part 1919, OSHA's gear certification regulations. As mentioned above, these requirements are now found in part 1917, the Marine Terminals Standard. Material handling devices are now exempted from certification only if they are listed in § 1917.50(h). Huletts, bridge cranes, ore and taconite loading facilities, and bulk coal loading facilities, which were exempted from certification under existing § 1918.3, are not exempted under existing and final § 1917.50.

Some commenters (Exs. 6–16a and NMSA *et al.*) urged OSHA to move the remaining regulations from subpart B of the Longshoring Standard to subpart F of that standard, ''Vessels's Cargo Handling Gear,'' on the grounds that doing so would consolidate all vessel cargo handling gear requirements into one section (Ex. 8–20). OSHA disagrees with this position because subpart B's vessel cargo gear certification requirements are procedural in nature, have international significance, and apply to all lifting appliances aboard the vessel, such as elevators and material handling equipment. In contrast, subpart F primarily addresses the specific operational requirements for cranes and derricks. Accordingly, the final rule continues to address vessel cargo gear certification in subpart B.

Section 1918.11 of the final rule, entitled ''Gear certification,'' requires employers to ensure that the vessel has a current and valid cargo gear register and certificates that are in accord with the recommendations of the International Labor Organization (ILO) Convention No. 152 as these pertain to

the testing and examination of cargo gear (paragraph (a)). Vessels holding a valid Certificate of Inspection from the U.S. Coast Guard (USCG) or public vessels are deemed to meet the requirements of paragraph (a). Paragraphs (c) and (d) of § 1918.11 specify the competencies that persons and organizations making entries and issuing the certificates required by paragraph (a) of this section must have, both with regard to U.S. vessels not holding a valid USCG Certificate of Inspection and vessels under foreign registry.

These requirements of the final rule are essentially unchanged from the corresponding provisions of the proposal. However, by requiring that vessel cargo gear be certificated in accordance with ILO 152 rather than ILO 32, OSHA is effecting a change from the Agency's existing Longshoring Standard.

Since 1960, safety and health regulations designed to protect U.S. dockworkers (with particular regard to vessels' cargo handling gear) have relied upon the documentary proofs of tests and examinations mandated by ILO 32 (Ex. 1–34). In Article 9 of that Convention, units and articles comprising ships' cargo handling gear are specified and assigned an annual/quadrennial schedule of tests/examinations that must be attended and attested to by individuals judged to be ''competent'' by the national authorities of the vessel's registry. Although not a signatory to that Convention, the United States has conformed to this Convention via regulations promulgated by: (1) the U.S. Coast Guard, regarding inspected U.S. flag vessels; and (2) OSHA, regarding foreign flag vessels (existing § 1918.12). The Coast Guard has promulgated cargo gear regulations that exceed those found in ILO 32, namely those codified at 46 CFR part 91, that promote safe and unencumbered operations for U.S. flag vessels trading at foreign ports. On foreign flag vessels trading at U.S. ports, however, OSHA has sole responsibility for regulating and enforcing rules that address the cargo gear U.S. longshore workers use.

Under ILO 32, proof load testing[6] was only required initially before gear was put into service. After that initial test, such gear received various degrees of visual scrutiny, supplemented occasionally by nondestructive testing, e.g., a hammer test. Components such as derricks, goosenecks, mast bands, derrick bands and any other difficult to disassemble fixed gear, were to be ''thoroughly examined'' every 4 years and ''inspected'' every 12 months. Other hoisting machinery, such as cranes, winches, blocks, shackles, and any other accessory gear, was to be ''thoroughly examined'' every 12 months.

ILO 152, adopted June 25, 1979, requires that proof load testing be conducted at least every 5 years, and applies to all ships' lifting appliances. Within Article 3 of ILO 152, the term ''lifting appliance'' means:

> Lifting appliance covers all stationary or mobile cargo-handling appliances used on shore or on board ship for suspending, raising or lowering loads or moving from one position to another while suspended or supported (Ex. 1–5, p. 2).

Thus, because the final rule requires compliance with ILO 152 instead of ILO 32, it expands testing and certification requirements for cargo handling equipment on board vessels. Such testing and certification, which was formerly restricted to specific assemblies and components (i.e., derricks, cranes, winches, etc.) will now include all ''lifting appliances'' as defined by the newer ILO Convention. This includes forklifts and other powered equipment used to handle cargo that might be carried by a Ro-Ro vessel, and elevators found on Ro-Ro vessels used to move cargo (including vehicles) from one deck level to another, in addition to the vessel's cranes and derricks. Under final rule § 1918.11, all of this equipment is required to be: tested and thoroughly examined initially before being put into use; retested and thoroughly examined every 5 years; and thoroughly examined every 12 months.

In 1993, OSHA received a letter from Sea-Land Service, Inc. requesting that OSHA interpret the current regulations to allow the lifting of two empty 40 foot ISO freight containers that are vertically coupled using semi-automatic twist locks (Ex. 1–161). OSHA's response allowed the practice under the existing regulations, provided that certain additional requirements were met (Ex. 1–160). However, the existing regulations, which reference Convention 32, did not require the certification of the ''lifting appliance,'' i.e., the top container and the semi-automatic twist locks.

In the preamble to the proposed rule, the Agency discussed differences between Convention 32 and Convention 152, including the requirement in the latter convention to certify lifting appliances. OSHA stated that, under Convention 152, when a container was used to lift another container, the top container would fall within the definition of ''lifting appliance'':

> In those situations where one container is used to lift another container, using twist locks, then the upper container and twist locks become, in effect, a lifting appliance and must be certified as such. Page 28602.

In response to this proposed interpretation of Article 3, paragraph (e) of ILO Convention 152, OSHA received comments only from the International Longshoremen's and Warehousemen's Union (ILWU) (Exs. 19, 6–19, and 78). Although these comments favored the proposed interpretation and requested the Agency to include it as a requirement in the regulatory text, they included no specific information regarding lifting containers vertically coupled. Furthermore, while Sea-Land Services, Inc. submitted a detailed six page comment (Ex. 1–6) addressing a number of the proposed changes to the Marine Terminals and Longshoring Standards, it did not address this issue. In addition, OSHA received a late, post-hearing submission from the International Longshoremen's Association (ILA) that indicated a serious problem with this type of lift, citing several incidents at U.S. ports where failures occurred (L–90a). While this letter cannot be the basis of rulemaking at this time since it is not part of the record, it has made OSHA aware of safety concerns that may need to be addressed by the Agency. The record contains a dearth of information regarding safety considerations associated with double container lifts, as well as feasibility information regarding certificating containers and twist locks as ''lifting appliances''. In light of this lack of information, OSHA has decided to reserve judgment on this issue, pending further study.

In the near future, OSHA will reopen the record on this narrow issue and publish a notice requesting specific information regarding whether or not OSHA should allow the practice of lifting vertically coupled containers, and, if so, under what circumstances. The notice will request information regarding the lifting of one container by another container using twist locks, including data on the following issues:

Have the bottoms of intermodal containers been designed and tested for the purposes of ''lifting''?

Have the twist locks been designed and tested for ''lifting''of containers?

What information do the manufacturers of containers and twist locks have regarding the use of their products as lifting appliances?

Do any international bodies currently certify containers and twist locks as ''lifting appliances''?

[6] Proof load testing, as used here, means lifting a known weight that is in excess of the safe working load (SWL) of the lifting appliance being tested.

Is there any scientific data that addresses maintenance testing and ''life'' of the components used for lifting purposes?

Has the impact of adverse weather conditions been evaluated in both design and operational concerns with regard to double container lifts?

What precautions can be taken to assure that the containers being lifted are empty?

What precautions can be taken to assure that the twist locks are all locked properly when the lifting occurs?

What precautions can be taken to assure that employees are not exposed to the hazard of a falling container?

What precautions can be taken to assure that defective or damaged containers should not be used to hoist other containers?

To what extent are lifts of vertically coupled containers currently being conducted and by whom?

How many containers and twist locks would have to be certificated for use as lifting appliances?

What would it cost to certificate the upper containers and twist locks for use as lifting appliances?

In vessel sharing agreements, is it feasible for upper containers and twist locks to be used as lifting appliances to be certificated?

What are the productivity gains, if any, associated with the lifting of vertically coupled containers?

What information, including anecdotal information is available on incidents involving vertically coupled containers that have fallen and hurt or killed employees or caused ''near-misses''?

Several commenters (Exs. NMSA *et al.*, NO Tr. pp. 388–393, 638–644) asked that OSHA continue to recognize and allow vessel's cargo gear on vessels whose cargo gear registers are in accordance with ILO 32 but not ILO 152:

* * * Refusal by stevedores to work vessels of nations that have not ratified ILO 152 will result in loss of business for the stevedore and terminal operator and can possible [sic] damage U.S. and foreign trade agreements. Until such nations of the world have ratified ILO 152, those still a signatory to ILO 32 should be recognized and accepted (Ex. 8–20, p. 4).

During the three public hearings held for this rulemaking, OSHA questioned witnesses about the difficulty posed by provisions requiring vessel's cargo gear to comply with the pertinent parts of ILO 152 (SEA Tr. pp. 276–278 and 333; NO Tr. pp. 388–394, 454–455, 638–642, and 712). Several commenters (NO Tr. pp. 638–642, 1391, and 1158) expressed concern that if OSHA requires vessel's cargo gear to meet ILO 152, vessels with cargo gear that does not comply will go to other countries to load and unload cargo that will then be brought into the United States by truck and rail, thereby having an adverse economic impact on the U.S. marine cargo handling industry. The two other countries that were of primary concern were Mexico and Canada. However, during the public hearings, it was pointed out by one witness that Mexico has ratified ILO 152 and Canada is expected to adopt the basics of ILO 152 in the near future (NO Tr. p. 627). (Also see the discussion in the section that follows, ''International Aspects.'')

OSHA recognizes that some vessels may need a longer phase-in period to comply with the ILO 152 cargo gear requirements. In addition, OSHA recognizes that the stevedore, who is the employer, does not own or have control of the vessels' cargo gear and thus must depend on the owner to accomplish the change before the stevedore can determine that the register is current and valid. Testimony by Mr. Mike Compton, Chair of the Safety Panel of the International Cargo Handling and Coordination Association (ICHCA), addressed the phase-in periods granted by the United Kingdom, for the ILO 152 cargo gear requirements. Mr. Compton stated:

* * * there were two lead-in periods given. For the change from a quadrennial to an annual thorough examination on derricks, there was one year given as a lead-in period.

The way in which this worked was that all of our member ports told their shipping company customers that this was going to happen in a year's time, and that in a year's time they would legally not be able to handle their derricks unless there was a thorough examination and record of it in the register within the last 12 months, and there was no problem with that. That ship owner had a year to see that was done.

With regard to the testing, which is now a new requirement of testing every five years, we gave a four-year lead-in time to that, which is more than enough time for a shipowner to ensure that the testing required was carried out.

Again, the member ports told their shipping company customers, who also heard about it in the course of their own trade associations, made appropriate requirements, arrangements, and there was no problem with that either (NO Tr. pp. 630–640).

OSHA finds Mr. Compton's recommendations persuasive and consistent with the goals of current International Trade Agreements.

Therefore, effective a year from the publication date of the final rule (§ 1918.11(a)(1)), all lifting appliances and all loose gear are required to have had a thorough examination that is duly recorded in a cargo gear register in accordance with ILO 152. Effective four years from the publication date of the final rule (§ 1918.11(a)(2)), all lifting appliances and all loose gear must have been tested (or retested) with the results duly recorded in a cargo gear register in accordance with ILO 152. At that time, vessels that do not have a cargo gear register that is properly filled out and up to date will be violating this regulation if the vessel's lifting appliances are used. However, in such cases, properly certified shore-based equipment may be used to load and unload the vessel.

A new paragraph, (a)(3), has been added to address these interim periods (up to one year for thorough examinations and up to four years for testing), vessels with cargo gear registers that are in accordance with ILO 32 will continue to be acceptable during these interim periods.

Several witnesses during the public hearings expressed concern that the cargo gear register forms required by ILO 152 were not readily available and that even if such forms were available, employers would have difficulty in reading and understanding them (SEA Tr. 277–278, NO Tr. pp. 651–655). In Appendix I of the proposed rule, OSHA provided a sample cargo gear register that came from the International Labor Organization's maritime office and conforms with ILO 152 requirements (See also Ex. 58). The sample register is in English and includes definitions and instructions on how to conduct the required inspections and/or tests and how to fill out the forms. Non-mandatory Appendix I, as proposed, is included in this final rule.

The International Cargo Gear Bureau, Inc. (Ex. 6–22), pointed out that although ILO 152 requires that proof load testing be done ''at least every five years,'' proof testing is often done and is required by some countries to be done every four years or even more frequently. The same commenter went on to say that this discrepancy should be clarified because four-year proof load testing is required in current §§ 1917.50(c) and current 1918.61(h). In addition, this commenter wrote:

If it is the intention of USDL/OSHA to adopt the five (5) year proof load testing cycle for shipboard cargo handling gear within the jurisdiction of USDL/OSHA, the justification for such relaxation of proof load testing requirements should be explained by USDL/OSHA considering the ''lost workdays'' statistics and statements on page 28595 of the June 2 **Federal Register** * * * (Ex. 6–22, p.4).

In the final rule, OSHA is not changing either the requirement at

current § 1917.50(c), which mandates a quadrennial proof load testing requirement for shore based material handling devices, or the requirement at current § 1918.61(h), which requires such testing for special stevedore gear. Instead, by requiring foreign vessels using ship's gear while working in the United States to comply with ILO 152, OSHA is providing greater protection to employees than is currently required, because compliance with ILO 152 requires inspection and testing of *all* lifting appliances, not just cranes and derricks, and requires retesting at least every five years. Thus, the final rule's vessel cargo gear certification requirements substantially increase employee protections.

One commenter wrote that OSHA should clarify in the rule what is meant by ''vessel's cargo handling gear'' because of the expanded requirements under ILO 152 (Ex. 6–22). OSHA modified the definition of ''vessel's cargo handling gear'' in the proposal to ''include all stationary or mobile cargo handling appliances * * *. '' and the final rule includes the same definition. OSHA has included a cross-reference to that definition in § 1918.11.

It should be noted that 29 CFR part 1919, provides procedures and standards governing accreditation of persons by OSHA for the purpose of certificating vessel's cargo gear and shore-based material handling devices, and the manner in which such certification shall be performed. Categories of competency have been established based on the equipment that they have been accredited to inspect. For example, a ''full function vessel'' accreditation would mean that the person or agency has been recognized as competent to inspect and certify all of a vessel's cargo handling equipment. Similarly, a ''loose gear and wire rope'' accreditation requires the showing of a different inspection competency. The inspection requirements of this subpart involve both of these categories.

With regard to these inspection requirements, several commenters wrote that paragraph § 1918.11(c) should be clarified by adding the term ''full function vessels'' to identify the type of accreditation that persons competent to make entries in the registers and issue certificates must have. (Exs. NMSA *et al.*, 6–16a). OSHA agrees with these commenters and has made the change in the final rule in both paragraphs § 1918.11(c) and (d). The words ''or loose gear and wire rope testing'' have also been added to identify those accredited agencies that can issue certificates for loose gear and wire rope that are part of the cargo gear register.

One commenter (Ex. 6–5) noted that OSHA's ''proposed rules are significantly more stringent than the existing Coast Guard regulations.'' The U.S. Coast Guard has rules covering marine terminals that handle bulk flammable liquids and gases. However, all employees engaged in longshoring operations, whether on U.S. flag or foreign flag vessels, are covered by OSHA's part 1918 regulations. These regulations cover forklifts and other powered industrial equipment. During this rulemaking, OSHA coordinated with, and received support from the Commandant of the U.S. Coast Guard (Ex. 6–44). OSHA believes that its final rule will provide longshoring and marine terminal employees with effective protection from the hazards of marine cargo handling.

The preamble section titled ''International Aspects,'' which was in the proposal, is repeated in this preamble to the final rule to explain why OSHA is retaining the provision (at § 1918.11(a)) that allows foreign flag vessels to comply with ILO gear provisions instead of requiring them to comply with U.S. standards. This issue was brought out in written comments and during the hearings (Ex. 6–22, NO Tr. pp. 454–455, pp. 650–651).

International Aspects:

As with all Federal agencies whose regulations influence international trade, OSHA has developed this final rule in light of international considerations. Through both law and policy, the United States has decided that standards-related activities should not, if possible, be a barrier to trade. The Trade Agreements Act of 1979 (19 U.S.C. 2501 *et seq.*) addresses technical barriers to trade regarding federal regulation. Section 2532 of this Act states the following:

> Section 2532. Federal standards-related activities.
>
> No Federal Agency may engage in any standards related activity that creates unnecessary obstacles to the foreign commerce of the United States, * * *.
>
> (1) *Nondiscriminatory treatment.* * * *
>
> (2) *Use of international standards.* (A) In general, * * * each Federal agency, in developing standards, shall take into consideration International standards and shall, if appropriate, base the standards on International standards.

Additionally, and consonant with this country's position on barriers to international trade, the United States is a signatory to the Multilateral Convention on the Facilitation of International Maritime Traffic (1965) (Ex. 1–3). As a contracting government, the United States has agreed to:

> * * * Undertake to cooperate in securing the highest practicable degree of uniformity in formalities, documentary requirements and procedures in all matters in which such uniformity will facilitate and improve international maritime traffic and keep to a minimum any alteration's informalities, documentary requirements and procedures necessary to meet special requirements of a domestic nature. (Article 3)

Mindful of these international aspects, OSHA sought to formulate an acceptable approach to the vessel's cargo handling gear issue, and to other issues. The Agency requested the Department of State (Ex. 1–7) to present OSHA's approach to all foreign nations whose vessels may enter U.S. ports. This exercise was conducted in the hope of identifying acceptance. Reports back from responding foreign nations (Ex. 1–6) indicated overwhelming support for the Agency's approach to these issues. Most of the nations responding, although stipulating that they had not yet ratified the more recent ILO Convention, suggested that their national laws recently ratified were at least as strong, and sometimes more stringent, than ILO 152. Thus, OSHA is confident that the cargo gear certification requirements of the final rule are consistent with those of ILO Convention 152 and national laws and practices of most other countries.

Subpart C—Gangways and Other Means of Access

In final rule subpart C, OSHA has organized requirements by subject matter and enhanced the uniformity of shoreside and shipboard requirements.

Subpart C is titled ''Means of Access'' in the existing and proposed Longshoring Standard. It contains requirements that employers must meet before allowing employees to board a vessel. Several commenters suggested that the title be changed to ''Gangways and Other Means of Access'' to better describe the contents of this subpart (Ex. 6–16a, NMSA *et al.*). These same commenters also recommended that this subpart be rearranged so that each section, such as Gangways, Jacob's ladders, etc., contains only the specific requirements that apply to the subject matter of that section. OSHA agrees with the recommended changes to the title and grouping of subjects in this subpart and has generally rearranged it accordingly.

The provisions of final § 1918.21 ''General requirements,'' are taken from the existing and proposed Longshoring Standards, with editorial changes made for clarity. In final § 1918.21(a), which requires that the means of access to the vessel not be located under suspended

loads to the extent possible, the words ''or others'' have been added after the word ''employees''. OSHA believes that suspended loads should not pass over a vessel's means of access, regardless of whose employees would be exposed to the hazards of overhead loads. While OSHA recognizes that the stevedoring employer may not have control over all employees (or users of the gangway), employers do have control over the movement of suspended loads and thus have the means to comply with this provision.

Final rule § 1918.21(b) stipulates that substantial steps and a minimum of one handrail be provided between the bulwark and deck when the upper end of the means of access rests or is flush with the top of the bulwark. This provision is unchanged from the corresponding provision of the proposal.

To eliminate the ambiguity of the current rule, which required that means of access be ''adequately'' illuminated, final paragraph 1918.21(c) references § 1918.92 which requires specific illumination levels. In addition, the final rule has a footnote that gives the candlepower requirement found in § 1918.92, to make it readily available in this section.

The title of § 1918.22, currently ''Gangways and other means of access,'' is being changed to ''Gangways'' in the final rule. The word ''gangways,'' as defined in § 1918.2, includes accommodation ladders, brows, etc. This section also joins two similar sections of OSHA's current Longshoring rules (§ 1918.11—titled ''Gangways'' and § 1918.21—titled ''Gangways and other means of access''). The final rule's § 1918.22, therefore, eliminates the need for employers and employees to look in different subparts for information on gangways.

Following the format of the current Longshoring Standard, gangway dimensions and characteristics are set out in paragraphs (a) and (b). Using a combination of specification language with performance-based alternatives, the final rule provides the flexibility needed in adapting to vessels built according to international guidelines. The final rule allows rails to be made of materials other than those specified in the current rule, if the material is at least equivalent in strength to those listed. Paragraphs 1918.22 (a) and (b) are essentially unchanged from the proposal.

Paragraph (c), which requires that the gangway be trimmed at all times, carries over language from the current rule, plus the term ''trimmed,'' a word that is also found in the Joint Maritime Safety Code of the New York Shipping Association/International Longshoremen's Association (NYSA/ILA Safety Code) (Ex. 1–2). This paragraph is designed to ensure, despite changing conditions caused by tides, cargo operations, etc., that the gangway and its components are fully useable at all times.

Final rule paragraphs (d), (f), (h), and (j) are essentially identical to the corresponding provisions of the current and proposed rules. They address fixed flat-tread accommodation ladders, handrails on walkways, and prohibitions against obstructions (paragraphs (d), (f), and (h), respectively), while paragraph (j) states that vessels inspected and certified by the USCG are deemed to meet the requirements of this section. Paragraphs (e), (g), and (i) have been editorially modified for clarity to address problems of interpretation associated with these provisions of the existing standard. Proposed paragraph (e) of the final rule has been revised to require a safety net or suitable protection when the gangway overhangs the water in a way that poses a danger of employees falling between the ship and the dock. The purpose of the net is to prevent an employee from falling to a lower level. This is consistent with ILO's ''Safety and Health in Dock Work'' (Ex. 1–138). Final rule paragraph (g) requires gangways to be kept clear of supporting bridles and other obstructions but allows that, in situations where gangway supporting bridles cannot be moved because of the design, the employer is to mark the hazard to alert employees using such a gangway. Paragraph § 1918.21(i) has been added to the final rule to address the hazard associated with slippery handrails and walking surfaces on gangways. Several commenters suggested the use of more performance-oriented language (Exs. 6–31, 8–20, NMSA *et al.*) than the proposal. OSHA agrees and has included the language suggested by the commenters in the final rule, which has been renumbered as § 1918.22(i).

Final rule § 1918.23, titled ''Jacob's ladders,'' carries over language from the current rule. Paragraphs (a) and (b) of this section contain criteria for rope ladders, also known as ''Jacob's ladders''. In keeping with the previously mentioned public comments regarding rearranging this subpart, two paragraphs, proposed as § 1918.23 (e) and (f), that address Jacob's ladders have been moved to become final rule § 1918.23 (c) and (d). Final paragraph (c) addresses the potential for the lower rungs of a Jacob's ladder to be crushed between the barge and another structure by requiring that a spacer or equivalent means be used to prevent this from occurring. Final rule paragraph 1918.23(d) requires that a net or equivalent protection be provided if there is a space between the vessel, barge, or other structure when using a Jacob's ladder; this provision is designed to prevent an employee from falling into the water or from being crushed between the barge and other structure. Such rope ladders are often provided by the vessel when more traditional means of access cannot be used. Nevertheless, the employer (who is often a contractor rendering a service to the vessel) must comply with the provisions of this section before employees are permitted to use Jacob's ladders.

Final rule § 1918.24 is a new section titled ''Fixed and portable ladders.'' This section was moved from proposed § 1918.25 ''Ladders,'' which included requirements for both fixed and portable ladders. For streamlining purposes, the final rule combines the requirements for portable ladders contained in the current Longshoring Standard with similar requirements contained in § 1917.119 ''Portable ladders.''

Generally, final § 1918.24 includes much of the current Longshoring Standard's language for ladders. Paragraph 1918.24(a) requires that a minimum of one ladder be provided for each gang working in a hatch and that an effective means of gaining a handhold be provided at or near the head of vertical fixed ladders. Paragraph (b) requires employers to identify ladders that are visibly unsafe and prohibit their use. Paragraph 1918.24(c) requires that portable straight ladders be sufficiently long to extend a minimum of 3 feet above the upper landing surface and be secured against slipping.

For fixed ladders, OSHA proposed to change the clearance required behind the ladder rungs from four inches (.11 m) to six inches (.16 m) on vessels built after December 5, 1981,[7] in order to be consistent with the recommendations of the ILO's Guide to Safety and Health in Dock Work (Ex. 1–129). In addition, OSHA's existing Longshoring Standard allows that where a fixed ladder has inadequate clearance, a suitable portable ladder could be used in its place, and the final rule continues to allow this practice. Two commenters addressed the issue of clearance. One commenter suggested that OSHA did not give adequate compliance time to vessel owners on this issue and stated that the

[7] This is the date when ILO Convention 152, Occupational Safety and Health in Dock Work, was put into effect.

six-inch (.16 m) requirement should apply to vessels only after a phase-in period or should apply only to vessels contracted for after the effective date of the final regulations (Ex. 6–5). The New York Shipping Association (NYSA) commented that using a permanent ladder with a four-inch (.11 m) clearance would be safer than using portable ladders (Ex. 6–16a). Although OSHA agrees with the NYSA comments overall, the Agency believes that a six-inch (.16 m) clearance is important to employee safety and OSHA also seeks to encourage conformance with the international guidelines. To address these commenters' concerns, however, OSHA is providing for a phase-in period before the six inch (.16 m) clearance requirement becomes effective. OSHA believes that this phase-in period will provide adequate time for the international shipbuilding community to include this requirement in its shipbuilding design criteria. On those vessels built on or after four years after the date of the publication of the final rule, fixed ladders must have six inches (.16 m) of clearance or more, or another means of access must be used. In the interim period, four inches (.11 m) of clearance is acceptable.

Provisions have been added to the final rule at paragraph (g) that reference ANSI standards for manufactured portable ladders. New provisions for ladder maintenance and usage similar to those found in the current Marine Terminals Standard have been added to the final Longshoring Standard in paragraph (i).

Final paragraphs (c) and (e) of § 1918.24 recognize that, as an alternative to securing the ladder, an employee(s) may hold a portable ladder in place while another employee is climbing. The final phrase reads ''positively secured or held against shifting or slipping while in use'' and is consistent with the PMA-ILWU Safety Code, Rule 1506 (Ex. 1–145).

In addition, to clarify final paragraph (e), where the employer can show that employees can safely use the cargo itself to climb in and out of the hold (often called ''safe cargo steps''), a straight ladder is not necessary.

Paragraph (f) of the final rule sets out the requirements for rung strength, spacing, and positioning, and establishes the widths between side rails required for ladders of various heights.

As mentioned above, paragraph (g) establishes standards for manufactured portable ladders by cross-referencing the appropriate ANSI requirements for portable wood ladders, portable metal ladders, and portable reinforced plastic ladders.

In paragraph (h) of the final rule, minimum requirements are set forth for job-made portable ladders. These requirements address between-rung distances, strength requirements, and width between side rail requirements.

The requirements in final rule paragraph (i) cover maintenance and inspection requirements for portable ladders. They identify the kinds of defects that require employers to take ladders out of service, either by tagging the ladder or removing it from the vessel. In addition, paragraph (i)(2) states that ladders must be inspected for defects before each day's use and after any event that could damage the ladder.

Paragraph (j), which includes provisions addressing ladder usage, acknowledges that while some ladders may not have slip-resistant bases, they can be positively secured against shifting or slipping while in use (paragraph (j)(2)). The language of this paragraph allows ''holding'' as an alternative to ''lashing'' to be consistent with paragraphs (c) and (e) of this section. Other provisions of paragraph (j) prohibit the use of single-rail ladders, the use of ladders as guys, braces, or skids, or as platforms, runways, or scaffolds. Other safety procedures and prohibitions are also included in this paragraph.

Final § 1918.25, which addresses bridge plates and ramps used to span the gap between the vessel and another vessel or the dock, combines the current language of the Longshoring Standard's provisions with the terms that apply to similar shoreside equipment (see § 1917.124). In the proposal, OSHA would have required sideboards that are at least six inches (.16 m) high. OSHA also proposed to require the same six inch (.16 m) sideboards for dockboards and ramps in the Marine Terminals Standard, § 1917.124(c)(5) and (d)(1). The six-inch height is the same as that for ''bull rails'' that were in place on the effective date of the Marine Terminals Standard (§ 1917.112). Bull rails, frequently railroad ties, are placed around the edge of the dock of a marine terminal and are used to prevent equipment from falling into the water. Based on the height requirement for bull rails in the Marine Terminals Standard, OSHA believed that six inch sideboards would prevent vehicles and equipment from accidentally falling off the edge of a bridge plate or ramp.

Several commenters expressed reservations about the six-inch sideboard requirement on the grounds that it was too high or was unnecessary (Exs. 6–16a, 6–29a, 6–31a, 6–36, 80, SEA Tr. pp. 171–172, 242–243, 385–389, 422–423, NO Tr. pp. 158–160, 164, 384–386). These commenters felt that six-inch sideboards on dockboards would create a tripping hazard, would interfere with forklift operations, or would fail to provide additional safety benefit. Other commenters (Exs. 6–29a, 6–36) suggested OSHA use ANSI Standard MH14.1 as a guide; that ANSI standard recommends a sideboard height of two and three-quarters of an inch. Others stated their preference that performance language and grandfathering of existing ramps would be appropriate (NO Tr. pp. 386, 432).

John Faulk of NMSA, at the public hearings in New Orleans, stated that bridged distances rarely exceed several inches in the industry (NO Tr. p.158). In addition, he said that there are thousands of ramps and bridge plates in the industry that would not meet the 6-inch height requirement and would thus require retrofitting with sideboards and noted further that there are no accident data to justify such a modification. In its post hearing comment, NMSA estimated that there were 35,000 ramps and bridge plates that would require modification under the proposal (Ex.80). NMSA estimated that it would cost $36 million to retrofit each of these ramps and bridge plates with sideboards.

After a thorough review of the record, OSHA concludes that six inches is an appropriate height for ''bull rails,'' but not for sideboards. As commenters noted, sideboards of that height could cause a tripping hazard and interfere with safe operations.

OSHA has reviewed the ANSI standard (MH14.1) and OSHA's proposed standard on *Walking/Working Surfaces and Protective Equipment (Fall Protection Systems)* (29 CFR 1910 subpart C) (55 FR 13360). In accordance with the ANSI standard and OSHA's proposal, when the space to be spanned is less than three feet (.91 m), no sideboard is necessary, because the space is not large enough to allow machinery such as a powered industrial truck to fall through. However, OSHA believes that sideboards, or some alternative, are necessary on dockboards and bridge plates spanning a gap greater than three feet. OSHA believes that three feet (.91 m) is a large enough opening to allow equipment to fall to a lower level, injuring the driver. In the final rule, OSHA has decided to use performance language similar to that in the proposed rule for *Walking and Working Surfaces and Protective Equipment (Fall Protection Systems)* (29 CFR 1910 subpart C) (55 FR 13360); thus, the final rule stipulates only that bridge and car plates be designed to

prevent vehicles from running off the edge (paragraph 1918.25(a)(4)) and that portable ramps be similarly designed (paragraph 1918.25(b)(5)). In addition, footnotes provide specification and compliance guidance on sideboard heights when the gap to be bridged is greater than 36 inches.

Paragraph (b) addresses portable ramps used afloat. Except for the requirement for sideboards, the final language remains the same as that proposed.

Final rule § 1918.26, *Access to barges and river towboats,* was numbered § 1918.23 in the proposal. This section has been treated separately in the final regulation because some barge operations, particularly those conducted in the Mississippi River system (see definition at § 1918.2), are unique.

Final rule paragraph (a) sets out criteria for ramps used to gain vehicular access to or between barges. Of primary importance is that such ramps be of sufficient strength for the intended load. Although the railings required by § 1918.25(b)(2) are not required on these vehicular ramps, as stated in paragraph (a), the ramps must be equipped with sideboards that will prevent vehicles from falling off the edge. Except for the railing requirement, ramps used for vehicle access to or between barges must meet all of the requirements of § 1918.25.

Final rule paragraph 1918.26(b) remains the same as proposed; it addresses employee passage to and from certain floating craft. Under favorable conditions, it is sometimes possible to pass to and from such vessels without the aid of any additional means of access. In unfavorable conditions, however, this paragraph sets forth the provisions required for safe passage. These range from a straight ladder to a Jacob's ladder or other safe means of access. Of significance is the exception that recognizes the practical difficulties that may be encountered on the Mississippi River system in providing traditional access. Historically (Ex. 1–98), this exception is based on tidal and current conditions on the Mississippi system.

Final rule paragraph (c) addresses the situation where a barge or raft is being worked alongside a larger vessel. Unless other safe means of access is provided, paragraph (c) requires a maximum of two Jacob's ladders for any single barge or raft being worked. This is consistent with the requirement in § 1918.24(a) that requires no more than two access ladders in a hatch. In final paragraph (c), the term ''gang'' is used to refer to a group of longshore workers assigned to a particular hold, deck, etc. on a ship to load or discharge cargo. The use of this term is consistent with its use elsewhere in this final rule.

Final rule paragraph (d) mandates that barges on which longshoring operations are taking place must be secured to the vessel, wharf, or dolphins. The purpose of this provision is to prevent workers from falling into the water while handling cargo.

Subpart D—Working Surfaces

Subpart D, Working Surfaces, addresses the hazards associated with slips, trips, and falls that are common causes of injuries in the marine cargo handling industry.

OSHA clearly understands that many hazards addressed by this and other subparts represent working environments and physical characteristics that are encountered much less frequently now than when the Longshoring Standards were last revised. This primarily is a result of the evolution of handling cargo in intermodal containers rather than as break bulk. However, OSHA believes those conventional break-bulk cargo handling methods, together with the more traditional vessel characteristics, such as a yard and stay cargo handling gear and hatches covered by hatch boards, are still encountered at U.S. ports. In the proposal, OSHA requested comment from the public on the issue of obsolete regulations, primarily those that addressed methods of cargo handling that are no longer used. OSHA also received testimony on this issue (SEA Tr. pp. 133–134).

It has been pointed out to OSHA, particularly at the West Coast public hearing, that ex-Soviet bloc vessels that were once not allowed to enter some United States ports, due to security reasons, are now allowed to enter. Some of these vessels have cargo handling gear and hatch coverings that had virtually disappeared from ports in the United States. In the final rule, OSHA is retaining many provisions that might otherwise have been considered obsolete because they still have application to these vessels. To illustrate, § 1918.31(d) prohibits the placing of poorly fitting hatch covers and hatch beams that would constitute a work surface. As a practical matter, seeing vessels at U.S. ports fitted out with hatch beams is rare. However, such situations do still arise.

Section 1918.31, ''Hatch coverings,'' (paragraphs (a), (b), (c), (d), and (e)) retains the same requirements as the current and proposed regulation, except that some editorial changes have been made for clarity.

Paragraph 1918.32, ''Stowed cargo and temporary landing surfaces,'' addresses surfaces used temporarily to load cargo, fall hazards posed by the edges of hatch sections or by stowed cargo, and fall hazards posed by gangs working on different levels of the hatch (paragraphs (a), (b), and (c), respectively). Paragraph (a) specifies that temporary surfaces used to land a load be of sufficient size and strength to allow employees to work safely, that edges of hatch sections or of stowed cargo be guarded by a safety net or equivalently protective means, and that employees working in the same hatch but at different levels be protected from falling by safety nets. The requirements in this paragraph are essentially identical to those in the existing rule and have only been modified minimally for clarity.

Final rule paragraph 1918.32(b) has been revised to address changes that have occurred in technology and work practices since OSHA's original Longshoring Standard was adopted. This paragraph does not apply to employees working on top of intermodal containers, whether above or below deck, because such work is now covered by Section 1918.85(j), ''Fall protection'' (for a more detailed discussion of this issue, see the preamble to § 1918.85(j), below). Instead, section 1918.32 applies when employees are working non-containerized cargo in the hold and are exposed to falls of more than eight feet (2.4 m); it requires that the edge of the working surface be guarded by a safety net or that other means of fall protection (such as guardrails or fall arrest systems) be used to prevent employee injury. This fall distance of 8 feet comes from the original Longshoring safety rules promulgated under the Longshoremen and Harborworker's Compensation Act (33 U.S.C. 901) in 1960 and is reflected in the existing rule. Rule 1016 of the Pacific Coast Marine Safety Code (PCMSC) (Ex. 1–145) is very similar to this paragraph, although the OSHA provision has been written to reflect a more performance-oriented approach. In addition, instead of specifying the precise fall distance, distance to the edge, and so forth that triggers fall protection in individual provisions, OSHA has defined the term ''fall hazard'' in the Definitions section (§ 1918.2). A discussion of the definition of ''fall hazard'' can be found in subpart A.

It is essential that employees satisfy the intent of this provision and do not merely appear to comply with it. Many times, particularly when safety nets have been rigged, they have been allowed to become very slack, and have

even in some cases been secured only at their top ends. The improper rigging of safety nets compromises or even removes the protection provided to falling employees.

This paragraph has also been revised to distinguish between the purpose and use of vertical safety nets, which rise at right angles at the perimeter of a work surface to prevent employees from falling, and trapeze nets, which are designed to be placed horizontally below a raised work surface to prevent falling employees from striking the surface below.

OSHA proposed to require that the safety nets specified in this section meet the requirements of ANSI A10.11, ''Personnel and Debris Nets.'' One commenter wrote:

> Rigging and testing nets under ANSI regs in maritime conditions may not be possible such as providing outriggers for horizontal distance. This regulation was written for long-term construction projects where nets can be rigged, tested and left in place. (Ex 6–36).

Commenters also pointed out that ships often supply the safety nets and that requiring a foreign vessel to provide a net that meets ANSI specifications may be difficult. Other commenters also opposed including the reference to the ANSI standard (Exs. 6–16a, 6–29a, 6–36, 8–8, 8–20). After considering the international implications of this provision as proposed, OSHA agrees with these commenters and has deleted the reference to ANSI A10.11 in the final rule. In its place, OSHA has added performance language suggested by the National Maritime Safety Association—''Safety nets shall be maintained in good condition and be of adequate strength for the purpose intended'' (Ex. 8–20).

The language in § 1918.32(c), which requires that gangs working at different levels of the same hatch be protected by nets from falling themselves or from being crushed by falling cargo, is unchanged from the proposed provision. However, because this paragraph, like paragraph (b), requires the use of safety nets, OSHA has included identical performance language in this paragraph, i.e. that ''Safety nets shall be maintained in good condition and be of adequate strength for the purpose intended.''

Final § 1918.33, titled ''Deck loads,'' addresses the safe performance of work on or around deck loads; it has been carried over from the current rule and the proposal and is unchanged in the final rule. It requires that employees be prohibited from passing over or around deck loads except where safe passage exists (paragraph (a)). This requirement is designed to protect employees from falling or being crushed by falling cargo. Paragraph (b) of the final rule requires employees giving signals to crane operators to have safe passage if they walk over deck loads from rail to coaming; absent such safe passage, this provision prohibits these employees from walking over deck loads. In situations where it is necessary for the employees giving signals to stand or walk at the outboard or inboard edge of a deck load having less than 24 inches (.61 m) of bulwark, rail, coaming, or other protection, those employees must be provided with fall protection equivalent to that provided by a safe passageway, i.e. with a guardrail, personal fall protection system, or other equally effective means.

Some commenters (Ex. NMSA *et al.*) recommended that OSHA not include this section in the final rule because, in their opinion, it is redundant with provisions in § 1918.32 and § 1918.91. However, OSHA does not agree with these commenters, because § 1918.32 addresses working below deck and section 1918.91 addresses housekeeping. Mr. Douglas Getchell, a member of the Pacific Coast Marine Safety Code Committee, International Longshoremen's and Warehousemen's Union, agrees with OSHA on this point; at the hearing, he testified that § 1918.32 and § 1918.91 only ''peripherally apply'' to conditions found when working deck loads. He stated that, since § 1918.33 is more specific to the subject, it should not be deleted (NO Tr. pp.246–250).

Final rule § 1918.34, ''Other decks,'' includes requirements to protect longshore workers from being injured while working on other decks, e.g. skeleton decks, mechano decks. Paragraph (a) prohibits the working of cargo on any deck that was not designed to support a load of the weight being worked, and paragraph (b) requires that grated decks be properly placed, supported, maintained, and designed to support employees; grated decks that do not meet this requirement may not be used to work cargo. OSHA proposed to change the title of this section of the existing rule, which is ''Skeleton decks,'' to ''Other decks'' and received support from commenters to make this change (Ex. 8–20, NMSA *et al.*). Accordingly, the final rule section is titled ''Other decks.''

Final rule §§ 1918.35 and 1918.36 address hazards longshore workers face when conducting operations around open weather deck hatchways or when weather deck rails are removed to conduct cargo operations. Vessels calling at U.S. ports are of varied designs and capabilities. Some vessels have coamings, which are the vertical structures that surround the hatch opening on a ship, that are much higher than the section 1918.35's minimum acceptable range (36 to 42 inches (.91 to 1.07 meters)), while other vessels may have no hatch coamings but have flush decks or decks with a short sill. Decks of the latter two types pose substantial fall hazards to longshore workers. Sections 1918.35 and 1918.36 require that, when employees work around the perimeter of open hatchways that are not protected to a height of 24 inches (.61 m) on vessels with low or no hatch coamings, appropriate guarding, such as that provided by taut lines or barricades, must be provided to a height of 36 to 42 inches (.91 to 1.07 m) on all but the working side of the hatch (§ 1918.35). Weather deck rails must be kept in place except when cargo is being worked, and they must be replaced after cargo operations are finished (§ 1918.36). These provisions were widely supported (Ex. NMSA *et al.*), and these sections are unchanged from the proposal.

Final § 1918.37, ''Barges,'' addresses the fall hazards associated with working on the decks of lighters and barges. Final paragraph (a) prohibits the use of marginal (less than three feet (.91 m) wide) deck space along the sides of covered lighters or barges on all such vessels having coamings more than five feet (1.5 m) high but allows an employer to provide, instead, a taut handline or a serviceable grab rail. Two commenters (Exs. 6–18, 6–42) asked OSHA to allow existing barges to be ''grandfathered'' from compliance with § 1918.37(a) on the grounds that ''Many barges currently in service do not meet the three-foot standard [the width for walkways]. Rather the walkways on these barges are only 18–24 inches in width'' (Ex. 6–18). OSHA is not providing such an exemption in the final rule because this requirement has been in place since the 1960's, and it allows considerable compliance flexibility, e.g. the use of a taut handline or a serviceable grab rail in lieu of a 3-foot wide walkway. This requirement is essentially identical to that proposed.

Final rule paragraph (b) prohibits working or walking on barge decks that have not been visually inspected to ensure that they are structurally sound and have been maintained properly. The visual check of such decks must be done before loading operations begin. If during discharge operations an unsafe surface is discovered, work must be stopped until protective measures are taken (such as bridging the unsafe surface with steel plate or barricading a deck section deemed unsafe). This provision is essentially unchanged from

the corresponding provision in the proposal.

Proposed § 1918.38, titled ''Log rafts,'' which was a new section in the proposal, has been moved to subpart H, ''Handling Cargo'' in the final rule. It has been combined with § 1918.88, ''Log operations,'' so that all requirements dealing with handling logs from the water are in the same section, as suggested by several commenters (Exs. 78, PMA *et al.*, SEA Tr. p. 397, pp. 410–411). A discussion of log rafts is found below in subpart H.

Subpart E—Opening and Closing Hatches

Final subpart E, titled ''Opening and Closing Hatches,'' remains very similar to the corresponding subpart of OSHA's current Longshoring Standard. This subpart addresses the hazards presented to employees by the opening and closing of covers designed to protect cargo from the elements. The principal hazards include employees falling into the hold while removing or replacing hatch covers and hatch beams and employees being struck by covers and beams as these articles are moved. The proposed language received widespread support from commenters (Exs. NMSA *et al.*, PMA *et al*) and are thus essentially unchanged in the final rule. OSHA is retaining sections in subpart E that address methods of covering hatches, such as with hatch boards, even though these methods have largely been replaced by more modern or automated methods or equipment. In both written comments and testimony, participants stated that vessels that require these older methods of covering hatches are still worked in U.S. ports and thus that OSHA should retain these requirements in the final rule (Ex. 8–20; SEA Tr. pp. 134–135).

Final rule § 1918.41, ''Coaming clearances,'' addresses the fall hazards associated with such clearances. Paragraph (a) addresses weather deck clearances and requires that when a smooth-sided deck load more than 5 feet high is stowed within three feet (.91 m) of the hatch coaming, and the coaming height is less than 24 inches (.61 m), a taut handline must be provided along the side of the deckload so that employees are able safely to remove or replace hatch beams and covers. This provision is essentially identical both to the corresponding provision of the existing standard and the proposed rule; it is also similar to requirements in the NYSA/ILA Joint Maritime Safety Code—part C/Rule 38 (Ex. 1–2) and the PCMSC—Rule 1007 (Ex. 1–145).

Final rule paragraph (b) is titled ''Intermediate decks.'' Paragraph (b)(1) requires that a three-foot (.91 m) clear work area be provided for intermediate deck hatchways before employees remove or replace these hatch beams or covers when a fall hazard exists. Paragraph (b)(1) also states an exception where the 3-foot clearance is not required when no fall hazard exists; for example, such a clearance is not necessary on the covered portion of a partially open hatch or when the lower deck has been filled to hatch beam height with cargo that itself provides a safe working surface. Paragraph (b)(2) specifically recognizes that a fitted grating can be considered part of the actual deck or working space if it is in good condition and is properly spaced within the 3-foot area. In addition, OSHA has dropped the reference to ''banana'' gratings found in the Agency's current longshoring regulation because it is an obsolete term.

Final rule paragraph (c) addresses the hazard of falling where, because of wing-space structures or spare parts storage, coaming clearance is reduced below the required 3-foot clearance. It requires employers to provide grab rails or taut hand lines in such cases.

Final paragraph (d) states that this section (§ 1918.41) does not apply where the opening and closing of hatches is accomplished by mechanical means that eliminate the need for employees to place or remove individual sections manually. However, whenever a three-foot clearance does not exist, means shall be taken to adequately secure cargo that is stowed within three feet (.91 m) of the edge of the hatch to prevent cargo from falling into the hold.

Final rule § 1918.42, ''Hatch beam and pontoon bridles,'' is carried over in its entirety from OSHA's current longshore rules, although some editorial changes have been made for clarity. Provisions in this section address the hazards of handling hatch beams and pontoons, such as falling into the hatch or being struck by these removable items. Equivalent rules can be found in section two of the PCMSC (Ex. 1–145) and parts C and O of the NYSA/ILA Joint Maritime Safety Code (Ex. 1–2).

Paragraph (a) of final rule § 1918.42 requires that hatch beams and pontoon bridles be long enough to fit their attachment points easily, be strong enough to lift the load safely, and be properly maintained. Paragraph (b) requires that bridles for lifting hatch beams be equipped with attachment devices, such as toggles, that cannot become accidentally dislodged. It also prohibits the use of hooks other than those specified in paragraph (b) unless such hooks are hooked into the standing part of the bridle.

Paragraph (c) requires that bridles used for lifting pontoons and plugs have the number of legs required by the design of the pontoon or plug and that all legs be used. Any legs that are not used must be hung on the hook or ring to prevent them from swinging free.

Paragraph (d) requires that at least two legs be fitted with a fiber rope lanyard that is a minimum of 8 feet long, is in good condition, and has a bridle end that is made of chain or wire. The purpose of all of the requirements in § 1918.42 is to ensure proper manual guidance of the lift.

Final § 1918.43, ''Handling hatch beams and covers,'' has also generally been carried over from OSHA's existing longshore rules, with some editorial changes made for clarity. Provisions in this section address the hazards associated with the handling and stowing of hatch boards, hatch beams, and pontoons; examples include employees or hatch covers falling into the hatch or employees being struck by improperly stowed items. Similar requirements are found in Section X of the PCMSC (Ex. 1–145), part O of the NYSA/ILA code (Ex. 1–2), and ILO Convention 152.

Paragraph (a)(1) requires that hatch covers or pontoons stowed on the weather deck adjacent to hatches must be positioned in stable piles that are a minimum of 3 feet from hatch coamings. An exception to this requirement is permitted in the situation where hatch covers or pontoons are spread one high between the coaming and bulwark on the working side of the hatch and there is no space between them (providing that the coaming is at least 24 inches high). Paragraph (a)(1) also prohibits hatch covers and pontoons from being stacked higher than the coaming or bulwark on the working side of the hatch.

Paragraph (a)(2) prohibits hatch boards or other covers that have been removed from the hatch beams in a section of the hatch that has been partially opened for the purpose of being worked, cleaned, or used for other operations from being stowed on those covers or boards in the hatch that have been left in place. This provision applies to seagoing vessels only.

Final rule paragraph (b) stipulates that hatch beams be laid on their sides or be stood on their edges and be lashed together except in cases where the hatch beams have flanges: (1) Whose width is at least 50 percent of the height of the web and (2) that rest flat on the deck when the hatch beam is stood upright.

Paragraph (c) addresses the potential dislodgement of strongbacks, hatch covers, or pontoons. It requires that, when such items are placed on the weather deck, they be placed so as not to obstruct clear fore-and-aft and coaming-to-bulwark passage and be lashed or otherwise secured. In addition, this paragraph requires that dunnage or other suitable material be positioned under each tier of strongbacks or hatch covers to prevent them from slipping; this provision applies only when such items are stowed on steel decks.

In paragraph (d), the final rule requires employers to take precautions designed to protect workers from falling hatch covers and strongbacks. It stipulates that hatch covers and strongbacks unshipped in an intermediate deck be placed a minimum of 3 feet from the coaming or be removed to another deck altogether, except that strongbacks may be placed a minimum of 6 inches from the coaming if they have been secured so that they cannot tip over or be dragged into the lower compartment.

To prevent accidental displacement, paragraph (e) requires that any hatch beam or pontoon left next to an open hatch section being worked must be locked or otherwise secured. In addition, unless portable, manually handled hatch covers (including those that have been bound together to form a single larger cover) have been securely lashed, they must be removed from sections being worked and adjacent sections.

Paragraph (f)(1) of the final rule mandates that the roller hatch beam at the edge of the open section of the hatch be lashed or pinned back to prevent it from being dislodged and falling through the open hatch. Similarly, paragraph (f)(2) requires that rolling, sectional, or telescoping hatch covers on barges that open in the fore and aft direction be secured against movement when they are in the open position, and paragraph (g) requires similar precautions for hinged or folding hatch covers when in the upright position (except in cases where the design of the system precludes unintentional movement).

Paragraph (h) prohibits the opening or closing of hatches while workers are in the square of the hatch below. This prohibition is necessary to prevent hatch beams or covers from dislodging and falling on the employees working on the lower level.

In the final rule, paragraph (i), which was a newly proposed provision, addresses the hazards of unsecured materials. Lashing wires, rods, and twist locks are often left on top of a hatch cover after the cargo has been discharged. These items can fall from the covers when the covers are being moved and injure employees, and this provision thus requires that all such materials be removed from the hatch cover or be secured before the hatch cover is removed. The words ''or secured to prevent them from falling off the cover'' has been added to the proposed language to recognize that, in addition to removing such materials, employers can achieve the required protection by securing these items to the hatch cover.

Final rule § 1918.43(j) requires that hatch covers or night tents be used to cover hatches, and that any covering that only partially covers a hatch, such as alternating hatch covers or dunnage strips, may not be covered by a tarpaulin. The reason for this prohibition is that employees could fall through the tarpaulin and partial covering. However, paragraph (i) allows an exception: tarpaulins may be used to cover an open or only partially covered hatch if they are used to reduce dust during bulk cargo loading and if positive means, such as barricades with placards, have been taken to ensure that employees do not walk on the tarpaulin. Verbal warnings, instructions or placards alone will not satisfy this provision. The exception has been added to the final rule, although the rest of this provision is similar to a paragraph in OSHA's existing Longshore Standard.

Subpart F—Vessel's Cargo Handling Gear

Subpart F applies to all gear and equipment used in cargo handling that is the property of the vessel. Examples of such equipment include cranes, derricks, specialized bridles, winches, wire rope, and shackles. This subpart addresses the hazards associated with that gear, such as using faulty gear, overloading or improperly rigging cargo gear, or the improper operation of cargo gear, which can result in serious injury or death (Ex. 1–103.).

Mr. Ronald Signorino, the Director of Health, Safety and Regulatory Affairs for Universal Maritime Services, described the diminishing amount of break-bulk cargo being handled with conventional cargo gear since the advent of containerized cargo (Ex. 6–35). He stated that traditional cargo handling expertise had become a ''lost art'' and therefore recommended that language be included in the final rule addressing the proper rigging and operating of conventional cargo gear. He reasoned that, since some cargo is still handled by conventional methods, including recommendations addressing the correct spotting of cargo handling gear would provide employees unfamiliar with such gear with guidance on its safe operation. Mr. Signorino noted that improperly spotted conventional cargo handling gear can fail, which causes the gear and cargo to fall and can lead to serious injury. OSHA agrees and has added this information in non-mandatory Appendix III.

Section 1918.51 contains general requirements that apply to all cargo handling equipment that is permanently attached to a vessel. Final rule paragraph (a) remains essentially the same as proposed and stipulates that the safe working load of the gear, whether marked on the lifting appliance itself or specified in the required certificates/gear register, may not be exceeded. It also specifies that any limitations imposed by the authority responsible for certificating the gear be followed.

Final rule paragraph (b) requires that each component of ship's cargo handling gear be inspected by the employer (or his or her designee) before every use and at appropriate intervals during use. This paragraph clarifies the corresponding requirement in OSHA's existing Longshore Standard by making clear that the employer has an obligation to do a visual inspection. One commenter, the International Cargo Gear Bureau, Inc. (ICGB), pointed out that the proposed paragraph would have limited the designees to ''representatives of the employer,'' which was not OSHA's intent (Ex. 6–22). OSHA has revised the language of the final rule to say, ''designated person.''

Referring to the same paragraph, § 1918.51(b), another commenter, the National Maritime Safety Association (NMSA), suggested that OSHA add the words ''and when necessary'' before the words ''at intervals during use'' (Ex. NMSA *et al.*). However, OSHA disagrees with this comment because the Agency believes that, during use, events could occur or conditions arise that would suggest to a prudent operator that an unscheduled visual inspection may be necessary. OSHA agrees with NMSA that the inspection intervals required by the final rule should be qualified but believes that the word ''appropriate'' captures the desired meaning better than the suggested word ''necessary.'' The final rule reflects this determination.

In final paragraph (c), employers are required to determine the load ratings of all wire ropes and rope slings presented in the vessel's wire rope certificate and to observe these ratings when using this gear.

Final rule paragraph (d) provides criteria for splicing wire rope and for wire rope configuration characteristics and is essentially unchanged from the corresponding paragraph of the proposal. It addresses eye splices, requirements for wire rope used in lifting, natural and synthetic fiber rope slings, and chains. Additionally, this paragraph brings the Longshore regulations for wire rope into conformity with the same criteria as those in OSHA's rules for shoreside marine cargo handling equipment (§ 1917.42) and thus reflects OSHA's effort to maintain consistency between parts 1917 and 1918 and to enhance employee safety.

Final rule §§ 1918.52, 1918.53, and 1918.54 all address the subject of rigging and operating vessel's cargo handling gear. The requirements of these sections are essentially the same as those parallel provisions found in the existing and proposed rules, although some language modifications have been made to enhance clarity.

Final rule § 1918.52, ''Specific requirements,'' contains provisions addressing preventers, stoppers, falls, heel blocks, coaming rollers, and cargo hooks. Paragraphs (a)(1) and (a)(2) mandate that preventers have sufficient strength to achieve their purpose and be properly secured to the head of the boom (unless, for cast fittings, the strength of the fitting exceeds the strength of all lines secured to it (paragraph (a)(1)) and that wire rope clips and knots not be used to form eyes in or join preventer guys (paragraph (a)(2)).

Paragraphs (b) (1), (2), and (3) contain requirements for the condition, configuration, strength, and securing of chain topping lift stoppers. These requirements are essentially unchanged from the parallel provisions of the proposal. OSHA solicited comment in the proposal regarding whether or not to delete § 1918.52(b) as obsolete. This paragraph addresses the use of chain topping lift stoppers and clamp type stoppers that are used manually to lower and raise the boom. This method of topping the boom is a potentially dangerous operation and has been largely replaced by the use of electric topping lift winches that do not require the use of stoppers. As noted earlier, however, vessels continue to call on U.S. ports equipped with this older equipment. Such vessels will need to be addressed by § 1918.52(b), as noted in the comments (Ex. NMSA *et al.*). OSHA agrees and has accordingly left this requirement in the final rule.

Paragraph (c) specifies requirements for the securing, conditions of use, formation of, and winding of the fall on the drum. Again, no comments were received on these provisions, which are essentially unchanged from those proposed. These provisions are designed to ensure that winch falls do not slip, break, or release while cargo is being lifted.

Heel blocks are covered by the requirements of paragraph (d). Paragraph (d)(1) requires that a preventer or equally effective means be used to hold the block in the event of heel block attachment failure. In paragraph (d)(2), OSHA requires that, in cases where the heel block is not so rigged as to prevent its falling when not under strain, the heel block must be secured, except where the heel block is at least 10 feet above the deck at its lowest point.

Paragraph (e) of the final rule requires portable coaming rollers to be secured by wire preventers, while paragraph (f) specifies that cargo hooks be as close to the junctions of falls as the assembly permits, but in all cases within 2 feet of the assembly. Paragraph (f) applies only to vessels and operations where fall angles greater than 120 degrees occur.

Cargo winches are covered in § 1918.53 of the final rule. Paragraph (a) stipulates that the moving parts of winches or other deck machinery be guarded to prevent employees from being caught in or between moving parts. According to paragraph (b), winches may not be used if control levers operate either with excessive play or friction; paragraph (c) prohibits the use of double gear winches or other winches equipped with a clutch unless a positive locking mechanism to lock the gear shift is provided. When the gears on a two-gear winch are being changed, paragraph (d) prohibits any load on the winch other than the fall and cargo hook assembly.

Paragraph (e) requires that any defect or malfunction that has the potential to affect safety be reported immediately to the officer in charge and that the winch in question not be used until the defect or malfunction has been corrected. The proposal added the following language to this paragraph: ''* * * and the winch shall not be used until the defect or malfunction is corrected.'' This addition was supported by the International Longshoremen's and Warehousemen's Union (Ex. 19). In addition, several comments were received regarding the phrase ''Any defect or malfunction of winches that affects safety * * *.'' These commenters stated that the language was too broad and that the less specific language in OSHA's existing standard should be retained instead (Exs. NMSA *et al.,* PMA *et al.*). Other commenters agreed with the proposed language, however (Ex. 19, NO Tr. pp. 250–251). OSHA finds NMSA's and PMA's arguments unconvincing because the Agency believes that employers will benefit from the more specific requirement. However, the final language has been modified for clarity to say ''Any defect or malfunction of winches that could endanger employees * * *''.

Paragraph (f) requires that temporary seats or shelters for winch drivers not be used if they create a hazard to the operator or other employees (e.g. a ''plywood roof'' that obstructs the view of the operator). In addition, paragraph (g) prohibits winch drivers from using control extension levers that have not been provided by the employer or the ship (except for short handles on wheel-type controls). If used, such levers must be of adequate strength and be securely fastened. Any extension lever that tends to fall under its own weight must be counterbalanced, according to paragraph (h).

In paragraph (i) of the final rule, OSHA requires that winch brakes be monitored during use, and that those that are not able to hold the load be removed from service. As proposed, this requirement mandates that winches be monitored during operation. One commenter suggested that the phrase ''monitored for performance'' be more fully explained in the final rule (Ex. 6–46). In response, OSHA notes that the requirements in § 1918.53 are directed to the employer of the employees who operate the winches to load and unload cargo. If, during operation, it is observed that the winch brakes do not prevent the cargo gear from lowering or slipping while under a load, the winch must be removed from service. To provide the specifics requested by this commenter, the language of paragraph (i) now reads as follows: ''(i) Winch brakes shall be monitored during use. If winch brakes are unable to hold the load, the winch shall be removed from service.''

The requirement at paragraph (j) states that winches may not be used if one or more control points are not operating properly, and further specifies that employees are not permitted to tamper with or adjust the winch controls. Both of these requirements are designed to ensure the safety of hoisting and lowering operations performed with a winch.

To ensure that unattended winch controls are not tampered with or adjusted, paragraph (k) requires that the control levers of unattended winches be placed in the neutral position and that the power be shut off or the control lever be locked. As proposed, a

feasibility exception that is included in OSHA's existing Longshore Standard has been deleted because it was based on a winch design feature that is no longer in use today because of technological improvements.

Section 1918.54, entitled ''Rigging gear,'' addresses the hazards associated with the unsafe practice of rigging guys or preventers so that they chafe against other guys, preventers, or stays. Such chafing can cause the vessel's cargo gear to fail because the chafing can cause the wires to separate, leading to possible serious injury or death as the gear and cargo fall down on the deck or into the hold. Several commenters supported the inclusion of this paragraph in the final rule (Ex. NMSA *et al.*).

Paragraph (a) requires each guy or preventer to be placed in a manner that prevents it from contacting any other guy, preventer, or stay, and paragraph (b) requires that guys be placed to produce the least amount of stress without allowing the boom to jackknife. Boom placement is addressed in paragraph (c), which states that the head of the midship boom must be spotted no further outboard of the coaming than is required to control the load. Preventers are covered in paragraph (d). Paragraph (d)(1) requires that these devices be secured to suitable fittings (other than those to which the guys are secured) and be as nearly parallel to the guys as the fittings permit. Except when the cleat is also a chock and the hauling part is led through the chock opening, the lead of preventers must be designed so that the direction of the line pull of the preventer is as parallel as possible to the surface on which the cleat is mounted (paragraph (d)(2)). Paragraph (d)(3) requires that guys and associated preventers be adjusted so that the load is shared as equally as possible when burtoning operations are underway. An exception is allowed where guys are designed and intended only for trimming purposes and the preventer is used in lieu of the guy; in such cases, the guy may be left slack.

Cargo falls are covered by paragraph (e), which stipulates that cargo falls under load are not permitted to chafe against any standing or other running rigging. A Note to this requirement stresses that, for the purposes of this paragraph, rigging is not to be construed to mean hatch coamings or other parts of the vessel.

In paragraph (f)(1) of the final rule, employers are required to secure the bull wire to the gypsy head by shackle or equivalent method where the bull wire is taken to the gypsy head for lowering or topping the boom. Fiber rope may not be used to comply with this provision. Paragraph (f)(2) states that, when it is not possible to secure the bull wire to the gypsy head or when the topping lift is taken to the gypsy head, at least five turns of the wire must be used.

When deck loads are higher than the rail and the clearance between the edge of the load and the inside of the bulwark or rail is less than 12 inches, paragraph (g) requires employers to provide a pendant or other alternate device to permit trimming of the gear without its going over the side. The provisions in section 1918.54 are essentially unchanged from the parallel requirements in the proposal.

Final § 1918.55, titled ''Cranes,'' covers deck cranes permanently attached to a vessel. OSHA's existing rule only addresses the hazards associated with the swing radius of the crane. The final rule's requirements, on the other hand, provide more comprehensive coverage of the hazards encountered in the use of ship's cranes. In addition, these requirements closely parallel similar shoreside requirements in part 1917 and in other OSHA crane standards.

In § 1918.55(a), OSHA prohibits the use of cranes that develop a visible or known defect affecting safe operation. In addition, proposed paragraph (b)(1) required that the operator's station be well maintained, with good visibility provided through the cab's glass. Comments were received (Ex. NMSA *et al.,* PMA *et al.*) recommending that OSHA reword the language of this provision of the existing Longshore Standard for the sake of clarity. Other commenters pointed out that the proposed wording of this provision was similar to language found in the Pacific Coast Marine Safety Code (although the code requires replacement of cracked or broken glass) (Ex. 19). In response to the comments received, OSHA has revised the language in this paragraph to read as follows: ''Cranes with missing, broken, cracked, scratched, or dirty glass (or equivalent) that impairs operator visibility shall not be used.'' The same language has been used in § 1917.45(f)(5), addressing the same issue in relation to cranes used in marine terminals.

Paragraph (b)(2) mandates that clothing, tools and equipment be stored in a manner that does not restrict access to or operation of the crane or interfere with the operator's view.

According to paragraph (c), areas that are within the swing radius of the body of revolving cranes and are accessible to employees must be guarded during cargo operations to prevent an employee from being caught between the body of the crane and any fixed structure, or between parts of the crane. In proposed paragraph § 1918.55(c)(1), OSHA addressed the danger of employees being caught between shipboard gantry cranes and fixed structures on deck along the travel path of the crane, such as would occur on a LASH (Lighter Aboard Ship) vessel or a self-contained container ship. (Ex. 1–103, cases 26 and 27). OSHA received both comment and testimony on this proposed language. The commenters pointed out that there are means other than physical guarding to protect employees in this situation, such as using a proximity device to shut down crane travel if an employee is in danger of being caught between the crane and a structure on the vessel (Ex. NMSA *et al.,* NO Tr. p. 396). OSHA agrees with these commenters and has added the words ''or other effective means shall be taken'' to paragraph (c)(1) of the final rule. Also, a note has been added for clarification that says; ''Verbal warnings to employees to avoid the dangerous area do not meet this requirement.''

An issue discussed at length during the public hearings was the bypassing of limit switches during cargo operations. Most cranes, both shore-based and shipboard, are equipped with limit switches. Limit switches are designed to prevent the crane and boom from damage by deactivating the crane when certain limits are exceeded. Limit switches can prevent the crane from the following hazards: boom collapse, unwanted contact with the vessel or other structure, exceeding the safe working load, or dropping a container. Another example of a limit switch is the anti-two-blocking device. The calibration of limit switches always incorporates a specific margin of safety.

In the proposal, OSHA did not allow the bypassing of limit switches during cargo operations. The National Maritime Safety Association, in their written comments, asked that OSHA allow limit switches to be bypassed, but only after an officer of the vessel has been notified, and only where a designated person directs the operation (Ex. NMSA *et al.*). During the public hearings in Seattle, members of the International Longshoremen's and Warehousemen's Union (ILWU) Longshore Coast Safety Committee testified that limit switches should not be bypassed except in certain situations, such as an emergency. They expressed concern that bypassing limit switches could put stresses on cranes for which they were not designed, resulting in a dangerous situation. The ILWU also stated that this issue had been considered by the Joint Co-Safety Committee, which consists of

members from labor and management, and that Committee had determined that cranes with a load should never be put in a bypass mode (SEA Tr. pp. 106–113).

Further, a member of the Pacific Maritime Association (PMA) testified at the Seattle hearings that because of the discussions between the PMA and the ILWU, Rule 277 of the Pacific Coast Marine Safety Code had been adopted:

> Bypass keys where ships' cranes equipped with limit switches, shall not be left in the override locks. That * * * [is], the keys were not to be maintained in the override locking position.
>
> That was the result of the discussion. There was never unanimous agreement on if bypass switches could be turned on for special moves or special types of operations (SEA Tr. p. 158).

During the Seattle hearings, further testimony on the issue of bypassing limit switches was given by Don Lawson, principal surveyor with Marine Surveyors and Consultants, Inc., a company accredited by the Department of Labor under part 1919 to inspect and certify vessel and shore-based cargo handling gear. Mr. Lawson stated:

> The purpose of the limit switch is:
>
> [First] to prevent stresses on the structure, particularly the boom, when the maximum radius is reached, and if the safe working load was on the hook at the time, to go below the safety switch, the lower limit safety switch, would be an overstressed situation.
>
> The second reason for a limit switch is preventing physical damage, physical contact with structures around the crane, and this is where there's been a lot of problems over the years.
>
> A limit switch should never be bypassed for cargo operations. I agree with the scenario of a life and limb situation or an emergency situation where there might be property damage and that there should be somebody technically-oriented to carry that out.
>
> In the hundred or so incidents we've been involved with, most the times the jib, when the limit switch is bypassed, is set down on the crutch or the foundation for another crane on the vessel, which is on the same platform, or it's the rail of the platform.
>
> The operator's view of these areas is limited because the structure of the jib is quite large and does obstruct the side view * * *.
>
> In all cases, if there's been contact with ship structure, the limit switch had been bypassed.
>
> Another statement that came out yesterday is there's a lack of design or a problem with design of vessels and that you must bypass the limit switch in order to get to certain reaches of a hatch. That's not true.
>
> The newer generation loggers have long midships hatches. Usually the middle hatches, and the two and three or three and four hatches are long, but they're served by cranes on both sides of the hatch.
>
> If you look at a shadow plan of the radius of the cranes, you'll see that they're concentric circles in the center of the hatch, but in the trunks the forward crane will not reach the after trunk and vice versa (SEA Tr. pp. 278–289).

Further testimony given by an ILWU container crane operator addressed bypassing the limit switches on the container spreader bar. These switches are designed to prevent the corner twist locks from unlocking when handling a container. Citing snow as an example, he stated:

> * * * I don't believe that we should use a bypass because we have snow jamming the sensors and the corners of the spreader. What we should be doing, of course, and what we normally do is lower the spreader and have somebody clean out the snow (SEA Tr. p. 111).

Another dock worker testified that the spreader corner locks can be bypassed to speed up an operation. Instead of having to wait for the limit switches to activate and release the locks, bypassing them allows for a faster operation. However, this same witness testified that this practice can also lead to a spreader releasing a container inadvertently while in the air (SEA Tr. pp. 306–307).

One employer, Captain John McNeil, Vice-President of Operations, Marine Terminals Corporation, testified that there are occasions where the limit switches on a container crane can be an operations problem.

> * * * The upper limit on container cranes is usually set by a limit switch, to six feet under the boom to permit normal, safe operations.
>
> When we have an especially high vessel that comes into that threshold one or two feet, it is a common practice, is it not, to shut off the bypass or to raise the bypass limits to be able to work that extra tier of containers? (SEA Tr. p. 285).

Additionally, Captain McNeil noted that limit switches are sometimes bypassed, prior to cargo handling operations, when a vessel has two cranes at the same hatch that can be operated together (married) or separately (SEA Tr. pp. 286–288).

Post hearing comments submitted by the ILWU repeated their position against bypassing limit switches and included suggested language for the final rule. They also stated that similar language should be included in the Marine Terminals Standard, as part of § 1917.45, *Cranes and derricks* (Ex. 78).

After a thorough review of all the comments and testimony, OSHA remains unconvinced that limit switches can be safely bypassed during cargo operations and continues this prohibition in the final rule. However, OSHA recognizes that, in addition to emergencies, there are certain non-cargo handling operations that occur that necessitate the bypassing of limit switches but have no adverse impact on worker safety. OSHA has identified three specific situations where such bypass systems may be activated: during an emergency, while performing repairs or when stowing cranes or derricks. To provide additional safeguards, any time a bypass system is used, it must be done under the direction of an officer of the vessel. Paragraph (c)(2) of the final rule has been revised accordingly.

The provisions of paragraph (c)(2) are also being carried over to shore-based cranes in the final rule on marine terminals. However, OSHA recognizes, in one unique, shore-based situation, where the limit switches of cranes can be readjusted without an adverse impact on worker safety. Specifically, when a container ship with an unusually high deck load causes the upper limit switches to activate before the top tier of containers can be worked, then the limit switches can be safely readjusted if the margin of safety provides enough extra height to allow readjustment. While readjustment may be allowable under these narrow circumstances, bypassing the limit switch is not. To provide additional safeguards, readjusting limit switches may only be done under the direction of a crane mechanic. Therefore, OSHA has also included language regarding adjustments of limit switches in § 1917.45(g)(11).

Final rule § 1918.55(c)(3) requires a minimum of three full turns of wire rope to remain on ungrooved drums and at least two turns on grooved drums under all operating conditions; this is a precaution against slippage of the rope.

Paragraph (c)(4) requires that crane brakes must be monitored during use. This requirement is essentially unchanged since the proposal. (See discussion about brakes in § 1918.53(i), above.)

Paragraphs (c)(5) and (c)(6) address crane control levers and cranes with power down capability. Both of these provisions, which are standard safe operating procedures for cranes, are unchanged since the proposal.

Under paragraph (c)(7), when two or more cranes are used together to hoist a load, a designated person must direct the operation and instruct personnel in safe positioning and rigging. The designated person must also direct the movement of the crane. No changes have been made to this requirement since the proposal, and no comments on this provision were received.

Paragraph (d), which applies to cranes that are unattended between work periods, states that § 1918.66(b)(4) (i) through (v) applies to such cranes.

Subpart G—Cargo Handling Gear and Equipment Other Than Ship's Gear

Subpart G, Cargo Handling Gear and Equipment Other than Ship's Gear, applies to all cargo handling gear used in cargo operations that is not part of the vessel (i.e. ship's gear). Some examples of the type of gear addressed in this subpart include: container handling lifting frames and certain multi-point engagement bridles, gear room constructed spreader bars for heavy lift cargo, special lifting devices for unique pieces of cargo, and bar pallet bridles. Except as noted below, commenters generally supported these provisions as proposed (Exs. NMSA *et al.*, PMA *et al.*).

Final rule § 1918.61 covers a wide range of subjects relating to gear inspection (examples: safe working loads, weight markings, certification, special gear). Paragraph (a) requires that all gear and equipment provided by the employer and brought aboard a vessel must be inspected before and, when appropriate, during its use by a designated person to assess its condition. If found to be unsafe, such gear cannot be used until it has been made safe. This paragraph is similar to the corresponding provision of the existing regulation, except that the term ''designated person'' has replaced the term ''authorized representative'' in the final rule. This change is consistent with the decision discussed in subpart A, Scope and definitions, regarding the use of the term ''designated person.''

Final rule paragraph (b)(1) is the same as the parallel requirement in the current and proposed longshore rules and requires that the Safe Working Load (SWL) of gear not be exceeded. Final rule paragraph (b)(2) was a new provision in the proposal. This paragraph requires the marking of the safe working load (SWL) on all cargo handling gear with a SWL of more than five short tons (4.5 metric tons). This practice is consistent with current recognized industry practice (Ex. 1–151). In the proposal, OSHA stated that most gear in use is already marked with the SWL, and no comments to the contrary were received.

Final rule paragraph (c) requires that any article of stevedoring gear weighing more than 2,000 pounds (.91 metric tons) must have its weight marked plainly on the article before being hoisted by the ship's gear. It is important to consider the weight of such articles when evaluating safe working loads of the vessel's cargo gear because the weight of the gear must be added to the weight of the load being lifted to figure out the actual load, which together cannot exceed the SWL of the vessel's cargo gear.

Final paragraphs (d) and (e) address certification and certification procedures. These provisions parallel those found in the shoreside Marine Terminal rules (§ 1917.50(a) and (b)(1)). Paragraph (d) requires certification of any special gear listed in paragraphs (f)(1) or (g) of this section. Paragraph (e) requires that this certification be done by a party accredited by OSHA under 29 CFR 1919. Final rule paragraph (d) has been corrected to include a reference to paragraph § 1918.61(g), which addresses the initial proof-load testing of intermodal container spreaders. The reference to paragraph § 1918.61(g) was mistakenly omitted in the proposal.

Paragraph (f), entitled ''Special gear,'' addresses special stevedoring gear, which is material handling gear fabricated of components that are not common, off-the-shelf items. Common, off-the-shelf gear would include hooks, shackles, and other items that have already been tested by the manufacturer. Examples of special stevedoring gear include gear room-constructed spreader bars for heavy lift cargo, special lifting devices for unique pieces of cargo, or bar pallet bridles that have some components that are not marketed or purchased with a specific cargo handling use in mind.

OSHA's existing Longshoring Standard requires initial testing for new special stevedoring gear, but does not require the tests to be conducted by an OSHA accredited agency (see § 1918.61(b) of that rule). The existing Marine Terminals Standard also requires initial testing for new special stevedoring gear. These tests, however, must be conducted by an OSHA accredited agency (see § 1917.50(c)(5)).

In the proposal, OSHA distinguished between heavy lifting gear (gear with a SWL over five short tons) and lighter gear. Heavy gear tends to be more complex in design and fabrication, more difficult to inspect and test, and presents a greater employee exposure hazard upon failure. Lighter gear, which is far more extensive and commonly associated with palletized/break bulk operations, is less complex in design and fabrication, less difficult to inspect and test, and presents a reduced employee exposure hazard upon failure. Based on these distinctions, OSHA proposed testing by an accredited agency for the heavy gear with proof load testing specifications ranging from 25% to 10% in excess of the SWL. For the lighter gear, OSHA proposed that testing be conducted by a qualified employee (in lieu of third party certification) to a specification of 25% in excess of the SWL.

Final paragraph (f)(1) requires special gear provided by the employer, the strength of which depends on special gear components and that additionally has a Safe Working Load of more than five short tons (4.5 metric tons) to be tested and inspected prior to initial use as a unit. Paragraph (f)(2), which is a provision similar to the corresponding provision of OSHA's existing Longshoring Standard, requires that special stevedoring gear with a SWL of five short tons or less continue to be inspected and tested prior to initial use as a unit by either an accredited agency or by a designated person. All tests required by this paragraph must be in accordance with Table A shown in paragraph (f).

Paragraph § 1918.61(g) of the final rule requires that all intermodal container spreaders provided by the stevedore for hoisting afloat (aboard a vessel) shall be similarly inspected, tested, and certified. This provision also requires any spreader that is damaged in a way that requires structural repair to be inspected and retested after the repair is performed and before the spreader is returned to service. It should be noted that intermodal container spreaders that are part of ship's gear are required to be inspected and tested as part of the vessel's cargo gear under ILO Convention 152 (see subpart B, Gear certification).

Paragraph (h) requires that all cargo handling gear covered by this section having a SWL greater than five short tons be proof-load tested every four years according to Table A found in paragraph (f) or paragraph (g) of this section, as applicable. This proof-load test may be conducted by an agency accredited by the U.S. Department of Labor under 29 CFR part 1919 or by a designated person.

Final paragraph (i) requires that certificates and inspection records generated by the tests required by this section be made available for inspection. These include the certificates issued by accredited agencies as well as inspection and test records produced by designated persons while testing the equipment. Additionally included is any initial test records required by the existing standard for the purposes of the periodic testing provisions of paragraph (h) of this section.

Several issues related to § 1918.61 arose during rulemaking; these can be categorized as follows:

(1) There are no OSHA-accredited agencies in or near some ports, some commenters said, especially small ports,

which would increase costs and burden, perhaps especially for some small employers;

(2) Several commenters contended that requiring OSHA accredited agencies to provide certification for fabricated equipment repeats the current function of steel fabricators;

(3) Some break-bulk stevedores noted that a great deal of equipment would have to be certified or inspected every four years.

In their view, the Agency has underestimated the costs of certification and four-year equipment testing. In addition, they argued that the Agency did not demonstrate how the proposed testing provisions will significantly reduce the risk of using special gear and spreaders and that the Agency has not shown that these requirements are reasonable and necessary. Each of these points is addressed in turn.

In response to a comment questioning the availability of the OSHA accredited agencies required to conduct the tests specified in this section (SEA Tr. p. 484), OSHA notes that there are currently 130 OSHA accredited agencies in the United States and that they are located in all of the major port areas, including the Great Lakes and the Inland Waterways. Mr. Donald Lawson, with Marine Surveyors and Consultants, also testified that there were 5 to 10 companies that could do the required testing in the Seattle and Portland, Oregon area alone (SEA Tr. p. 278).

Several commenters questioned whether OSHA had provided information or data that showed that the proposed revisions to these requirements would reduce employee risk in this industry. The record clearly demonstrates, on a national level, that gear failures frequently occur. Data in the IMIS database indicate a record of injuries and fatalities due to gear failures (Ex. 1–103, cases 108, 116, 124). OSHA thus concludes that these requirements, which are designed to prevent gear failure, are necessary to employee protection.

In addition, OSHA received several comments and testimony suggesting that only a prototype or sample of special stevedoring gear needed to be proof load tested, instead of testing every single piece of gear, as proposed (Exs. 8–8, 8-20, SEA Tr. pp. 164–169, NO Tr. pp. 209–211). For example, Mr. Don Lawson, principal surveyor with Marine Surveyors and Consultants, testified:

> I agree with the fact that a prototype can be developed with sufficient engineering and tested, but once production starts there need to be controls in workmanship and quality control and quality assurance and in the material * * * . They'll look for things, such as traceability and materials, for production controls, and for quality assurance * * *. Beyond that, the next step would be to make periodic visits to spot check workmanship, and then to carry out testing on 10 out of 100 or one out of 200 units (SEA Tr. pp 282–283).

After careful consideration, OSHA agrees with Mr. Lawson's concern for quality assurance and reproducibility of specifications in unique shop-built stevedoring gear. Unlike the quality control mechanisms built into a manufacturing process that mass-produces items, OSHA believes that shop built items are more subject to variations in fabrication. These items, therefore, shall be individually tested according to this section.

Several commenters criticized the Agency's estimate of the costs that employers must incur to meet the revised standards for gear testing (SEA Tr. pp. 154, 236–250, 399, and 570). Some of these commenters are representatives of stevedores who perform specialized longshoring operations, such as logging and wood pulp, almost entirely on vessels. Since these employers primarily use special gear located aboard vessels, their gear has not previously been required to be tested, as marine terminal equipment has. Those employers who are involved primarily in container transport are not as affected by the final standard as stevedores engaged in break-bulk operations. Although some commenters expressed concern over the potential costs of these provisions, others agreed with OSHA that they were economically feasible for affected firms, as demonstrated by the comments of Mr. John Faulk, testifying on behalf of NMSA:

> NMSA agrees with the approach by OSHA for 1917.50(c) and 1918.61(d) concerning certification of special stevedoring gear is practical, economically feasible and will provide adequate safeguards* * *. Except for the recommendations submitted by NMSA in their written comments * * * NMSA fully endorses OSHA's proposed language on the other provisions found in this subpart (NO Tr. p. 153).

The Agency has revised its cost estimates and its estimation of the impact on particular employers for this final rule (see SectionVI, Summary of the Final Economic Analysis and Regulatory Flexibility Analysis).

OSHA has included a table entitled ''Cargo Gear Testing Requirements'' in a non-mandatory appendix (Appendix IV). A form of this table was originally recommended by the National Maritime Safety Association and the Pacific Maritime Association (Exs. 8–8, 8–20) for inclusion in the standard as a compliance tool. Besides the performance and frequency requirements, OSHA has added the proof load testing specifications from Table A of § 1918.61(f) to the table in Appendix IV so that it summarizes all of the testing gear requirements of this section. OSHA believes that this tabular information will enhance the clarity of the provisions and thus promote compliance.

For consistency, these same changes are being made to the parallel provisions of the Marine Terminals Standard (§ 1917.50 (c)).

Final rule § 1918.62, titled ''Miscellaneous auxiliary gear,'' covers all miscellaneous gear provided by the stevedore that is not part of ship's gear. The hazards addressed by this section are those generally associated with an employee being struck by falling objects, e.g. dunnage, gear or cargo, when the gear fails. These provisions of the final rule parallel the same requirements for miscellaneous gear found in the shoreside cargo handling standards at § 1917.42.

Several modifications have been made to the existing rule to reflect the changes that have occurred in modern marine cargo handling methods. For example, the replacement criteria for wire rope are more stringent than those in the current regulation (see § 1918.62(a)(4) of the final rule), and the prohibition against using new parts made of wrought iron now accords with the prohibition in ILO Convention 152 (see § 1918.62(a)(5)(ii) of the final rule). Additionally, the final rule consolidates a number of closely related provisions formerly scattered throughout the rules into this one section; again, this is consistent with the format of the corresponding section in part 1917. Several commenters supported these provisions as proposed (Ex. NMSA *et al.*).

Paragraph (a)(1) mandates that, after the completion of each use, loose gear be placed in a manner that will avoid damage to the gear. In addition, this provision states that loose gear must be inspected after each use and be repaired before reuse if found to be defective.

Section 1918.62(a)(2) prohibits the use of defective gear and requires that distorted hooks, shackles or other similar gear be discarded to prevent its reuse. Several commenters suggested that OSHA clarify the meaning of the word ''defective'' (Exs. 19, 6–31a, 8–8, and 8–20), and the final rule now explains that those defects falling within the definition of ''defective'' as used by the manufacturer of the particular gear are addressed by this provision of the final rule. In addition, when manufacturers' specifications are

not available to determine whether gear is defective, the employer must use the appropriate paragraphs of this section to make these determinations.

Paragraph (b) covers wire rope and slings that are not part of ship's gear. Employers are required by paragraph (b)(1) to follow the manufacturer's recommended ratings for wire rope and wire rope slings and to have such ratings available for inspection. In cases where the manufacturer is not able to supply the rating, employers must use the wire rope and wire rope sling tables found in Appendix II of this rule.

OSHA, in the proposal and the final rule, has included a comprehensive collection of tables, in Appendix II, that are to be used when manufacturers' specifications or gear certificates are not immediately available at the worksite for safe working load assessment. These tables are primarily based on American Society of Mechanical Engineers Standard (ASME) B30.9–1990 (Slings) (Ex. 1–148) and on requirements applying to wire rope clips and shackles currently contained in the Agency's rules for marine terminals.

Several commenters urged OSHA to make the use of these tables non-mandatory (Exs. 8–8, 8–20); these commenters noted that the proposed appendix containing these tables was non-mandatory and argued that the terminology used in the provision of the regulatory text referring to these tables should also be nonmandatory. In response, OSHA notes that the corresponding tables in OSHA's existing Longshore rule are referred to in mandatory language, and after careful consideration, has concluded that reliance on these tables is mandatory when certificates or manufacturers' use recommendations are not available. Consequently, OSHA has decided to change the status of Appendix II from non-mandatory to mandatory. This position was supported by several commenters (Exs. 19, 78, 6–49, 6–50, 6–51, 6–52, 6–53, 6–54, and 6–55). According to final rule paragraph (b)(2), wire rope having a safety factor of less than 5 may be used only in accordance with the limitations specified in paragraphs (b)(2)(i) through (iii). Wire rope or wire rope slings having any of the defects specified in paragraph (b)(3)(i) through (vi) may not be used for fear of failure.

Paragraphs (b)(4) through (b)(9) address covering or blunting of the ends of strands in splices, the use of wire rope clips to form eyes, the securing of wire rope, and eye splices. These provisions are essentially unchanged from the parallel provisions in the existing rule and in the proposal and are considered standard industry practice.

Paragraph (c) of the final rule contains similar provisions that apply to natural fiber rope and natural fiber rope slings used aboard ship, and paragraph (d) addresses the same hazards as they apply to synthetic rope and synthetic rope slings. The load ratings found in the various tables in Appendix II are to be used for ropes and slings of all types, as identified on the appropriate table.

In § 1918.62(e), those defects that are sufficient to require the removal from service of natural or synthetic ropes are identified; these defects include abnormal or excessive wear, cut or broken fibers, rotting, and other structural defects that could cause the rope to fail under load. Paragraph (f) requires, where practicable, that properly fitted thimbles be used in cases where the rope is secured permanently to a ring, shackle, or other attachment. These provisions are also essentially unchanged both from the corresponding provisions of the existing rule and the proposed rule.

Paragraph (g) of the final rule, titled ''Synthetic web slings,'' prescribes the conditions of use, causes for removal from service, and other requirements governing synthetic sling use. Paragraph (g)(1) prohibits the use of slings and nets composed of more than one piece of synthetic webbing and used as a single unit to hoist loads greater than the loaded capacity of the sling itself. In paragraph (g)(2), those defects that require the sling to be removed from service are specified; examples of such defects are acid or caustic burns, snags or punctures, and signs of excessive wear or damage. Paragraph (g)(3) prohibits the return to service of defective synthetic slings unless they have been repaired by a sling manufacturer or an entity with equivalent competence and additionally pass two proof tests. Manufacturers' use recommendations are required to be followed by paragraph (g)(4), and paragraph (g)(5) of the final rule mandates that fittings have a breaking strength that is at least equal to that of the sling to which the fittings are attached. These requirements, which were not specifically addressed by commenters, are essentially unchanged from the parallel requirements of the proposed rule and the Agency's Marine Terminals Standard. Their inclusion in the final rule thus achieves consistency in synthetic sling requirements in OSHA's marine cargo handling rules.

Paragraph (h) is titled ''Chains and chain slings used for hoisting.'' Employers are required by paragraph (h)(1) to observe manufacturers' ratings for safe working loads when wrought iron or alloy steel chains and slings are used and additionally must have such ratings available. When such ratings are not available, Table 4A of Appendix II must be relied on for this information (for alloy steel chains and chain slings only). Paragraph (h)(2) specifically prohibits the use of coil steel chain or of other types of chain not recommended for slinging or hoisting by the manufacturer. The provisions of paragraph (h)(3) address the inspection of sling chains, specify the conditions that require removal of the chain from service, and stipulate that the inspection of chains used for slinging and hoisting may be performed only by designated persons.

Stringent requirements governing the repair of chains used for hoisting are included in paragraph (h)(4), and paragraph (h)(5) requires any wrought iron chains continually used for hoisting to be annealed or normalized at intervals not to exceed every 6 months. Following ILO recommendation 160 (Ex. 1–8), OSHA proposed to add language to this section to prohibit the use of wrought iron (which is considerably less elastic than steel and thus is more prone to fail) in new parts of lifting appliances or loose gear (§ 1918.62(h)(5)(ii)). Although wrought iron is rarely seen on vessels that are trading today, such gear may still be in use on some vessels, and OSHA has therefore included this provision in the final rule.

Paragraphs (h) (6), (7), and (8) prohibit the use of kinked or knotted chains, require hooks, rings, links, and other attachments to have rated capacities at least equal to those of the chains to which they are affixed, and mandate that chain slings be marked with their size, grade, and rated capacity, respectively. Shackles are covered in paragraph (i)(1), which requires that the manufacturers' safe working load, if known, not be exceeded; where this information is not available, employers are required to follow Table 5 of Appendix II. Paragraph (i)(2) mandates that all screw pin shackles provided by the employer and used aloft (except in cargo hook assemblies) have pins that are positively secured.

Hooks other than hand hooks are required by paragraph (j)(1) to be used in conformance with the manufacturers' safe working load and to be tested in accordance with paragraphs (a), (c), and (d) of § 1919.31 unless manufacturers' test certificates are available for such hooks. Paragraphs (j) (2), (3), (4) and (5) specify the conditions of use pertaining to hooks (other than hand hooks). These

requirements are essentially unchanged from those proposed.

Pallets are covered by the requirements of paragraph (k). Paragraph (k)(1) specifies that pallets be made and maintained so that they will support the loads being handled and requires that the fastenings of reusable pallets that are used to hoist loads consist of bolts and nuts, drive screws, threaded nails, or equivalently strong fastenings. Provisions addressing the hoisting of reusable pallets, bridles for handling flush end or box-type pallets, and the stacking of pallets, as well as a prohibition against the reuse of single-use pallets, are found in paragraphs (k)(2), (3), (4), (5), and (6).

Section 1918.63, titled ''Chutes, gravity conveyors, and rollers,'' and § 1918.64, titled ''Powered conveyors,'' contain requirements for the safe use of chutes, rollers and both gravity and mechanically powered conveyors. These sections are unchanged from the corresponding provisions of the proposal; in addition, these rules parallel the requirements covering similar equipment in the Marine Terminals Standard (see §§ 1917.48 and 1917.49). After this final rule is effective, there will thus be no regulatory inconsistencies with such equipment, which often physically originates on shore and extends onto the ship.

The principal hazards associated with the use of chutes, rollers, and gravity and mechanically powered conveyors are caught in, struck by, and crushing injuries and engulfment (e.g. by moving grain). Accordingly, the provisions in §§ 1918.63 and 1918.64 require, among other things, that this equipment be strong enough to handle the loads imposed, be equipped when necessary with sideboards, be free of splinters and sharp edges, have emergency stop controls (powered conveyors), have their pinch points guarded, be equipped with mechanisms to warn of conveyor startup, and be equipped with overload devices, guards, and other safety devices when necessary. For clarity, the lockout/tagout language has been amended to limit the conditions when power may be restored during the servicing of equipment.

Final rule § 1918.65 covers the use of all mechanically powered vehicles brought aboard vessels. Included in this category of equipment are all industrial trucks and all bulk cargo moving vehicles. These vehicles are also used in the shoreside aspect of marine cargo handling, and the hazards are essentially the same in both ''sides'' of cargo handling operations. The changes to this section of the final Longshoring Standard parallel those requirements found in § 1917.43, the corresponding section of the Marine Terminals Standard.

The requirements in final rule § 1918.65, ''Mechanically powered vehicles aboard vessels,'' are essentially unchanged from those proposed. Paragraph (a) states that this section applies to all types of powered vehicles used aboard ship to hand equipment or material. Paragraph (b)(1) requires any modification that could affect the capacity or safe operation of a vehicle to be done only with the manufacturers' prior written approval and/or that of a registered professional engineer experienced with the equipment. This requirement is necessary to ensure that operators of these vehicles, and other workers in the vicinity, are not injured in an accident involving an overloaded, poorly balanced, or otherwise unsafe vehicle.

Paragraphs (b) (2) and (3) require that vehicles be used within their rated capacities, and that the total weight of the lift made by two or more trucks working in unison not exceed the combined safe lifting capacity of the trucks used, respectively.

Final rule paragraph (c) addresses guards for fork lift trucks. The first provision requires all such trucks to be fitted with securely attached overhead guards that are designed to protect the operator from falling loads. Paragraph (c)(2) prohibits the use of overhead guards that obstruct the operator's view and stipulates that any opening in the top of the guard not exceed 6 inches in width or length (or be sized to prevent the smallest unit of cargo being handled from falling through the guard). Paragraphs (c) (3), (4), and (5) require overhead guards to be built so that: failure of the mast tilt mechanism will not displace the guard; the guard is large enough to extend over the operator during all operations; and that guards not be removed except when the presence of the guard would prevent entry into the work space (and then only if the operator is not exposed to overhead obstructions in the space). Paragraph (c)(6) requires fork lifts to be fitted with vertical backrest extensions if necessary to prevent the load from hitting the mast; the extension must provide such protection even if the mast is at maximum backward tilt.

Guards applicable to crawler-type, rider-operated cargo moving vehicles are covered by paragraph (d); at paragraph (d)(1), the final rule requires such vehicles to be equipped with an operator's guard that is built to protect the seated operator from contact with an overhead projection. Paragraph (d)(2) mandates that guards and their attachment points be sufficiently strong to withstand a load that is equal to the drawbar pull of the machine and that is applied horizontally at the operator's shoulder level; and paragraph (d)(3) states that guards are not required when the vehicle is used in situations that pose no threat to the seated operator of being hit by an overhead projection.

Final rule § 1918.65(d)(4) contains a requirement for rollover protection on bulk cargo moving vehicles (such as the type used to trim and position bulk cargo in underdeck spaces). Such protection is required on similar pieces of equipment used in construction industry settings, where the hazard posed by turnover also exists. Comments received supported this requirement for both shoreside and shipside equipment; however, these same commenters requested a phase-in period of two years because of the large number of machines that would need to be retrofitted (Exs. 19, 6–29, 6–31a, 8–8, NMSA *et al.*). In addition, testimony indicated that OSHA provided a similar phase-in period to the construction industry for rollover protection. (SEA Tr. p. 175) To provide sufficient time to retrofit the large number of vehicles in the industry and to be consistent with past OSHA policy, the final rule provides for a two-year phase-in period in this paragraph.

In addition, OSHA sought comment in the proposal on the need for rollover protection on bulk cargo moving vehicles used shoreside, i.e. in the marine terminal environment. As noted above, several commenters supported the addition of this protective measure to the Marine Terminals Standard (Exs. NMSA *et al.*, 19). To achieve consistency between the rollover protection requirements in the Marine Terminals and Longshoring rules, OSHA has provided for a similar two year phase-in period in § 1917.43(f).

Paragraph (e) of the final rule covers approved trucks. Several commenters pointed out that parts 1917 and 1918 use different terminology to refer to the same type of equipment (Ex. 8–8, NMSA *et al.*). In part 1917, the term ''approved power-operated industrial truck'' is used, while the longshoring rules uses the term ''approved power-operated vehicle'' (see § 1918.65(e)). Accordingly, OSHA has changed the term used in the final Longshoring Standard to ''approved power-operated industrial truck'' to be consistent with the language in part 1917 as well as OSHA's proposed ''Powered Industrial Truck Operator Training'' (61 FR 3092). As defined in paragraph (e)(1) of the final rule, an approved power-operated

industrial truck is one listed as approved by a nationally recognized testing laboratory. Paragraph (e)(2) requires such trucks to bear a label or other indication that the truck is so approved. Paragraph (e)(3) states that, in hazardous atmospheres, only approved trucks may be used.

Maintenance requirements for mechanically powered vehicles are addressed in paragraph (f), which requires, at paragraph (f)(1), that such vehicles be maintained in safe working order, not have their safety devices removed, and not be operated with any defect, e.g. a fuel system leak, that could affect safe operation. Requirements pertaining to braking systems, replacement parts, and repairs to the fuel and ignition system are covered in paragraphs (f) (2), (3), and (4). Batteries must be disconnected and/or stored energy discharged before repairs can be made to the primary electrical system of mechanically powered vehicles (see paragraph (f)(5)). Paragraph (f)(6) stipulates that only designated persons may perform maintenance and repair on these vehicles.

Final rule § 1918.65(g) remains as proposed. This paragraph requires that vehicles purchased after the effective date of the final rule be equipped with parking brakes. This provision received support, since nearly all pieces of newly manufactured equipment today have parking brakes and the value of such brakes in preventing accidents is widely recognized (NMSA *et al.*).

Paragraph (h) covers the operation of mechanically powered vehicles. Paragraph (h)(1) states that only stable and properly positioned loads that are within the rated capacity of the vehicle may be handled, and paragraphs (h) (2) and (3) require the drivers of these vehicles to ascend and descend grades slowly and to travel with the load trailing in those cases where the load obstructs the operator's forward view. Steering knobs are prohibited by paragraph (h)(4) except where the vehicle has power steering, and paragraph (h)(5) requires that a mechanism to alert the operator that the load has been engaged be provided if the vehicle is one that has a cargo lifting device with a means of engagement that is hidden from the operator's view. Paragraph (h)(6) prohibits any load on a mechanically powered vehicle from being suspended or swung over any employee; this provision is necessary to ensure that employees are protected from cargo falling from overhead loads. Paragraphs (h) (7), (8), (9), and (10) cover safe working surfaces, load engaging means, guarding of the edges of open deck barges and covered lighters, and precautions to be taken when employees ride on mechanically powered vehicles. Paragraph (h)(11) sets out the conditions under which employees may be elevated by fork lift trucks and includes specifications that must be met by platforms used for this purpose.

With the few exceptions noted above, OSHA received no comments on the proposed requirements in § 1918.65. These requirements, which pertain to mechanically powered vehicles used aboard ship, are essentially unchanged since the proposal.

Section 1918.66 of the final rule covers all cranes and derricks that are not part of a vessel's permanent cargo handling gear but are placed aboard a vessel temporarily to conduct cargo operations, as stipulated in paragraph (a). Examples of such equipment are mobile and crawler type cranes that are positioned on barges and used to load and discharge cargo. In developing this section of the final Longshoring Standard, OSHA relied on the corresponding provisions for cranes and derricks found in § 1917.45 of the Marine Terminals Standard. Once this final rule is effective, these provisions will thus be consistent for both aspects of the marine cargo handling industry.

Paragraph (a)(1) requires all such cranes and derricks to be certificated in accordance with OSHA's gear certification requirements (29 CFR part 1919), and paragraph (a)(2) requires the weight of any crane hoisted aboard a vessel to be posted on the crane. Requirements for rating charts, rated loads, exceptions to designated working loads, radius indicators, and operators' stations for cranes and derricks brought aboard vessels are shown in paragraphs (a) (3) through (7) of the final rule. Paragraphs (a) (8) through (12) contain provisions addressing counterweights or ballast, outriggers, exhaust gases, electrical equipment, and fire extinguishers associated with these cranes and derricks. Requirements specifying the amount of rope that must remain on the drum, how wire rope must be secured, and a prohibition against the use of fiber rope fastenings in hoisting operations involving these cranes and derricks are contained in paragraph (a)(13), while paragraph (a)(14) addresses brakes. Crane and derrick operating controls are required to be clearly marked by paragraph (a)(15), and paragraphs (a) (16) through (18) cover boom stops, foot pedals, and access to footwalks, cab platforms, the cab, and any portion of the superstructure of cranes and derricks brought on board for cargo handling purposes.

Operating precautions and requirements for cranes and derricks of this type are detailed in paragraph (b) of the final rule, entitled, ''Operations.'' The provisions in this paragraph cover the use of two or more cranes together, the guarding of the crane's swing radius, prohibitions against the use of equipment that could exert side loading stresses on the crane or derrick boom or the use of a crane or derrick that has a visible or known defect that could affect safety, and steps to be taken if a crane or derrick is to be left unattended (see paragraphs (b) (1) through (4)).

Paragraph (c) sets out a number of protections for employees being hoisted (including the use of anti-two-blocking devices on all cranes and derricks used to hoist personnel). For example, paragraph (c)(1) states that no employee may be hoisted by the load hoisting apparatus of a crane or derrick unless a platform having the characteristics specified in paragraphs (c)(1) (i) through (vii) is used. Final rule paragraph (c)(2) requires that the hoisting mechanism of cranes and derricks being used to hoist personnel operate in the power up and power down mode. This requirement is being brought into the Longshoring Standard from the Marine Terminals Standard (§ 1917.45(j)(2)) to provide parallel safeguards in both aspects of marine cargo handling operations.

Proposed paragraph (c)(3) required that cranes used to lift personnel be equipped with an anti-two-blocking device, a device which prevents the hoist block from coming into contact with the head block of the boom. Such ''two-blocking''' can occur when the operator is not paying attention to how high the hoist block is in relation to the head of the boom. After contact, continued hoisting of the block can cause the block to separate or break from the load line, causing the hoist block and load to fall. OSHA has determined that this requirement is necessary to prevent serious injury or death to employees being lifted by a crane; in 1988, the Agency adopted such a requirement for cranes used to hoist personnel in the construction industry (§ 1926.550(g)(3)(ii)(C), 53 FR 29139). Although OSHA's 1983 Marine Terminals Standard did not contain such a requirement, and inadvertently omitted this requirement in the proposal, the Agency has rectified this oversight in the final rule (see § 1917.45(j)(9)).

There were many issues related to anti-two-blocking devices that were raised by participants in the rulemaking, including whether OSHA has any data on risk or accidents relating to these devices; whether it is technologically

feasible to retrofit all maritime cranes with anti-two-blocking devices; and whether this requirement is truly necessary for safety in the marine cargo handling operations.

In response, OSHA notes the following. First, this issue primarily concerns mobile cranes, because most, if not all, container gantry cranes and portal gantry cranes are already equipped with anti-two-blocking devices. Mobile cranes are common on the Gulf Coast, but some are used at smaller ports on the East and West Coasts as well. In Gulf ports, very few ships that have containers that are stacked more than one or two high visit non-gantry crane facilities. Containers stacked only to this height are easily accessed with ladders, and this is the usual method of working them instead of using cranes to hoist the employees.

Several commenters noted that employees are rarely hoisted in this industry by non-container gantry cranes (e.g. mobile and crawler cranes) and that cranes used in longshoring have very long booms, unlike those in the construction industry, which greatly reduces the potential for two-block accidents in longshoring (NO Tr. pp. 165, 171, 172). The hoisting of employees by container gantry cranes is allowed when the spreader platform meets the requirements of § 1917.45(j) and the crane is not hoisting a load. Commenters also said that some stevedores employ rented cranes that may not have anti-two-blocking devices on them and that it may be impossible to retrofit some existing cranes with anti-two-blocking devices (NO Tr. pp. 17, 398). Also, ship's gear is often relied on for some specialized longshoring operations, and in this situation the stevedore has no control over whether or not the ship's gear has this safety device. One commenter stated that very few ships had anti-two-blocking devices on their cranes (NO Tr. p. 399).

Industry commenters who opposed the requirement for anti-two-blocking devices did not do so primarily on economic grounds, although they noted that installing an anti-two-blocking device was a significant expense. Anti-two-blocking devices were estimated to cost from $3,000 to $13,000 each (NO Tr. pp. 368, 708).

One commenter, who had purchased a new crane with an anti-two-blocking device, reported that it was necessary to disconnect the safety device because it was not possible to perform ''duty-cycle'' work of transporting lengths of steel. The company reported that it virtually never lifted personnel by crane (NO Tr. p. 708). Another commenter also testified that ANSI requires all cranes purchased after January 1, 1991, to be equipped with anti-two-blocking devices (NO Tr. p. 710). Several commenters questioned whether the anti-two-blocking requirement was necessary because there was a lack of accident data and its intended use would be so infrequent (Ex. 6–29a, NO Tr. pp. 164, 171).

Mr. James Pritchett, owner of Crane Inspection Services, an OSHA accredited agency, testified in New Orleans:

> One of the main reasons I came to the meeting that deals with regulations on cranes, I was delighted to read into the regulations that OSHA was considering anti-two-blocking on maritime cranes. Generally speaking, that is the rule for general . . . industry.
>
> I think a man is a man regardless of what location he's working in. I think he's important in construction, general industry, longshoring, or maritime the anti-two-blocking device is a safety device; it's not intended for an operational device.
>
> Also, it can be deactivated for duty cycle work. Its real intent is to be used for, or I should say, it really comes into play very importantly in a man lift situation (NO Tr. pp. 733–735).

As noted by several commenters, the purchase and installation of anti-two-blocking devices can be avoided through work practices and administrative approaches— cranes other than container gantry cranes are presently rarely used for lifting personnel (NO Tr. p. 171). On the other hand, where the need or frequency for lifting personnel is great, anti-two-blocking devices will offer greater protection for employees. In addition, OSHA is aware that mobile cranes equipped with anti-two-blocking devices are frequently rented to stevedore companies at East Coast marine terminals. The Agency concludes that the use of anti-two-blocking devices is necessary and feasible in marine cargo handling operations and requires their use in final § 1917.45(j)(9) and § 1918.66(c)(3).

In consideration of the above and consistent with past OSHA policies, the Agency believes the hoisting of employees by a crane to be an inherently dangerous practice that should only be conducted under very controlled circumstances. The common use of personnel platforms to transport employees by container gantry cranes, however, effectively controls these hazards. Nonetheless, in the case of cranes other than container gantry cranes, this practice should be avoided when other methods are feasible and present less of a hazard. OSHA therefore requires that all the provisions of § 1918.66(c) be met before employees may be hoisted by the load or hoisting apparatus of a crane or derrick, including the use of an anti-two-blocking device.

Final rule § 1918.66(d) addresses routine inspections of cranes and derricks that are not part of vessel's gear. Paragraphs (d)(1) and (d)(2) require that designated persons inspect each crane and derrick before each day of use and that such persons thoroughly inspect all functional components and accessible features of each crane or derrick at monthly intervals. Paragraph (d)(3) stipulates that defects found during such inspections that could potentially pose a safety hazard to employees be corrected before the equipment is used. In addition, this provision states that such repairs may only be performed by designated persons. Employees are required by paragraph (d)(4) to maintain records of monthly inspections for 6 months, either in or on the crane or derrick or at the terminal.

Protective devices are addressed by paragraph 1918.66(e). Paragraph (e)(1) states that moving parts, such as chains, gears, and sprockets, that could pose a hazard to employees during operations must be guarded, and paragraph (e)(2) requires that crane hooks be secured to prevent inadvertent disengagement of the load.

Paragraph 1918.66(f) addresses load indicating devices (LID's). To help prevent the overloading of cranes, LID's are currently required in both § 1918.74(a)(9) and § 1917.46. OSHA, however, had proposed not to carry over the requirements for LID's for vessel mounted cranes. Usually such devices rely upon boom radiuses (outreach) as an important factor in arriving at a load indication. When a crane is used aboard a ship, however, the LID's do not produce the same level of accuracy as for land-based cranes due to the motion of the vessel when a load is imposed. OSHA sought comment on alternative means to prevent the overloading of cranes used afloat. No comment was received. However, OSHA did receive comment supporting the continued requirement for LID's on cranes aboard a barge or vessel (Ex.6–2). OSHA is aware of the current practice of derating the capacity of the crane to account for waterborne conditions. This practice remains an acceptable method of preventing the overloading of waterborne cranes. Considering this and since the record supports the existing requirements, OSHA has decided to retain the language (as corrected) found in the current § 1918.74(a)(9) and has codified this at § 1918.66(f). Parallel

language has been included in final § 1917.46(a)(1)(ii).

Final § 1918.67 remains as proposed and carries over the requirements found in the current § 1918.75. These provisions require communication between the stevedore (i.e. the employer) and the officer in charge of the vessel whenever internal combustion or electrically powered tools, equipment or vehicles are brought aboard, and whenever the ship's power is needed for operating the employer's electrical tools or equipment.

Final § 1918.68 remains as proposed and provides for the effective grounding of all portable electrical equipment, such as saws, drills, grinders, etc., through a separate equipment conductor that either runs with or encloses both circuit conductors. This represents a clarification of the current rule. Double-insulated tools and battery-operated tools are excluded from the requirements.

OSHA proposed to delete the regulations under the current section titled ''Tools,'' (§ 1918.72), in the belief that the current OSHA General Industry Standards, subpart P, titled ''Hand and Portable Powered Tools and Other Hand-Held Equipment'' comprehensively addressed the subject of portable tools. Comments and testimony were received that supported the existing requirements for tools and in the final, OSHA has kept the existing Longshoring Standard's requirements. (See discussion regarding tools in the preamble of subpart A.)

Subpart H—Handling Cargo

Subpart H of the final rule is titled ''Handling cargo.'' This subpart specifically covers the actual shipboard cargo handling process. The sections that comprise this subpart (§§ 1918.81–89) address the hazards encountered by longshore workers while loading and unloading cargo. The primary hazard is being struck by the cargo, whether it is palletized, containerized, roll-on/roll-off (Ro-Ro), or otherwise packed or packaged. OSHA is retaining in this final rule those provisions found within subpart H of the Agency's current Longshoring Standard; carrying over applicable regulatory language from the Agency's rules for the shoreside segment of marine cargo handling (part 1917, the Marine Terminals Standard); and adding new requirements to address the hazards associated with the newer methods of handling cargo. For the most part, OSHA received widespread support for the changes that have been made to this subpart of the final rule (Exs. NMSA *et al.*, PMA *et al.*).

Final §§ 1918.81 through 1918.84 address those hazards common to the handling of break bulk (or general) cargo. Paragraph (a) of section 1918.81, ''Slinging,'' requires drafts to be safely slung before hoisting and any loose dunnage or debris to be removed to protect employees handling the draft. Other provisions in this section address cargo handling bridles, methods of slinging to prevent sliders, the safe use of case hooks, the hoisting of bales, the safe handling of unitized loads, manual guidance of loads, observation of the draft during hoisting, and provisions prohibiting the lifting of loads over employees or employees riding the hook or load. Proper slinging, building, bulling and stowing of drafts of cargo are essential to prevent cargo from coming loose from the draft and falling on or tipping over onto employees. These requirements are essentially unchanged since the proposal, and OSHA received no comments specifically addressing these provisions.

Section 1918.82, ''Building drafts,'' contains a requirement (in paragraph (a)) that drafts be built in a manner that prevents cargo from falling from the draft, or that means be taken to ensure the same result. In addition, paragraph (b) stipulates that buckets and tubs used to handle bulk or frozen cargo not be loaded above the height of their rims; this provision is necessary to ensure that pieces do not fall on employees below.

The tiering and breaking down of stowed cargo is covered in § 1918.83. Paragraph (a) requires the securing of cargo in ship's hold if such cargo could present a hazard to employees working in the hold. Precautions must be taken, as required by paragraph (b), in breaking stowed cargo; this provision is intended to prevent such cargo from falling on employees. Paragraph (c) of the final rule requires employers to check employees trimming bulk cargo into and out of the hold. This provision also requires employees working alone in a tank or compartment to be checked at frequent intervals to ensure that the employee is safe.

The bulling (dragging) of cargo is addressed in § 1918.84 of the final rule. Provisions in this section cover precautions to be taken during bulling, the safe use of snatch blocks, the securing of beam frame clamps, and a prohibition against the use of falls led from cargo booms of vessels to move scows, lighters, or railcars.

The final regulatory text of §§ 1918.81 through 1918.84 remains the same as the proposed text of these sections. In addition, OSHA received no comments specifically related to these requirements.

Section 1918.85, titled ''Containerized cargo operations,'' contains requirements addressing this modern method of cargo handling. This section applies to containerized cargo operations of any form (see definition of ''intermodal container'' at § 1918.2). These paragraphs track OSHA's current Longshoring Standard (part 1918), and the shoreside requirements found in OSHA's current Marine Terminals Standard (part 1917).

Section 1918.85(a) requires that each intermodal container must be marked with its gross, net, and tare (empty) weights. This paragraph of the final rule remains the same as the corresponding proposed paragraph.

Final rule § 1918.85(b) (1) through (5) address the determination of the weight of intermodal containers to be hoisted. The proposed provisions largely reflect the current rules in both the Longshoring and Marine Terminals Standards.

Paragraph § 1918.85(b)(6), allows closed dry van containers loaded with vehicles to be brought aboard vessels under certain conditions without first being weighed on a scale. The proposal added paragraph (b)(6) to this section to be consistent with OSHA Instruction STD 2.2, dated July 3, 1989 (Ex. 1–114). Those employers who choose not to comply with these conditions must weigh the container before loading. The same language is found in the Marine Terminals Standard at 29 CFR 1917.71(b)(6).

Paragraph (c) provides that no container(s) shall be hoisted if their gross weight exceeds either the weight marked in accordance with paragraph (a)(3) of this section or the capacity of the crane or other lifting appliance being used. Paragraphs (d) and (e) cover container inspection and precautions to be followed when containers are suspended. The requirements in paragraphs (a) through (e) are essentially unchanged from those in the proposal.

Paragraph 1918.85(f) addresses the lifting of intermodal containers. It requires that containers be handled using lifting fittings or other arrangements specified in paragraphs (f)(1) through (3) of this section unless the container is so damaged as to make special handling necessary. Paragraph (f)(1)(i) specifies that the hoisting of loaded containers 20 or more feet in length be done as follows: When hoisted by the top fittings, the lifting forces are applied vertically from a minimum of four fittings. Lifts that are less than vertical are permitted only when the container is an International Standards

Organization (ISO)[8] ''closed box container,'' the condition of the box is sound, the speed of hoisting and lowering is moderated, the lift angle is 80 to 90 degrees, the distance between lifting beam and load is at least 8 feet 2.4 inches (2.5 meters), and the length of the spreader beam is at least 16.3 feet (5 meters) for a 20-ft container and 36.4 feet (11 meters) for a 40-ft container. If these specifications are met, the final rule thus allows non-vertical lifts in limited situations. In contrast, proposed paragraph (f)(1)(i) would have required that loaded containers, when lifted from the container's top corner fittings, only be performed with a purely vertical force. The proposed language is identical to the practice spelled out in the ISO guidelines for handling containers as well as with several other standards or recommendations (Exs. 1–13, 1–115, 1–116, 1–117).

Currently, OSHA's Marine Terminals Standard's requirement for lifting containers allows non-vertical lifts under specified circumstances, i.e. it states that ''when hoisting by the top fittings, the lifting forces shall be applied vertically from at least four (4) such fittings or by means which will safely do so without damage to the container, and using the lifting fittings provided'' (§ 1917.71(f)(1)(i)). The Agency's current Longshoring Standard also allows non-vertical lifts, i.e. it states: ''All hoisting of containers shall be by means which will safely do so without probable damage to the container, and using the lifting fittings provided'' (1917.71(f)(1)(i)). A commenter noted that a decision of an Administrative Law Judge of the Occupational Safety and Health Review Commission (OSHRC) has held that these current OSHA rules allow any lift that has an angle greater than 60 degrees. (Continental Stevedoring and Terminals, Inc., 15 BNA OSHC 1966 (ALJ, No. 91–475, 1992) at CH Tr. p.157).

Ports or facilities that rely mainly on container gantry cranes generally do not perform non-vertical lifting of containers. Non-vertical lifting of containers is generally performed by mobile cranes, portal gantry cranes or by vessel's gear. A non-vertical lift is made by connecting four wires (or chain legs) either directly to the crane's hook or to a spreader bar hung from the crane. A spreader bar is a simple steel beam with two lengths of chain or cable on either end and a hook or other fitting on the chain legs to attach to the corner fittings of a container. Spreader bars are made shorter than the container, both for ease of maneuvering in tight lifts and to avoid snagging containers and ship parts or rigging. The longer the spreader bar, the more nearly vertical the lift on the container.

A box spreader can also be used to lift a container vertically using a single wire crane. A box spreader is essentially the same device that a container gantry crane uses to lift containers. However, a box spreader is both heavier and costlier than a simple spreader bar. In addition, box spreaders may introduce additional safety risks for longshoremen working on container tops. For example, the use of box spreaders requires additional maneuvering to position and secure the spreader to the container thus increasing employee exposure to falls (See, for example Montz at NO Tr. p. 101).

Mr. Vincent Grey appeared as an expert witness for OSHA in this proceeding. Mr. Grey has served as chair of the ISO Technical Committee 3874, Freight Containers, and is a recognized international expert on this mode of cargo handling. In addition to testifying on container lifting at the public hearings he also submitted written comments to the docket (Exs. 1–31, 6–28, 49, and 50). Mr. Grey supported the Agency's proposed requirement permitting only vertical lifting of containers (NO Tr. p. 70). According to Grey, containers are designed and have been tested only for purely vertical lifts. In addition, he explained that no one, including the ISO technical standards committee, has ever conducted a study or evaluation on the impact that non-vertical lifting would have on the containers (NO Tr. p. 70). He noted that any deviation from verticality adds compressive forces along the top rail and tension across the bottom of the container and that such forces could cause a container to fail, either crumpling across the top or ripping open along the bottom, with contents and container possibly falling on employees underneath (NO Tr. p. 74). Mr. Grey concluded that since containers were designed only for vertical lifts, non-vertical lifts reach beyond the margin of safety built into the containers (NO Tr. p. 72).

At the hearings during questioning, however, Grey admitted that he had never witnessed a container failure due to non-vertical lifting (Id. p. 79). He also admitted that non-vertical lifts are common around the world in smaller ports and less advanced countries that do not use container gantry cranes and that spreader bars of less than container length have been used for lifting containers around the world for more than 30 years (Id. pp. 83–84). When lifting is done without gantry cranes, Grey said, it is quicker and more efficient to employ spreader beams and perform non-vertical lifts.

A number of commenters opposed the proposed requirement. For example, John Faulk, representing NMSA, stated that there are no data on container failures caused by non-vertical lifts (NO Tr. p. 157). Instead, container failures are caused by overloading, improper packing, shifting loads, and defects in container construction, according to Mr. Faulk's testimony.

Hal Draper of the West Gulf Maritime Association agreed with Mr. Faulk's comments and noted that OSHA had not produced data indicating that accidents were occurring as a result of non-vertical lifts (NO Tr. p. 223). He also pointed out that the stevedore has no control over stowage, and that containers are frequently stowed in such a way that a non-vertical lift is required to unload a container or move it to gain access to other break bulk cargo. Mr. Draper also listed several situations in which it is not feasible to move a container with a vertical lift, such as: In midstream cargo operations; when inexperienced crane operators cannot handle the gear well; when the weight of a box spreader beam for a vertical lift is 7,500 pounds and may make the lift exceed the crane's capacity; when a container on a box spreader beam with cones would damage other cargo or containers when lowered; and when the gear necessary for a vertical lift increases the fall hazard for longshore employees because of the additional exposure to falls by employees needed to position the spreader. He also stated that simple bar spreaders work well for non-vertical lifts because they are light—a 36-foot long bar for lifting a 40-foot container weighs 3,000 pounds and provides 8 to 10 feet of head clearance for employees atop the container. Mr. Draper recommended that OSHA allow non-vertical lifts to be made between 80 and 90 degrees to the horizontal.

Other members of industry supported these comments. For example, Jim Heikkinen of Transocean Terminal Operators, Inc. stated that his firm had used spreader bars for many years without incident and that changing to a box spreader bar would increase both the weight of the gear and the risk posed to employees working containers (NO Tr. p. 679). Leo Naekel of Jore Marine Services reported that there were some lifts on barges that could not feasibly be made with a purely vertical lift (SEA Tr.

[8] The ISO is a worldwide federation of national standards bodies whose mission is to promote the development of international standards to reduce technical barriers to trade. The ISO standards are consensus documents and represent voluntary guidelines.

pp. 273–276), and Doug Stearns of Jones Washington Stevedoring Company stated that his firm sometimes had to use the ship's gear to move break bulk cargo (SEA Tr. p. 390). He also noted that the stevedore cannot require ships to carry a box spreader bar to make a pure vertical lift and that the weight of a box spreader beam can also be a problem. In addition, Mr. Stearns reported that he had never seen a container fail with a spreader beam but had seen many drop from box spreader beams. Mr. Stearn also questioned the Agency's estimates of the cost involved in changing to gear capable of vertical lifting.

Two commenters, however, supported the proposed prohibition of non-vertical lifts. For example, Douglas Getchell of the ILWU stated that non-vertical lifts should only be allowed when vertical lifts are technically infeasible; in his opinion, the alleged economic infeasibility of making vertical lifts in some situations should not be sufficient reason to allow such lifts (SEA Tr. p. 90). Arguing along the same lines, Albert Cernadas of the International Longshoremen's Association urged OSHA only to permit vertical lifts, with non-vertical lifts allowed only when there is no alternative (NO Tr. pp. 470–472). These same unions in the post hearing comment period, however, supported studying the risk consequences of a limited non-vertical lift. They agreed that there was a need to examine and scientifically to identify any conditions where a less than vertical lift could be permitted that would not place excessive stress on the containers and therefore not place workers at increased risk.

Several commenters pointed out that there are times when containers are stowed in the wings of the hold of a break bulk vessel, which makes a true vertical lift impossible (Exs. NMSA *et al.*, PMA *et al.*, 6–10, 6–16a, 6–28a, 6–29a). In such cases, the container must first be moved below the hatch and must sometimes be dragged by attaching cables or chains to the corners of one end of the container to pull it along the deck. The cumulative effect of these ''dragging'' movements is to increase the potential for container failure, and the increased wear and tear on the container presents a greater hazard of container failure than would a non-vertical lift.

After the public hearings, NMSA asked Mr. Grey to conduct an engineering study to determine whether OSHA should permit a minor departure from the 90 degree lift or prohibit non-vertical lifts in all circumstances. NMSA was joined in supporting the need for this study, in order to help resolve this controversy, by the ILA and ILWU. The study was designed to determine, through the use of mathematical models, the transverse and longitudinal stresses placed upon a container being hoisted from the four corner castings at the extreme of a minus 10° tolerance to verticality. The analysis of these compressive forces on these ''containers'' were then compared to the safe limits found in the ISO specifications.

In the introduction to the study, Grey explains the 1961 origin of the ISO vertical lift specification from his perspective as an active member of the technical committee. He indicated that the committee ''ordained that containers over 10 feet be lifted vertically when being picked up by their top corner fittings'' for several reasons (Ex. 80, p.2). The world was about to experience the explosion of the growth of containerization on the major trade routes. There was no industrial experience in handling containers, which were modified trailers from the highway trailer manufacturing industry. Partially out of concern for the uncertainties of the durability of the containers over their life cycles and partially as a matter of engineering convenience, the committee never considered the impact of the absolute verticality requirement on those facilities that only occasionally had to handle containers. Grey expressed ISO's main concern as follows:

> The ISO was essentially aimed at instituting an efficient way to move the world's international foreign trade tonnage and at the same time minimize labor cost and freight claims. Hence, the ISO committee's highest priority was to concentrate on handling the boxes in a fully automated system. (Id.)

As indicated above, no study has ever been conducted by the ISO or anyone else to establish criteria for acceptable tolerances to absolute verticality until Grey's study.

Based on the results of his study, Mr. Grey recommended that, under certain controlled conditions, lifts that were nearly but not totally vertical would be a practical and acceptable safety practice (Ex. 80, p.12). His analysis indicated that lifts that were no more than a ten degree deflection from vertical would not subject a container to undue stress that could compromise the structural integrity of the container (Id.). The ILA, ILWU, and NMSA, who collectively represent the principal interested parties in this rulemaking, supported Mr. Grey's findings, and this group stated its support in a joint post-hearing submission (Ex. 85). Mr. Grey's study thus corroborated earlier testimony presented by Hal Draper of the West Gulf Maritime Association that showed that 80-degree lifts added little additional force across either the top or bottom of containers (Ex. 6–29).

A prohibition on non-vertical lifts would primarily affect smaller ports, smaller employers, and ports that handle a mixture of break bulk cargo and containers, such as the Gulf Coast. Simple spreader bars have been widely used for 30 years to lift containers. Spreader bars are relatively light, simply constructed, and allow faster (less costly) container lifting than would box spreader beams. Box spreader beams, which would be required to provide a true vertical lift at each corner fitting, are heavier, costlier, and are infeasible to use in some situations.

After careful consideration of the Grey study and the relevant record evidence, and in light of the unanimous support of the major cargo handling stakeholders, the Agency has concluded that worker safety is not compromised, indeed, is not even affected, by accepting any lift that is 10 degrees within vertical to be a vertical lift for the purposes of paragraph (f). In addition, OSHA believes that this revision will also enhance enforcement efforts as well as voluntary compliance by eliminating the confusion and ambiguity that currently exists. The final standard thus allows containers to be lifted at an angle of 80 to 90 degrees providing the following conditions are also met: the container being lifted is an ISO ''closed box container'' (other types of containers such as flat racks and open top containers must be picked up vertically); the condition of the box is sound, and the speed of hoisting and lowering is moderated when heavily laden containers are involved. OSHA considers a heavily laden container to be one that is loaded to within 20 percent of its rated capacity. To lift at an 80 degree angle, the distance between the lifting beam and the load must be at least 8 feet and 2.4 inches (2.5 m), the length of the spreader beam must be at least 16.3 feet (5 m) for a 20-foot container and at least 36.4 feet (11 m) for a 40-foot container. This final language has been codified at § 1918.85(f)(1)(i) and is also being included in § 1917.71(f).

Paragraphs (f)(1) (ii), (iii), and (iv) contain requirements for hoisting from the bottom fittings, lifting containers by fork lift truck, and using other means of hoisting. Paragraphs (f)(2) (i) and (ii) establish requirements for intermodal container spreaders that employ lanyards and for the design and use of spreader twist lock systems.

In final rule paragraph (g), the Agency requires that a safe means of access and egress be provided to each employee who, due to the nature of the work, must work on the top of stowed containers—both above and below the deck. In practice, most employees gain such access by riding aboard safety platforms installed on container crane lifting frames. Such means are permissible when the lift is conducted in a manner consistent with design requirements found in the shoreside rules (§ 1917.45(j)). This provision remains unchanged from the proposal.

Paragraph (h) applies on vessels using any loaded intermodal container spreader. It prohibits employees from riding a spreader with a load attached. This provision is also unchanged from the proposal. A similar prohibition for the shoreside aspect of marine cargo handling (marine terminals) is included in this rulemaking (see § 1917.45(j)(9)).

When safer methods are available, such as safety platforms installed on the container crane lifting frame, OSHA requires in paragraph (i) that portable ladders not be used to gain access to the tops of containers that are stowed more than two high. This paragraph of the final rule is unchanged from the corresponding provision of the proposal.

Final rule § 1918.85(j) covers the hazard of falls from the tops of intermodal containers. In the proposed standard, the Agency would have required, to the extent feasible, the use of ''positive container securing devices'' after June 2, 1997, to eliminate work on top of containers. Employees who worked at facilities without container gantry cranes would have been required to wear personal fall protection equipment when working on top of containers except where this was not feasible. When fall protection systems were not feasible, employers would have had to alert employees to the hazard and instruct employees in minimizing the hazard. In a footnote to this provision in the proposed standard, a fall hazard was defined to exist when employees worked within three feet of the edge of a container that was 10 feet or more above the adjoining (lower) or next lower surface. In addition, an opening of 12 or more inches between containers constituted a fall hazard when there was a drop of 10 feet or more.

OSHA's current Longshoring and Marine Terminals Standards do not contain a specific container-top safety provision. However, the Agency has been concerned about falls from the tops of containers for many years and has cited employers for such hazards under the General Duty Clause (Section 5(a)(1)) of the Act and under § 1918.32(b) of OSHA's Longshoring rules (Ex. 1–139). This provision states, in the context of stowed cargo and temporary landing platforms:

> When the edge of a hatch section or stowed cargo more than 8 feet high is so exposed that it presents a danger of an employee falling, the edge shall be guarded by a safety net of adequate strength to prevent injury to a falling employee, or by other equal means of protection under the existing circumstances.

Although some employers questioned the applicability of § 1918.32(b) to container operations, a ruling by an administrative law judge established that that provision did indeed have application to container top on-deck exposures. The Agency's policy on this issue was spelled out in an instruction to its field staff (C.P.L. 2–1.17), issued in 1982 (Ex. 1–49). In that instruction, OSHA determined that § 1918.32(b) applied to containers but stated that there were situations where it would not be feasible to abate the container fall hazard. The directive instructed OSHA compliance officers to address the infeasibility issues in the following manner:

> A violation [of § 1918.32(b)] shall not be issued; however, OSHA should recommend and encourage the employer to work toward a solution and assist the employer in every way possible to effect a means of protection by advice, consultation and dissemination of information obtained during other inspections.

The Agency has issued few citations for the lack of fall protection on container tops. The marine cargo handling industry has sought a specific fall protection standard in this rulemaking, one that will be uniformly enforced to provide employees with needed protection against falls.

Falls from the tops of containers have resulted in a number of serious occupational injuries and fatalities (Exs. 1–18, 1–19, 1–20, 1–21, 1–22, 1–23, 1–24, 1–43, 1–67, 1–68, 1–100, and 1–108). Before the Longshoring and Marine Terminals proposal was published, the Agency contracted for and received a report on container top safety from Dr. A. J. Scardino (Ex. 139). Dr. Scardino is a registered professional engineer who is a nationally recognized expert in risk management and hazard identification. He has prepared several technical documents for OSHA, and has served as an expert witness in OSHA rulemaking and enforcement proceedings.

OSHA hired Dr. Scardino to conduct a representative study of the conditions, practices, procedures and hazards associated with containerized cargo handling. In his study, Dr. Scardino concluded, ''Work which requires employees to go aloft on container tops should be eliminated (to the extent feasible) through the use of engineering controls and work practices.'' (Id. p. 7). The proposed requirements for container top fall protection reflected many of Mr. Scardino's recommendations.

Fall Protection

Background. Fall hazards from containers have long been recognized by the stevedoring industry as both extremely dangerous and difficult to prevent. As early as 1968, U.S. terminal operators recognized the need to improve container top safety. That year Matson Terminals, Inc. developed the first system of container top fall protection (Ex. 1–53). In that system, Matson provided a D-ring fixture to be installed in the roof of its containers. Employees working aloft were provided with a safety belt and lanyard to secure to the D-ring. For a number of reasons, use of the system proved difficult, and it is not used today. Since then, numerous systems of fall protection have been developed, usually employing an anchorage point located either on a basket lowered by a crane, or on cables anchored to containers. In 1970, the Coast Labor Relations Committee of the ILWU raised the issue of working on containers with OSHA's predecessor agency, the Bureau of Labor Standards. In their letter of August 24, 1970 (Ex. 1–50), the Coast Committee asserted:

> Consider if you will the dangers attendant to working atop containers. They are not equipped with skidproof surfaces, there are no protective railings, and there are no requirements that safety belts be provided. In dry warm weather such work is dangerous enough, but the dangers are critically compounded when workers must labor atop these during windy and wet weather. At the very least, BLS regulations ought to provide that * * * safety belts be [required] for men working aloft.

As the containerized transport revolution progressed during the 1970's and into the 1980's, exposure to fall hazards on containers increased proportionately. Container use multiplied rapidly and ships were designed and built exclusively for the transport of containers. These ships eventually would carry several thousand containers, stacking them below decks and higher and higher on top of the deck. It became necessary to secure containers to each other to prevent unintentional movement during transit. To achieve this stability, stacking cones were developed that

workers placed in the corner castings of the container (an operation called ''coning'') while the containers were being loaded on the ship. This often required employees to work on top of the containers. The containers were further secured by installing bridging connectors across the corners of the top row of containers and lashing them diagonally to the deck with wire cables. Bridging and lashing operations also required working on top of containers. When the containers were unloaded from the ship, workers removed stacking cones from the corner castings of the container (called ''deconing'') while working on top of containers.

Virtually all of the original stacking cones were replaced in the early 1970's by twist locks, which eliminated the need for some lashing but still required workers to climb on top of the containers to place or remove the twist locks. Today twist locks are the most commonly used fitting for securing freight containers onboard vessels (Ex. 1–140). Newer semi-automatic twist locks (SATLs) were developed in the mid 1980's. The use of SATLs is now currently employed by most of the large shipping lines throughout the world and the United States. In fact, OSHA estimates that over 50 percent of ships calling in U.S. ports are already utilizing SATLs. (Ex. 2).

The use of SATLs avoids accidents and saves money. Unlike conventional twist locks, which must be inserted by workers on top of the container and manually locked, semi-automatic twist locks are inserted into the *bottom* of the container by workers standing on the dock; these devices lock automatically when placed on another container. Both SATLs and conventional twist locks can be unlocked by workers standing on the deck of the ship using an actuator pole, although on some container ships the stacks are so high that the pole is unable to reach the top container's corner from the deck.

When unloading using conventional twist locks, the upper container is first removed, leaving the twist locks on the top of the lower container. Workers must remove conventional twist locks from the top of that container before the spreader can attach to the corner castings. In contrast to conventional twist locks, SATLs are designed to remain attached to the bottom of the container being unloaded. SATLs are then removed by workers standing on the dock. Because workers do not need to be on top of the containers, the use of SATLs, therefore, eliminates worker exposure to fall hazards during this operation.

The use of SATLs also enhances productivity and reduces lashing costs (Ex. 1–140, p. 76; Ex. 1–141). A time-and-motion study that compares the performance of conventional twist locks to that of SATLs indicates an increase in productivity in the range of 25 to 29 percent. This translates to a 11.1 percent overall reduction in stevedoring costs (Ex. 1–141, pp. 4, 5; Ex. 2).

Another advance in securing containers in transit that eliminates the need for workers to go on top of containers is the development of above deck cell guides aboard vessels. Cell guides are rigid, structural members that form cells where containers are stowed. These cell guides allow for the ready placement of containers in a manner that prevents movement in transit. Although cell guides in the hold are common in container ships, above deck cell guides are far less common, constituting only 2 percent (Ex. 2, pp. 2–19) of container ships calling at U.S. ports.

In addition, OSHA is aware of the existence of positive container securing devices other than those discussed above, such as the SeaLand framing system (Ex. 1–57). The final rule uses the term ''positive container securing devices'' in the regulatory text. OSHA believes that this term is broad enough to allow for the SeaLand framing system and other innovative technological improvement.

While the use of SATLs is the most widespread method of positively securing containers that eliminates the fall hazard, OSHA is aware of certain problems, such as removing jammed SATLs and non-standardized locking systems on SATLs, that have been encountered with their application, use and design (Exs. 1–140, 1–142, 1–143, 1–144).

While container securing devices were undergoing rapid development, ports and shippers on the East and West Coasts were replacing older derricks and cranes that lifted cargo with a single wire with container gantry cranes that vertically lift from four points—one at each corner. In a container gantry crane, the crane operator is positioned directly above the load and moves with it—offering a much better view of the work. Today's container gantry cranes move along the pier on rails and employ automated box spreaders that automatically grip the container's four top corner fittings to lift it. The container is then raised vertically, carried horizontally to the dock (if unloading), and then set on a flat-bed truck trailer or similar vehicle. SATLs can then be removed before the container is finally lowered onto the truck's bed. The entire cycle for a container may take as little as a minute. In the container industry, cycle time for loading and unloading containers is critical.

For smaller ports, and especially ports on the Gulf Coast, that still must handle cargo in the more traditional ''break bulk'' mode, SATLs have not eliminated the need to go aloft (i.e. for employees to work on top of the containers). When containers are raised and lowered with a traditional single-wire crane typical of this part of the industry, the cargo sways and, in addition, the operator is in a cab on the dock and has a poor view of the loading process on deck. Without workers on the top of containers to steady and guide a container with cones in its bottom corners, the cones may damage lower containers, and such damage was reported by many commenters to the record. Having workers on the top of containers to guide the container also speeds the moving operations when using these types of cranes. Typically, when single-wire cranes are used to move containers, the crane will have a spreader bar almost as long as the container with two cables with hooks at either end that are manually inserted into containers' corner fittings. This typically brings a worker near the edge of the container. In this part of the industry, SATLs cannot eliminate the need for workers to go on the top of containers.

Negotiations between marine cargo employers and unions have in some instances resulted in added safety practices for container top work. For example, the Longshore Division members of the International Longshoremen's and Warehousemen's Union (ILWU) and the Pacific Maritime Association (PMA), agreed upon a package of 25 work rules that were specifically designed to enhance safety at container terminals, including container top safety.

Internationally, a number of national and multi-national organizations have acted on the problem of container top safety. The International Labor Organization, in its Code of Practice for Safety and Health in Dockwork (Ex. 1–130), specifically requires that:

> A person gaining access to the top of a container should be adequately protected against the danger of falling where appropriate by wearing a suitable safety harness properly tethered, or by other effective means, whilst on the container.

In its Directions for Safety in Dockwork, the National Swedish Board of Occupational Safety and Health (Ex. 1–131) provides, in part, that ''Work on top of a container is only permissible if

measures have been taken to prevent falling down.'' In the port of Hamburg, Germany, a ''lash basket'' designed by a dockworker (Ex. 1–45) rides underneath the container spreader and moves between container stows. Here, the dockworker remains in this one person basket while performing his work, thus minimizing container top exposures. In the port of Bremerhaven, a specially designed ''rigger box,'' which is similar in configuration to some U.S. container cage designs, provides an anchorage for fall protection systems for dockworkers who work on top of containers (Ex. 1–52).

Several significant issues on container top fall protection arose during the rulemaking:

1. At what height, when working on top of containers, was there significant risk to employees? At or below 8 feet? At 10 feet? And what accident or injury data were available that supported a determination of a fall hazard?

2. When was fall protection technologically or economically feasible, whether from container gantry cranes or single-wire cranes?

3. Was fall protection economically feasible on containers? Was fall protection only economically feasible above 10 feet (for two-high stacks and higher)?

Determining the appropriate fall height was the most important issue in the rulemaking and received the most attention from stakeholders.

Comments by the National Maritime Safety Association (NMSA) and the Pacific Maritime Association (PMA) were representative of employer positions. Both PMA and NMSA supported the Agency's proposed requirement to engineer out employees' work on top of containers whenever feasible. Industry also supported the proposed requirement for fall protection only above the first level of containers (PMA *et al.* and NMSA *et al.*). Several smaller longshoring employers who use non-gantry cranes for lifting—where the proposed standard would have required personal fall protection—noted that in some cases the fall protection systems would themselves introduce additional tripping or snagging hazards for employees atop containers (CH Tr. pp. 22, 84, SEA Tr. p. 71, NO Tr. p. 223).

Although industry commenters asserted that relatively few fatalities had been caused by falls from containers, OSHA presented numerous instances of fatalities and injuries resulting from such falls over the past 20 years (Exs. 1–18, 1–19, 1–20, 1–21, 1–22, 1–23, 1–24, 1–43, 1–67, 1–68, 1–100, and 1–108). Labor unions consistently advocated the necessity of fall protection while working atop any container (Exs. 19, 78, 1–150, NO Tr. pp. 467–470).

In its comments and public testimony NIOSH (Ex 81, NO Tr. pp. 499–503) concluded that falls from a one-high container (8 feet or more) posed a significant risk of injury or death to an employee. NIOSH introduced a study of falls that showed injuries and deaths occurring from heights as low as 6 or even 4 feet, although none of these incidents were caused by falls from containers. NIOSH representatives recommended that fall protection be provided on one-high containers (Ex. 81, NO Tr. p. 500).

Subsequent to the hearing, the major marine cargo handling stakeholders (NMSA, ILA and ILWU) participated in joint discussions in an attempt to resolve their divergent positions as articulated during the hearings. These exercises proved successful as evidenced by a post-hearing submission (Ex. 85). The stakeholders resolved a number of issues, particularly with regard to container top safety. They agreed that fall protection is necessary when employees work on any container top of 8 feet or higher. In addition, they recognized the existence of situations when the use of fall protection presents a greater hazard than not using fall protection; they concurred on the definition of ''Fall hazard''; and they pointed out the need for flexibility in twist lock design.

In the final rule, OSHA is requiring that workers who must work atop containers be protected by fall protection in accordance with paragraph (k) when they are exposed to a fall hazard. NIOSH data demonstrating the risk of death or serious injury from falls as low as six feet are convincing and consistent with the injury and fatality reports from the Agency's IMIS data and concern for employee risk voiced by union presentations. Accordingly, the Agency has concluded that working even on the first level of containers poses a significant risk to employees.

Proposed paragraph (j)(1) contained a definition for ''fall hazard'' in a footnote. However, because ''fall hazard'' has application in other sections of the final longshore rule (§§ 1918.32(b) and 1918.85 (j), (k), and (l)), the definition of fall hazard is now included in § 1918.2, the ''Definitions'' section of the final rule. According to this definition, fall hazards (absent weather considerations) exist only within 3 feet (.92 m) of the container's edge (i.e., whenever the container top constitutes the employees work surface). As described in Dr. Scardino's findings, under no circumstances should the employee's center of gravity (the hips) be within 3 feet (.92m) of the unprotected edge of the container without fall protection (Ex. 1–139, p.3). This definition makes it clear that it is the unprotected edge where the hazard exists, and not necessarily the entire work surface. Additionally, any gap of 12 inches (.31 m) or more on a horizontal surface formed by containers is considered an unprotected edge, and a fall hazard would thus exist under this definition. (For further discussion of the gap issue see 51 FR 42685 and 53 FR 48186).

With regard to the feasibility of fall protection in cargo handling operations, many commenters supported the Agency's preference for engineering controls, such as SATLs, that would eliminate fall hazards, over the use of fall protection systems. Engineering controls cannot, however, completely remove the need to work on top of containers; operations such as lashing and installing bridging still require personnel to work on top of containers. However, for routine loading and unloading, SATLs remove employees from working on top of containers when gantry cranes are in use. Although SATLs and cell guides have imposed significant costs on the shipping and/or longshoring industry, the record clearly indicates that productivity gains have considerably offset the cost (see Section VI, Summary of the Final Economic Analysis and Regulatory Flexibility Analysis).

Where containers are lifted with cranes other than gantry cranes, SATLs have not eliminated the need for employees to routinely work on top of containers. The industry presented examples of container top loading and unloading operations from non-gantry crane ports for which fall protection was not possible or potentially more hazardous. In New Orleans, Mr. John Faulk, representing NMSA testified,

> This leads to the * * * issue of container top fall protection feasibility. On page 28614 of the Preamble, OSHA recognizes the fact that there may be particular instances when fall protection may not be feasible. Examples of situations where the use of fall protection systems may prove infeasible are found in Appendix 3 of the 1918 proposal, but only two examples are listed.
>
> NMSA recommends that the words ''stair step stows'' and ''valley stows'', as well as ''barges,'' as a type of vessel, be added to Example 2. A third example stating: ''When hoisting containers with single point suspension container handling gear''; and, a fourth example, stating: ''While attaching and detaching fall protection systems'' should also be added (No Tr. p. 167).

Dr. Scardino, in response to a question about providing fall protection during break bulk operations said:

* * * there are some circumstances, again, in order to have fall protection, you have to have some place to tie off * * *. When they have a single attachment for a boom crane, a truck crane, working shore side, the top of the container, all four corner castings, are occupied with the pendant lines, and they have to be physically removed. There is no place for the individual to tie off. And for the system to be effective * * * [it must] be attached to something.

So in some break bulk situations, unfortunately, there's no place to tie the individual off to, other than not to do the operation at all (SEA Tr. p. 81).

The Agency agrees with these findings and the final rule recognizes that fall protection may not be feasible in all cases where work atop containers is performed.

The phase-in period. In view of the recent technological improvements in positive container securing devices indicated above, OSHA finds that many work operations, notably coning and deconing, that expose workers to container top fall hazards can now be eliminated. As noted above, SATLs have proven to be particularly effective when container gantry cranes are utilized (Ex. 1–140). In fact, the use of these devices (e.g., SATLs) in these circumstances can, in most instances, eliminate the need for workers to go on top of containers. In light of this, two years after the date of publication of this rule, § 1918.85(j)(1) will prohibit the performance of coning and deconing on top of containers being worked by a container gantry crane. OSHA has estimated that more than 50 percent of ships calling at U.S. ports already utilize SATLs (Ex. 2). Since it is OSHA's policy to allow a reasonable time to come into compliance with engineering controls in the final standard, the Agency is allowing two years for the implementation of positive container securing devices.

OSHA recognizes that positive container securing devices will not entirely eliminate the need for workers to go on the top of containers. Certain container placement or securing tasks, in addition to coning or deconing, must still be performed. In these situations (e.g., securing bridge clamps or releasing jammed twist locks), a comprehensive fall protection program must be implemented.

Where cranes other than container gantry cranes are used to handle containers, OSHA recognizes that the use of SATLs may not be feasible. The precise placement capabilities of a container gantry crane are far superior to other lifting devices, thus facilitating the use of SATLs. This enhanced capability is due to the four point suspension system of the container gantry crane, which provides greater stability and control of the container being handled, enabling the crane operator to place the container without assistance. Container operations where the spreader is suspended from a single point, on the other hand, have far less stability and control and typically require the assistance of other employees in the placement of containers. Such employees may be exposed to fall hazards. Further, as discussed above, even if SATLs are feasible when other than gantry cranes are being utilized, their use may not substantially reduce the need for employees to work on container tops in the handling of containers. (This is unlike the situation with container gantry cranes, where the use of positive container securing devices, e.g., SATLs, virtually eliminates the need to work on top of the containers.) Therefore, OSHA is not requiring the use of positive container securing devices when containers are being handled by other than container gantry cranes.

With regard to the feasibility of fall protection, OSHA recognizes that, in this industry, there may be particular instances when fall protection may not be feasible. An example of a circumstance where fall protection may not be feasible is the placement of an overheight container on a chimney stow using gear that requires the manual release of hooks. In these types of situations, the standard requires the employer to:

1. Make a determination that an employee will be exposed to a fall hazard but that the use of fall protection is not feasible or would create a greater hazard;
2. Alert the exposed employee about the hazards involved; and
3. Instruct the exposed employee how to best minimize the hazard.

OSHA emphasizes that such situations are not common and that when they do occur, the burden is on the employer to fully comply with these requirements before the employee performs the work. In fact, the Scardino study indicated that a ''specific set of circumstances could not be framed'' where fall protection might not be feasible (Ex. 1–139, p. 1). Claims of infeasibility of fall protection will be closely scrutinized by the Agency in its enforcement of the final rule.

As was proposed, the final standard in § 1918.85(k) establishes the technical requirements for container top fall protection systems (See § 1918.2). Most of the requirements in this paragraph are basic to any occupationally related fall protection system. They address the design, selection, care and proper use of personal fall protection equipment. These elements include an anchorage, connectors, a body harness, lanyards, and deceleration devices. For further information regarding fall protection systems see § 1910.66 and § 1926.502.

In addition, § 1918.85(k)(7) and (10) have been specially crafted for the container top situation. Paragraph (k)(7) addresses the situation where a container gantry crane, or its extension, is being used as the anchorage point for the fall protection system in use. Under these circumstances, the crane must be placed in the slow speed mode and equipped with a remote shut-off switch that is in the control of the tied off employee. In addition, an indicator must be within sight to inform the employee when the remote shut-off switch is operational (CH Tr. p. 28, SEA Tr. pp. 289–290). As proposed, this paragraph included language requiring that all crane functions be stopped by a remote shut-off switch. It was pointed out during the hearings that this could lead to an unsafe condition (e.g. rendering the crane inoperable when it was needed for an emergency rescue) (SEA Tr. p. 113). OSHA agrees with this position and the final language has been amended to limit the operation of the remote shut-off switch effects to the trolley, gantry, and hoist functions (i.e. those functions that directly affect the employee on top of the container) of the crane.

OSHA has used the term ''designated person'' throughout this rulemaking (see definitions—§ 1918.2) to identify a person who has a special skill in a particular area to do safety-related functions. Regarding container top fall protection systems, a ''designated person'' could do the daily inspections required in §§ 1918.85(k)(2) and (11). In the proposed rule, however, OSHA believed that the complexity of systems design decisions as required by §§ 1918.85(k)(6) and (8) should be made by a registered professional engineer. While one commenter contended that, based on his experience, engineering certification in this area was not readily available (NO Tr. p. 574), the record also contains a post hearing submission that includes a list of such engineers (Ex. 84). OSHA now recognizes that these specialized engineering skills may not be readily available in some locations. Consistent with other OSHA standards, the final rule provides flexibility by allowing the certification of equipment by a ''qualified person.'' A footnote in paragraph (k)(6) defines what is meant by the term ''qualified person'' for the purpose of this paragraph. To be considered qualified, a person must have a recognized degree or professional

certificate and extensive knowledge and experience in the subject field, and must be capable of design, analysis, evaluation and specifications in the subject work, project, or product.

OSHA also recognizes that manufactured fall protection components are extensively tested and certified by qualified persons working for the manufacturer (probably registered professional engineers). In complying with paragraph (k)(8), the employer may rely on these manufacturers' certifications with respect to unmodified equipment that is being used according to manufacturers' recommendations. Job-made components, on the other hand, must be tested and certified by a qualified person.

As noted above, the other fall protection requirement unique to longshoring operations in the final rule is paragraph (k)(10). This paragraph addresses the situation where the employee is transported by a device, such as a safety cage, attached to a container gantry crane spreader. Such a device is required to have a secondary means of attachment to the spreader besides the primary attachment mechanism (usually a hydraulic twist lock mechanism) to prevent accidental disengagement (See NMSA *et al.*). However, OSHA is aware of a system used by the Massachusetts Port Authority which employs a mechanical device that does not allow the automated box spreader to release the safety cage unless deliberate action is taken by employees using the cage. The device mechanically prevents two of the spreader's twist locks that are on opposite corners from disengaging the cage. In order for the crane operator to release the cage from the spreader, the personnel in the cage must first lift a lever that allows the two twist locks to disengage. The crane operator can not override this back-up system, and the spreader's hydraulic system also can not override it. The only way to override the system would be to disassemble it. This device, although not technically a secondary means of attachment, meets the intent of the proposed regulation. Therefore, the final regulation has been modified to allow this device by changing the wording from the proposed ''secondary means of attachment engaged'' to read a ''secondary means to prevent accidental disengagement and the secondary means shall be engaged''.

Final § 1918.85(k)(13), which requires the employer to establish a procedure that addresses the safe retrieval of an employee in the event of a fall, is carried over from the proposal. This provision received wide support from commenters (Ex. NMSA *et al*).

Final § 1918.85(l) provides for fall protection in container operations that require employees to work along unguarded edges (other than on container tops). In these situations, fall protection meeting the requirements of paragraph (k) of this section must be provided where the fall distance is greater than eight feet (2.4 m). This primarily addresses work operations such as lashing, locking and unlocking twist locks from surfaces other than container tops, or signaling to direct the placement of containers. This is consistent with OSHA's approach in this rulemaking to fall distances in §§ 1918.32(b), 1918.85(j), (k), and (l). (See definition of ''fall hazard'' at § 1918.2.)

Final § 1918.86, titled ''Roll-on roll-off (Ro-Ro) operations,'' which was a new section in the proposal, addresses operations aboard Ro-Ro vessels. The emergence of Ro-Ro vessels is a recent development and is not addressed in the current rules. Along with container operations, this new section has provisions that address advances in modern technology in the marine cargo handling industry. The cargo generally can be driven on or off the vessel by way of ramps and moved within the vessel by way of ramps and/or elevators. Traffic patterns can vary greatly in these vessels. Some Ro-Ro vessels carry intermodal containers both on deck and below. Examples of such vessels are car carriers, which simplify the import and export automobile trades, and stern or side port combination carriers, which provide water carriage for wheel mounted and containerized cargo. Commonly such vessels are fitted with ramps that extend to the dock or wharf, and are fitted with internal ramps and/or cargo elevators (lifts). In this manner, cargo is either driven through the vessel from deck to deck until reaching its final stowage location, or hoisted by cargo elevator to its proper deck and then driven to its final stowage location. Once positioned in its stowage location, the wheeled cargo is lashed to securing fittings provided on the deck. In such operations, lashing personnel are exposed to being struck by vehicular traffic. In addition, other employees involved with loading or unloading wheeled cargo, both drivers and pedestrians, are exposed to traffic hazards. This section addresses the hazards attributable to this process, in which employees and vehicles are in closely confined and marginally illuminated space.

In § 1918.86(a), OSHA proposed that an organized system of traffic control be established and maintained at each entrance and exit ramp. The highest concentration of vehicular and pedestrian traffic in Ro-Ro operations, and thus the area where substantial accident potential is most pronounced, is the area on and around ship-to-shore access ramps. Ramps inside the vessel, although generally not as congested as ship-to-shore access lanes, must also be addressed by the traffic control system if they experience a periodic traffic flow that warrants such control. These provisions, as proposed, received wide support and remain identical in the final (Exs. 6–19, NMSA *et al.*, PMA *et al.*, SEA Tr. pp. 455–458).

Final paragraph (b), which remains as proposed, addresses the hazard of exceeding the capacity of the ramp used to transfer cargo. Ramps must be plainly marked with their load capacity and these capacities must not be exceeded (Ex. 1–5).

Paragraph (c) provides protection for employees that use the ship's ramp for access. OSHA proposed that a physical separation be provided to separate the lanes of travel for pedestrians and vehicles. When the design of the ramp prevents physical separation of pedestrians from vehicles, OSHA proposed that a signaler direct traffic and not allow concurrent use. Much of the comment and testimony on this paragraph addressed the issue of the requirement of a signaler and the prohibition of concurrent use (Exs. 6–16a, 71, NMSA *et al.*, PMA *et al.*, SEA Tr. pp. 207, 244). One view presented at the hearings asserted that, if there were no physical separation on the ramp, simultaneous use of the ramp by vehicles and pedestrians (longshore workers returning to the ship to unload vehicles) can only be achieved by posting a signaler at each stern and side port ramp (Ex. 19). Others maintained that this end can be achieved in many different ways and suggested that performance language would be more appropriate (NMSA *et al.*, PMA *et al.*). OSHA, in the final regulation, requires a physical separation when pedestrians and vehicles are using the ramps simultaneously. Examples of physical separation are railings, stanchions with wire, rope, or other material separating vehicle and pedestrian traffic. Lines painted on the ramp or plastic cones do not meet the intent of the regulation. When physical separation is not possible, a positive means shall be established to prevent simultaneous use of the ramp by vehicles and pedestrians. Examples of positive means include a person controlling the use of the ramp or a signal system. Verbal instructions and training alone are not sufficient.

The proposed regulation has been modified in the final rule to reflect these changes.

Final paragraphs (d), (e), and (f), addressing ramp maintenance, hazardous routes and air brake connections, respectively, received support and remain the same as the proposal (Exs. NMSA *et al.*, PMA *et al.*). These provisions recognize the unique features of modern Ro-Ro vessel ramp design that allow for multiple access destinations.

Final paragraph (g) requires that flat bed and low boy trailers be marked with their cargo capacity and not be overloaded. Comment and testimony was received that addressed the problems with marking the cargo capacity on equipment that may be old, retrofitted, or modified:

> The point being that there's a lot of old equipment out there that has been patched up. Various features of the chassis has [*sic*] been changed so that there's no manufacturer out there that would come in and say yes, that's my vehicle or my chassis and I sold it to you 10 years ago and it was rated at this capacity, and yes, it's this capacity now.
>
> So you're not going to get a manufacturer to do it because they have no idea what you've done to that chassis, so it's kind of left up to the employer by the owner of that chassis. (SEA Tr. p. 414.)

Similar arguments were received in both testimony and comment recommending that OSHA exempt existing equipment from this requirement, having it only apply to new equipment purchased after the effective date of the final rule (Exs. 78, NMSA *et al.*). On the other hand, Doug Getchell of the ILWU recommended that OSHA require these markings on existing equipment as well.

> There's some very durable equipment out there you're talking about that could be in play for a long, long time to come.
>
> I believe that our position is that all of the equipment should be adequately proof-load tested before it's put back into use again. (SEA Tr. p. 105.)

After careful consideration, OSHA believes that ''grandfathering'' of this requirement is inappropriate. In the absence of such a marking, the capacity of the flat bed or low boy trailer would not be known. These trailers are used to transport break-bulk cargo into the holds of RO-RO ships, often down steep ramps. Overloaded trailers would constitute a serious hazard to employees. However, since the record indicates that much unmarked equipment is presently in use, the final rule allows the period of one year from the publication date of this standard for compliance with this provision. The similar provision in § 1917.71(f)(4) will also have a delayed effective date.

Paragraphs (h), (i), (j), (k) and (l), addressing cargo weights, tractors, safe speeds, ventilation, and securing cargo, respectively, received general support and remain in the final as proposed (Exs. NMSA *et al.*, PMA *et al.*). In addition, ventilation issues regarding Carbon Monoxide (CO) are discussed at length in subpart I, below.

Proposed paragraph (m) required high visibility vests or equivalent protection for authorized personnel working in Roll-on roll-off operations. This is similar to an existing requirement in the Marine Terminals Standard, § 1917.71(e), which specifies that employees working in the immediate area of container handling equipment or in the terminal's traffic lanes must wear high visibility vests, decals, reflectors or equivalent protection.

Several issues arose in the rulemaking in regard to the requirement for wearing high visibility vests: (1) Whether the Agency had any data or analysis that indicated that there was significant risk in wearing only reflective decals on hard hats; (2) whether replacing hard hat decals with high visibility vests will substantially reduce that risk; and (3) whether the Agency had largely underestimated the cost of providing high visibility vests. They argued that since the true cost was much higher than Agency estimates, and the attendant risk reduction had not been demonstrated, the Agency had failed to show that the vests are reasonably necessary for worker protection.

Regarding the lack of data issue, OSHA believes that the record clearly indicates several fatalities that may have been prevented if the employee had been wearing high visibility vests (Ex. 1–78, 1–89, and 1–103).

Regarding the second issue, some commenters argued that a reflective decal or decals placed on the employee's hard hat would be equivalent to the protection afforded by a vest (Exs. 6–29a, NMSA *et al.*, NO Tr. pp. 154–156, 459.) Several other industry representatives reported difficulty in getting workers to wear vests without discarding them each day (NO Tr. p. 211). Employers from the Gulf and West Coasts reported that for much of the year vests added to the discomfort of working in the heat which was an additional reason why employees did not wear them (NO Tr. pp. 155, 212). Other commenters noted that vests in cold climes often disappeared under coats. For example, a representative from NMSA gave this testimony:

> If the vest was visible, of course. The more visibility the better it is * * * but in some cases the vest is covered up by an outer garment, in cold weather conditions or foul weather, and it's not visible anyway. The hard hats are still being worn by the man with the reflective devices. The more high visibility you could provide, of course, the better it is for everybody. We don't want to be limited to just the vest (NO Tr. P. 356).

In addition, commenters reported that for some operations, such as lashing containers, the vests themselves had snagged on ladders or gear thus causing accidents (NO Tr. pp. 683 and 690). As a consequence, several stevedores who currently supply vests do not require employees to wear them while performing container lashing work. OSHA notes that these paragraphs do not require the wearing of high visibility vests during the lashing of containers.

NIOSH supported a requirement that employees wear reflective material on both their vests and hard hats:

> The portion of the body that's covered by a hard hat that is visible from a distance is considerably smaller than the portion of the body covered by some sort of an outer garment, be it a vest or a coat or what not * * *. I would strongly encourage that reflective material on hard hats be in addition to some of the material on the trunk of the body. (NO Tr. p. 500.)

Further testimony on the issue came from a representative from the ILWU:

> We've submitted comments, or support the notion, that particularly during daylight hours, the vest is far more visible than the hard hat. In terms of the amount of square inches, if you will, [the vest] is significantly greater than that provided by a hard hat * * *. Would you agree that the visibility of an individual with a vest and a hard hat during daylight hours is greater than with an individual with just a hard hat? (NO Tr. p. 355.)

In addition, although there are no existing U.S. Government or national consensus standards specific to longshoring on the amount of high visibility material required on safety clothing, international standards do exist. The British/European standard (BS EN 471:1994) prescribes minimum amounts of fluorescent and retro reflective material for high-visibility clothing (Ex. 71).

With regard to the equivalent protection issue, OSHA's current position was discussed in the preamble to the proposed standard. The Agency indicated that the reflective area of a decal on a hard hat is substantially smaller than that of a vest, and has no protective value if the worker is not wearing the hard hat. In fact, hard hats are not required for all work areas in marine terminals and vessels unless there is an overhead hazard (NO Tr. pp.

353–354). Furthermore, the reflective value of decals on hard hats is lost when the employee bends over which occurs during the lashing or unlashing of automobiles. In contrast, the reflective value of a high visibility vest is not only far greater but is not lost even during lashing or unlashing operations. Based on its enforcement experience, the Agency is aware that high visibility vests are available in various sizes (and many types are adjustable) including ones that are large enough to wear over cold weather apparel. OSHA's position regarding decals remains unchanged from the proposal.

With regard to the final issue, numerous employers and their representatives said that the Agency had grossly underestimated the costs of supplying vests in the preliminary regulatory impact analysis. They argued that reflective vests would have to be replaced every time they were required and that the costs would be excessive (Exs. NMSA *et al.*, 80, NO Tr. p. 557). For example, Paul Robinson of Crowley American Transport said that his company, which requires all employees to wear vests, had spent $57,000 in the past year for vests. OSHA acknowledges that some employers have a significant problem controlling the issuance of vests. However, the Agency sees little difference between this equipment and other personal protective equipment, such as hard hats, which the industry has been able to control. In the preamble to the proposed standard the Agency had estimated that 75 percent of the employees in the industry would require a new vest only once a year. The Agency has revised its estimate for supplying high visibility vests to the industry (see Section VI, *Summary of the Final Economic Analysis and Regulatory Flexibility Analysis* later in this preamble).

The Agency has concluded that wearing high visibility vests significantly reduces the probability of injury when working on RO/RO vessels or container handling ashore because it makes the worker much more visible in a busy, congested operation that involves working around fast-moving vehicles. Final paragraph (m), therefore, requires that only authorized persons be permitted on any deck while loading or discharging operations are being conducted and such persons shall be equipped with high visibility vests or equivalent protection. In addition, a footnote has been added indicating that decals on hard hats will not be considered equivalent protection for the purposes of this paragraph. However, OSHA will accept high visibility equipment meeting the European standards as providing protection that is equivalent to that required by paragraph (m). A note has been added with the minimum requirements of high visibility and retroreflective material in square inches and square meters. The parallel provision in the Marine Terminals Standard will be revised accordingly in final § 1917.71(e).

Proposed paragraph (n) provided signaling requirements when vehicles were being maneuvered into stowage positions when other personnel are in the adjacent vicinity. OSHA received several comments on this issue suggesting that a performance-based requirement, one stating the goals to be achieved, would be more appropriate than the specifications contained in the proposed provision (NMSA *et al.* and PMA *et al.*). Since the objective of this provision is to prevent vehicles being driven into stowage positions from striking employees who are lashing these vehicles into place, and since the proposed requirement allowed employees only one way to achieve this goal, i.e. under the direction of a signaller, OSHA has developed a more performance oriented requirement for the final rule to provide both protection and enhanced flexibility. In the final standard, this provision reads as follows:

Vehicle stowage positioning. Drivers shall not drive vehicles, either forward or backward, while any personnel are in positions where they could be struck.

Section 1918.87, ''Ship's cargo elevators,'' sets out requirements for the use of shipboard elevators (lifts) that are most common on many different Ro-Ro and combination carrier vessel designs. In approaching the issue of elevator usage, OSHA remained mindful of foreign vessel prerogatives. The provisions of the final rule are protective of U.S. longshore workers, but are not expected to have an impact on any other nation's vessel designs.

Final paragraphs (a), (b) and (d), addressing safe working load, load distribution, and open deck barricades respectively, received support and they remain essentially the same as the proposal (NMSA *et al.*, PMA *et al.*).

Proposed paragraph (c), however, would have allowed the vehicle driver to ride the cargo elevator when that driver's vehicle was being lifted on the elevator. Several commenters wanted the language to be changed to allow persons other than the driver to ride the elevator with the load (NMSA et al., PMA *et al.*). The driver is allowed on the elevator to make sure the brakes are applied to prevent the cargo from rolling. However, allowing other personnel to ride the elevator presents an unnecessary danger if a fall hazard, as defined in § 1918.2, is present. If riding the elevator does not present a fall hazard, however, the record does not support the proposed restriction. Therefore, OSHA has modified this paragraph to prohibit personnel from traveling on the elevator if fall hazards are present.

Section 1918.88, ''Log operations,'' is also an entirely new section addressing the hazards associated with loading logs from the water into a vessel. This is a particularly hazardous operation both because of the location where it occurs (on the water) and the nature of the cargo. Logs loaded from the water have usually been in the water for a long time, causing them to absorb water. The extra water adds to their weight and loosens the bark, making the log surface very unsure and slippery. In response to comments, the provisions in proposed § 1918.38, ''Log rafts,'' which was proposed in subpart D (Walking/Working Surfaces), are being moved to this subpart and renumbered § 1918.88(h) (Exs. NMSA *et al.*, PMA *et al.*).

Commenters argued that proposed paragraph (a), ''Working in holds,'' could be incorrectly interpreted to mean that employees would be required to leave the hold of the vessel whenever and wherever logs are being loaded. This language has been clarified to require that employees need to remain clear of areas where they may be struck by logs. This suggested language received widespread support (Exs. 35, 78, NMSA *et al.*, PMA *et al.*).

Final paragraph (b) requires that employees working on log booms wear personal flotation devices in accordance with § 1918.105(b)(2). This requirement is in the current regulation, but was not in the proposal. During the hearings, testimony was given supporting the retention of language of the current standard which requires the wearing of personal flotation devices when working on log booms and such language is in the final regulation (NO Tr. pp. 447–449).

Final paragraph (c) requires the employer to ensure that each employee wears appropriate footwear to climb or walk on logs. Such footwear typically is spiked, also known as ''caulked'' shoes. Such specialized footwear may be styled like a sandal that attaches to existing footwear, and is specifically designed for working logs. Comment was received suggesting that OSHA should not determine who would provide this item of personal protective equipment (PPE) (Exs. NMSA *et al.*). OSHA has a standing policy regarding the provision

of PPE. See subpart J for a discussion on this issue. OSHA has interpreted its general PPE standards to require employers to provide and to pay for specialized PPE required by the company for the worker to do his or her job safely and in compliance with OSHA standards. OSHA considers special footwear needed for walking on logs to be such equipment. The final remains essentially the same as the proposal, with the term ''caulked sandals'' added as an example of such special footwear.

Paragraphs (d), (e), and (f), addressing lifelines, Jacob's ladders and life-rings, received support and remain the same in the final as proposed.

Final paragraph (g) requires that a rescue boat be available when employees are working on log rafts or booms. Commenters presented two positions on this issue. One commenter urged OSHA to require that the rescue boat be powered, citing the hazard of employees falling into the water while loading logs from the water and being carried away by the river current. Requiring that the rescue boat be powered would allow an employee who falls into the water to be rescued quickly, in the opinion of this commenter (Ex. 19). An opposing view was expressed by other commenters, who argued that the fact that other lifesaving equipment, such as the life-ring required to be available by paragraph (f), was already required and the fact that a non-powered boat was often all that was necessary, made any requirement for a powered rescue boat to stand by while employees were loading logs excessive (Ex. 37, SEA Tr. pp. 412–413).

The final rule adopts a performance approach and requires that rescue boats that are ''capable of effecting immediate rescue'' be available during logging operations. The employer must thus decide, based on local conditions, what type of rescue boat is appropriate to the immediate circumstances. For example, when currents are fast enough to carry an employee away, the final rule would require employers to make a powered rescue boat available. It should be noted that OSHA's enforcement policy regarding drowning hazards incorporates guidelines developed by the U.S. Army Corps of Engineers (Exs. 1–159 and 1–160). These guidelines require a powered rescue boat to be available whenever the waters are rough or swift or where manually-operated boats are not practicable. In addition, OSHA requires that anti-drowning measures be taken in scuba diving at a trigger current of one knot (§ 1910.424(b)(3)). In light of these discussions and to assist employers in complying with these rescue provisions, the final rule specifies in a note that powered rescue boats are required when the current exceeds one knot.

As discussed in the beginning of this section, proposed § 1918.38 has been moved to this subpart and has been renumbered § 1918.88(h) (1), (2) and (3). Although paragraph (2) in the proposal required walking sticks on the ''off-shore side of the vessel,'' commenters pointed out that logs can be worked on both sides of the vessel. (Exs. 36, 78). OSHA has amended the proposal accordingly, requiring in the final that walking sticks ''* * * extend along the entire length of all rafts on the sides of the vessel being worked * * *''

Proposed § 1918.89, addressing the handling of hazardous cargo, was carried over from the existing Longshore Standard (§ 1918.86). OSHA requested comment from the public asking if the requirements in proposed paragraphs (a) and (c) were unduly repetitious. Commenters indicated that these requirements were, indeed, redundant and, were therefore unnecessary (Exs. NMSA *et al.*, PMA *et al.*). OSHA agrees that these requirements are already addressed in the Hazard Communication and the Emergency Response requirements found in subpart A and subpart I, respectively, and has removed these provisions from § 1918.89 in the final rule. The text of proposed paragraph (b), which required that hazardous cargo be secured to prevent spillage, now becomes the entirety of the text of final § 1918.89. For consistency, these changes are reflected in part 1917 (§ 1917.22).

Subpart I—General Working Conditions

Subpart I, General Working Conditions, contains provisions that address: dangerous atmospheres; lifesaving equipment such as first aid kits and life rings; hazard communication; sanitation; qualifications of machinery operators and training of supervisors; illumination; and housekeeping. These provisions, as proposed, received widespread support from commenters (Exs. NMSA *et al.*, PMA *et al.*) and are essentially unchanged in the final rule, except as discussed below.

Section 1918.90 ''Hazard communication'' is a cross reference to the Scope and Application section of the final rule. It requires, by reference, compliance with OSHA's general industry hazard communication standard, § 1910.1200. Consistent with the President's Initiative to reduce the size of the Code of Federal Regulations (CFR), OSHA has decided simply to cross-reference the Hazard Communication Standard in the Scope section as one of the part 1910 provisions applicable to longshoring, instead of incorporating that entire standard into this rule. OSHA is using this same incorporation by reference approach in the Marine Terminals Standard (part 1917). This strategy results in a net savings of approximately 50 pages in the CFR.

Final rule § 1918.91 addresses housekeeping requirements, e.g. slippery surfaces, protruding nails, and so on, and remains essentially the same as the proposed section, with one exception. As stated in the proposal, OSHA considers lashing gear used with containers, roll-on/roll-off cargo, and, in particular, automobiles, to be ''equipment,'' and, in the final rule, lashing gear is specifically referred to in paragraph (a). These housekeeping provisions are necessary to maintain a safe work area and reduce accidents to employees handling cargo.

Final rule § 1918.92 provides illumination requirements for cargo handling work aboard vessels and remains the same as the corresponding section of the proposal. These illumination requirements are consistent with those in the current Marine Terminals rule (see § 1917.123). They specify illumination levels in walking, working, and climbing areas; methods of measurement; arrangement of light sources; requirements for portable lights; and prohibition of the use of matches of open flame lights. Both part 1917 and part 1918 require a minimum of five foot-candles (54 lux) of illumination during cargo operations.

Final § 1918.93 requires protection from atmospheric hazards that are not addressed specifically in other sections of part 1918. A list of those sections is included in paragraph (a) for ease of reference. This section establishes requirements for the determination of the hazard, testing for the hazard when ventilation is being applied, and procedures for entry into hazardous atmospheres. In addition, the hazards associated with emergency entry and asbestos spills are also addressed. This section remains essentially the same as the parallel section of the proposal. The types of atmospheric hazards likely to be encountered by shipboard employees are much the same as those found in shoreside operations. Consequently, this section of the final rule contains provisions that are essentially identical to those found in the Marine Terminals Standard (see § 1917.23). This approach will provide consistent requirements that appropriately address both aspects of marine cargo transport operations.

Section 1918.94 of the final rule, ''Ventilation and atmospheric conditions,'' provides ventilation and other requirements for specific atmospheric workplace conditions that are found in longshoring operations, such as excessive concentrations of carbon monoxide (CO), atmospheric contamination by fumigated grains, tobacco, and other fumigated cargoes, and toxic atmospheres generated by menhaden and similar species of fish.

Paragraph (a) addresses the hazards associated with shipboard exposures to carbon monoxide. The buildup of unhealthy levels of carbon monoxide is of particular concern in breakbulk and Ro-Ro vessel operations. In the former, forklifts are used in the hold; in the latter, almost any type of vehicle can be operated either to perform material handling or because the vehicle itself is the cargo (i.e. vehicles being transported on Ro-Ro ships).

Carbon monoxide is a flammable, colorless, practically odorless gas. Most occupational exposures to this ubiquitous substance are the result of the incomplete combustion of organic material (HSDB 1990; Gosselin, Smith, and Hodge 1984, p. III–94).

OSHA's current limits for carbon monoxide in marine terminals and longshoring are 50 ppm as an 8-hour TWA and, in enclosed spaces, a 100 ppm ceiling, i.e. the maximum allowable exposure at any given point in time. The ACGIH has a TLV® -TWA (8-hour) of 25 ppm for carbon monoxide, and NIOSH (1973d/Ex. 1–237) recommends an 8-hour TWA limit of 35 ppm and a 200-ppm ceiling for CO. OSHA proposed to establish permissible exposure limits (PELs) of 35 ppm (8-hour TWA) and 200 ppm (5 min STEL) in outdoor, non-enclosed spaces in the marine cargo handling environment, and to retain the 100 ppm ceiling for CO in enclosed spaces in marine terminals and longshoring operations.

In addition to the 50 ppm TWA in Subpart Z of part 1910, OSHA's Longshoring and Marine Terminals Standards have long had a 100 ppm ceiling for CO in enclosed spaces. OSHA received several comments and considerable testimony concerning the proposed 100 ppm ceiling (Exs. PMA *et al.*, 71, 77, 80). The Pacific Maritime Association also recommended a short-term exposure limit of 200 ppm measured during a five minute period for Ro-Ro and automobile-carrying ships (enclosed spaces). This recommended STEL paralleled OSHA's proposed requirement for a CO limit for outdoor, non-enclosed spaces (SEA Tr. pp. 189–190.)

Mr. Rob Dieda, Safety Director for Stevedoring Services of America's California operations, supported the PMA position and added that:

> Preliminary inquiries indicate that drivers will not exceed the 8-hour time weight average, however, foremen, superintendents and clerks may be overexposed, depending on the ventilation of the ship being worked.
>
> SSA's other jobs rarely last more than one shift, with 6-hour shifts being normal. Most operations utilize unit breaks for approximately 20 minutes, once or twice a shift, depending on the shift length, where all employees exit the vessel.
>
> We average 12 vessels per month, so employees are not exposed daily. (SEA Tr. p. 300.)

Mr. John Fling, Safety Specialist for Red Shield Service Company testified:

> During our testing, the measurements were taken in the breathing zone of the individuals and in the proximity of the foremen and clerks. We received periodically what I call spikes because of their duration. We would get spikes well over 100. I got one spike even over 200.
>
> Now I call these spikes, because * * * of the duration * * * they would quickly go up, peak out, and then immediately start falling off. Things influencing these spikes was [sic] the ventilation on the ship, the type of car being discharged, the number of cars being discharged.
>
> Each time that meter went over 100 parts per million we were technically in violation; we were supposed to evacuate the ship at that point, according to the rule. However, because of the way the level falls off, before we could even start the evacuation, we were back below 100.
>
> The time weighted averages on all of these vessels has never exceeded 50 parts per million over the eight hour period. As a matter of fact, we're still well within the 35 parts per million within an eight hour period.
>
> So our recommendation, from a standpoint of compliance, would be to adopt the 35 parts per million TWA and use the 200 parts per million either as an STEL or even as a ceiling. (SEA Tr. pp. 508–509.)

Mr. Fling also submitted written testimony that included actual carbon monoxide readings from several Ro-Ro vessels that showed a few readings above 200 ppm. It also showed that the reading taken immediately (within one minute) after these high peak readings was below 100 ppm and that subsequent readings well below 100 ppm. Eight-hour exposure levels were all well below 35 ppm (Ex. 72).

The National Institute for Occupational Safety and Health (NIOSH) testified at the hearings in New Orleans on the health effects of carbon monoxide. Mr. Larry Reed, Assistant Director for Policy Development, Division of Standards Development and Technology Transfer, said that, although NIOSH supported a 100 ppm ceiling as being more protective, the NIOSH recommended exposure limit (REL) for carbon monoxide is 35 ppm as an eight-hour time weighted average, with a ceiling limit of 200 ppm. The OSHA panel asked if NIOSH had data on CO's health effects that could support a five-minute short-term exposure limit (STEL) of 100 ppm for carbon monoxide (NO Tr. p. 619). NIOSH replied in post hearing comments that it could not support a five-minute STEL of 100 ppm because such a limit would allow peak concentrations of CO to exceed the ceiling of 200 ppm and that the adverse health effects of exposure at that ceiling have clearly been demonstrated in research. NIOSH reiterated its support for a ceiling of 200 ppm (Ex. 81).

Occupational fatalities and disabling illnesses still appear on the waterfront due to high levels of (CO) accumulating in cargo spaces. In 1980, 11 longshoremen working a vessel in Miami, Florida, were hospitalized after being overcome by carbon monoxide fumes (Ex. 1–76). Another incident involving carbon monoxide occurred in 1985, in Puerto Rico, where 12 longshoremen were overcome while working in the hold of a vessel where a propane-powered fork lift was being used (Ex. 1–77). In another incident in Miami, which occurred in 1988, 2 crewmembers were killed and 14 others hospitalized due to carbon monoxide poisoning that was caused by a gas-powered water pump that was being used to remove water from the hold of a vessel (Ex.1–81).

In 1989, OSHA promulgated a new air contaminant standard for general industry, updating the permissible exposure limits (PELs) found in subpart Z of part 1910. (OSHA later proposed a similar air contaminants standard for maritime and construction employment, but withdrew it after the court decision on the part 1910 PELs.) Included in the list of updated exposure limits in subpart Z were carbon monoxide (CO) and hydrogen sulfide (H_2S). When the general industry standard was vacated and remanded by the U. S. Court of Appeals in the PELs decision (AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir. 1992), the previous PELs continued in effect, and they still apply to general industry and maritime, including longshoring and marine terminals. The current PEL for CO is 50 ppm as an 8-hour time-weighted average (50 ppm TWA), and the ceiling for H_2S is 20 ppm TWA. (On H_2S, see discussion of § 1917.94(f) below.)

In issuing this final rule on cargo-handling operations, OSHA has reviewed the record and has decided to retain the current 50 ppm TWA for CO for both marine terminals and

longshoring, which is consistent with the TWA for general industry in subpart Z of part 1910. The Agency believes that it is unnecessary at this time to lower the TWA below the general industry level because the unique aspects of exposure to CO in marine cargo handling operations are addressed by the ceiling for CO exposure in enclosed spaces, as is discussed more fully below. In future rulemakings, OSHA intends to review many of the PELs in subpart Z and determine whether there is a need to lower them. Any rulemaking action to reduce the TWA for CO or H_2S will address exposures to those substances in all workplaces covered by subpart Z, including longshoring and marine terminal operations.

In addition to continuing the 50 ppm TWA, the record of this rulemaking strongly supports the continued need for a 100 ppm ceiling for CO in enclosed spaces, with the limited exception of a 200 ppm ceiling for Ro/Ro operations. In longshoring and marine terminals, employees regularly enter and work in enclosed spaces. Exposure can rise much more quickly to IDLH levels in enclosed spaces, and escape from these spaces can be difficult. In these sectors, there is thus a higher potential for concentrations to rise to IDLH levels of CO. The 100 ppm ceiling for enclosed spaces in the final rule is intended to serve as a trigger level, to enable employees to exit the enclosed spaces before CO concentrations reach hazardous levels. This is particularly important because of two factors that are closely interrelated: First, employees working in enclosed spaces may need more time to exit those spaces because of their location and configuration aboard a vessel; and second, CO generated into an enclosed space can rapidly accumulate to unsafe levels. Thus, by requiring employees to exit enclosed spaces when the CO level reaches 100 ppm, the standard takes these factors into account to assure that the employees will not be exposed to hazardous concentrations of CO in the spaces.

With regard to the 200 ppm exception, uncontroverted testimony in the record indicated that a 100-ppm ceiling level was not feasible for Ro-Ro operations even though Ro-Ro vessels are designed with extensive ventilation capabilities. As indicated above, these commenters pointed out that, although levels of CO do spike to 100 ppm, they almost immediately fall below this level, with subsequent levels well below. In addition, from an operational standpoint spikes may occur upon starting the vehicles for unloading. Typically, employees are within the vehicles and are in the process of exiting the vessel. If a CO alarm were to go off under these circumstances, it appears unreasonable to require the employees to stop the vehicles and evacuate the vessel on foot, thereby increasing their exposure (See also PMA *et al.*). This type of exposure contrasts sharply with non-Ro-Ro operations, such as working in the hold of a vessel using gasoline powered industrial trucks. Here the CO build up is gradual, does not dissipate rapidly and the evacuation is usually by vertical ladder and more physically demanding. Based on this evidence, OSHA is setting a 200 ppm ceiling limit for occupational exposure during work on those vessels. The Agency notes that although this exception is based on feasibility considerations, it does meet the NIOSH recommendations for a ceiling based on health considerations.

In the near future, OSHA intends to review and revise many of the permissible exposure limits currently in subpart Z of Part 1910, most of which are applicable to both general industry and longshoring employment. If the health evidence supports lower limits for CO than are contained in either the current General Industry Standard or the Longshoring Standard, the Agency will propose the necessary changes for both standards.

Traditionally, in the marine cargo handling industry, carbon monoxide (CO) is the most common hazardous atmosphere that is tested for because of the use of cargo handling equipment that is powered by gasoline, diesel fuel, and propane, in spaces on a vessel that have a tendency to accumulate CO (tween decks, holds, lockers). Testing for carbon monoxide is generally done by a foreman, superintendent, or safety person. Most testing is done using hand-held instruments that give an almost immediate reading of CO in parts per million (ppm). Several persons testified at the hearings in Seattle about current industry practice with regard to carbon monoxide testing. Mr. John Fling, Safety Specialist, Red Shield Service Company, said:

> Jones Oregon Stevedoring Company does a large number of auto ships each year. We use a carbon monoxide dosey [dosimeter] tube to measure the amount of carbon monoxide that the foremen are exposed to. This gives us an average reading for the shift.
>
> To get a better picture of what was happening on a time period, we ran concurrently tests using a digital readout carbon monoxide meter. The meter was calibrated both before and after the tests.
>
> During our testing, the measurements were taken in the breathing zone of the individuals and in the proximity of the foremen and clerks * * * (SEA Tr. pp. 508–509.)

The current OSHA regulation uses the term TWA, time weighted average, and requires that the TWA for CO not exceed 50 ppm averaged over an eight hour period. In marine cargo handling, however, a TWA usually will not accurately reflect an employee's exposure to air contaminants such as CO. Marine cargo handling exposes employees to workplace conditions that can change dramatically from minute to minute. Longshore workers work on many different vessels from day to day. The vessels are often under a foreign flag and not under the control of the employer, and the employee's work locations and weather conditions are always changing. For example, work can take place in a hold, which is an enclosed space, and then change to a frozen cargo locker, which is a confined space, within a short time. Changing weather conditions can cause carbon monoxide either to dissipate quickly (in windy conditions) or settle and build up (during the summer when the air is stagnant). These work conditions contrast sharply with those in manufacturing, for example, where the workplace is in the same location day after day, the employer has control over the physical worksite, and weather is not a factor. For these reasons, the cargo handling industry uses direct reading instruments, which provide immediate feedback on CO levels. The measurements are area rather than personal measurements. When the peak level is reached, workers must be removed from the work area. To ensure that CO levels remain safe over the course of the work shift, the rule requires ''that tests of the carbon monoxide content of the atmosphere are made with such frequency as to ensure that concentrations do not exceed allowable limits.'' Since the requirement for the retention of logs is addressed in subpart Z (Access to employee exposure and medical records, § 1910.1020), the proposed requirement for maintaining the logs under § 1918.94(a)(2) has been deleted from the final rule to avoid duplication (See § 1918.1). In final § 1917.24(a) and § 1918.94(a)(ii), OSHA uses the term ''eight hour average area level.''

The remainder of the paragraph on carbon monoxide addresses the vessel's mechanical ventilation and the use of portable blowers. These requirements are essentially unchanged from the proposal, except that the formula for calculating an eight hour time weighted average has been removed from the final regulation because it is appropriate for

personal monitoring and not for area monitoring (§ 1918.94(a)(1)(i)(B)).

In final § 1918.94(b), OSHA addresses the hazards associated with handling grain treated with fumigants. This section requires, before handling bulk grain in any vessel compartment in which employees are or may be present, that the employer determine whether grain to be loaded or discharged aboard a vessel has been fumigated. If such treatment has been carried out, the employer must determine, by means of tests, that the atmosphere in the compartment is not hazardous to the health or safety of employees. These tests must be conducted by a designated person with the knowledge and experience to measure such atmospheres and prescribe the appropriate protective equipment, if necessary. In many cases, such a person will be a certified industrial hygienist or a Marine Chemist (certified by the National Fire Protection Association). This section also requires that, if the atmosphere in a compartment reaches the level specified as hazardous either by the fumigant manufacturer (as indicated by the Material Safety Data Sheet (MSDS) required by 29 CFR 1910.1200) or by Subpart Z of 29 CFR 1910.1000, all employees must be removed from the compartment and may not re-enter until tests demonstrate that it is safe to do so. The requirements in final § 1918.94(b) remain essentially unchanged from the parallel requirements of the proposal.

Final § 1918.94(c) includes OSHA's requirements for handling cargoes of fumigated tobacco. Tobacco cargoes, both imported and exported, are shipped most typically in bales, in hogsheads, and in intermodal containers. The requirements in § 1918.94(c) apply when cargoes are break-bulk, i.e. are being transported in piece lots of bales or in hogsheads. When such cargoes are containerized, employee exposure is addressed in the Marine Terminals Standard, § 1917.25(g). Comment was received requesting that OSHA clarify whether this section applied exclusively to break-bulk cargo (Ex. NMSA *et al.*). In response to this comment, OSHA has added the word ''break-bulk'' to this provision of the final rule. Paragraph (c) prohibits the employer from loading tobacco until the carrier has provided a written certification stating whether or not the tobacco has been fumigated. This requirement is necessary because tobacco is often fumigated with toxic substances, in which case the cargo must be aerated for a specified number of hours before it is safe to handle.

Final § 1918.94(d) addresses other fumigated cargoes. It requires employers to determine that the concentration of fumigants are below those specified either by the fumigant manufacturer (as indicated by the Material Safety Data Sheet (MSDS) required by § 29 CFR 1910.1200) or by subpart Z of 29 CFR 1910.1000 as hazardous before such cargo was either loaded or discharged. The proposed provision would only have applied to the loading of such cargo. OSHA received the following comment on this provision:

> In recent years the ILWU has been receiving and discharging cargo that has been fumigated in foreign ports (e.g. the discharge of logs from New Zealand and Chile that have been fumigated with methyl bromide). (Ex. 78.)

This commenter requested that the word ''discharge'' be added to § 1918.94(d) to address the fact that some cargo continues to be hazardous even at the time of discharge from the vessel. Testimony provided during the public hearings (NO Tr. p. 381) supported this change. OSHA agrees that the added language will provide additional protection and has accordingly amended the language of this provision in the final rule.

Final paragraph § 1918.94(e) addresses the use of personal protective equipment (PPE) to protect against exposures to concentrations of grain dust. It requires the use of such PPE when employees are exposed to grain dust concentrations that are above those allowed by subpart Z of 29 CFR 1910.1000. This provision is essentially unchanged from that proposed.

Final § 1918.94(f) addresses longshoring operations aboard vessels engaged in the menhaden trade (or trade in similar species of fish). Menhaden is a term that refers to several species of trash fish. Menhaden is used to produce, among other products, fertilizer, pet food and fish oil (See 46 FR 4213.) In the form of cargo handled at specialized menhaden marine terminals, menhaden presents a health hazard to longshore workers because it decomposes, generating hydrogen sulfide (H_2S). As recently as 1987, a hydrogen sulfide incident aboard a menhaden vessel led to serious injury and a fatality (Ex. 1–80). This section of the final rule does not apply to vessels that are using refrigerated holds for the storage of all cargo, because refrigeration prevents the menhaden from decomposing.

This section requires that, before employees enter a hold that contains menhaden, the hold be tested for hydrogen sulfide and oxygen deficiency. These tests must be performed by designated supervisory personnel. The maximum allowable atmospheric concentrations of hydrogen sulfide, as measured by direct reading instruments is a 20 ppm ceiling. The oxygen level must not be less than 19.5%. Unless these atmospheric levels are met, employees are not permitted to enter the hold. The corresponding provisions of the Marine Terminals Standard appear at § 1917.73(a)(2).

OSHA's current limit for hydrogen sulfide in Marine Terminals is a 20 ppm ceiling; this limit applies, along with other provisions, in menhaden tanks (§ 1917.73); the Agency's current Longshoring Standard is silent with regard to both H_2S and menhaden. The General Industry Standard (which applies to marine terminals and longshoring through subpart Z of Part 1910) is a 20 ppm ceiling.

OSHA proposed an 8-hour TWA of 10 ppm in Longshoring and Marine Terminals and a STEL of 15 ppm for menhaden operations. It should be noted that this rulemaking only addresses the appropriate level of H_2S in compartments, holds, and enclosed spaces and does not apply to other circumstances in longshoring operations and marine terminals.

As discussed earlier, OSHA intends to review and revise many of the permissible exposure limits currently in subpart Z of Part 1910, most of which are applicable to both general industry and longshoring employment. As a result, OSHA has decided not to change the permissible exposure limits for H_2S in longshoring or marine terminal operations at this time. The 20 ppm ceiling currently in the part 1910 subpart Z standards will continue to apply; for consistency between shipboard and shoreside cargo handling operations, OSHA is retaining the existing 20 ppm ceiling contained in the Marine Terminals Standard (§ 1917.73(a)(2)) and making it applicable to longshoring as well (§ 1918.94(f)). If the health evidence ultimately supports lower limits for H_2S than are contained in either the current general industry standard or the longshoring standard, the Agency will propose the necessary changes for both standards.

Final § 1918.94(f) requires that atmospheric testing be conducted prior to entry, and during work operations to ensure safe levels of both H_2S and oxygen, that the tests must be conducted by designated personnel, and that employees may not enter a hold unless safe atmospheric levels of both H_2S and oxygen are present.

Final § 1918.95, titled ''Sanitation,'' contains requirements necessary to maintain sanitary conditions. These provisions, for the most part, are consistent with the current regulations for shoreside cargo handling (§ 1917.127). They address washing and toilet facilities, drinking water, eating areas, and garbage and overboard discharges.

OSHA received considerable comment and testimony objecting to the inclusion of tables in the proposal specifying the number of required toilet facilities (Exs. NMSA *et al.*, PMA *et al.*, 6–31a, SEA Tr. p. 107, NO Tr. pp. 160-161, 361–365, 387, 559–562). The Agency does not believe that the tables are necessary, and has decided, instead, to use the more performance-oriented language of the current Marine Terminal Standards. This change also has the added benefit of achieving uniformity between the two aspects of marine cargo handling operations.

Longshoring work is normally done next to a marine terminal. If the marine terminal's sanitation facilities are available for longshore employees, this would constitute compliance with § 1918.95. Section 1917.127, which covers sanitation at marine terminals, is essentially identical to § 1918.95. The remainder of § 1918.95 is essentially unchanged from the corresponding provisions of the proposal.

Final § 1918.96, titled ''Maintenance and repair work in the vicinity of longshoring operations,'' addresses work (such as ship's maintenance and repair) performed while marine cargo handling operations are being done. In such circumstances, employees may be exposed to hazards not found in longshore operations (such as excessive light or heat from hot work or over spray from abrasive blasting or spray painting). In OSHA's current Longshoring Standard, the parallel provisions (§ 1918.95) contain requirements to account for the hazards that can be anticipated when maintenance and repair work are undertaken concurrently with cargo handling. These requirements were proposed as § 1918.95, and only minor changes have been made to improve clarity.

Sections 1918.96(a) through (d) remain the same as proposed. These requirements prohibit the conduct of longshoring operations in situations where the noise associated with maintenance or repair work is such as to interfere with the ability to communicate warnings or instructions (paragraph (a)); prohibit longshoring operations in the hold or on deck if work is being performed overhead that could expose longshore employees to falling objects (paragraph (b)); prohibit longshoring operations in conditions that could expose longshoring employees to damaging light rays, hot metal, or sparks from hot work operations being conducted in the vicinity (paragraph (c)); and prohibit longshoring operations in the immediate vicinity of abrasive blasting or spray painting operations to protect longshore workers from exposure to the hazards associated with these operations (paragraph (d)).

OSHA also proposed in § 1918.96(e) to prohibit cargo handling operations where employees are exposed to electromagnetic (nonionizing) radiation emitted from the radio and radar equipment on the vessel or from radio and television towers that are close to marine cargo handling facilities. OSHA issued a Hazard Information Bulletin on September 5, 1990, concerning a nonionizing radiation incident caused by radio transmitting towers that were near a cargo handling facility. The radio frequency emissions were aimed in the direction of the cargo handling operation and the radiation caused longshore workers touching the crane wires and hooks to be burned. This situation was corrected by having the transmissions directed away from the cargo handling area. Two commenters asked OSHA to delete this paragraph from the final rule, contending that nonionizing radiation has not been a problem in the longshoring industry (Exs. 6-1, 6–16a). Other commenters agreed that this paragraph should be deleted because it is duplicated by regulations found in § 1918.1(b)(7) (Exs. NMSA *et al.*, PMA *et al.*), which incorporates by reference OSHA's General Industry Standard for nonionizing radiation, § 1910.97. In addition, comment and testimony brought to OSHA's attention two articles, one by the United Kingdom's Health and Safety Executive and the other from the Canadian Coast Guard, that specifically addressed nonionizing radiation emitted by vessel radar (Exs. 22 and 77, SEA Tr. pp. 235–236, NO Tr. pp. 660–662). In summary, these studies suggested that nonionizing emissions from vessel radar are not harmful, even in a worst case scenario, where the radar is transmitting and the scanner is stationary at a distance of 19 feet (6 m). If the scanner is transmitting while rotating, the safe distance is 5 feet (1.8 m). OSHA agrees that proposed § 1918.96(e) is somewhat duplicative because of the incorporation by reference of § 1910.97 in the ''Scope'' of this standard. However, the proposed provisions were also not as protective as the General Industry provisions. The proposed provision has therefore not been included in the final rule. Nevertheless, although OSHA believes that nonionizing radiation is not generally a hazard during marine cargo operations, the OSHA Hazard Information Bulletin, discussed above, illustrates that problems can occur. Accordingly, OSHA has added a ''Note'' to § 1918.1(b)(7) that addresses the proximity hazards of vessel radar emissions.

OSHA is adding a new paragraph, § 1918.96(e), to the final rule that addresses machine guarding (including the control of hazardous energy sources -lockout/tagout). It requires guarding of danger zones on machines and equipment used by employees and further stipulates that the power supply to machines be turned off, locked out, and tagged out during repair, adjustment, or servicing work on such machines. This provision is written in performance-oriented language and is similar to § 1917.151. In addition, this provision of the final rule relies on the ''danger zone'' concept used in part 1917 and carried forward in final part 1918 (§ 1918.2). For additional discussion of the danger zone concept, see the ''Other Issues'' and ''Scope and application'' sections of this preamble.

Final § 1918.97 sets out requirements for first aid and lifesaving facilities, and parallels closely the same provisions of OSHA's rule for the shoreside aspect of marine cargo handling (§ 1917.26). Paragraph (a) states that employers must direct their employees to report work-related injuries to the employer, regardless of the severity of the injury. This requirement is essential to ensure that hazards causing injury to employees are identified and controlled. Paragraph (b) requires that a first aid kit be available on or near each vessel being worked and that at least one person trained in first aid be available to provide first aid during cargo handling operations. This requirement is designed to ensure that first aid can be provided quickly if needed. For the benefit of small employers, OSHA is including a non-mandatory Appendix V, which contains a list of the basic elements of a first aid training program that incorporates generally accepted guidelines for, among other aspects of a first aid program, the handling of potentially infectious body fluids (i.e. ''universal precautions''). Providing such compliance assistance materials is consistent with the intent of recently enacted small business legislation (e.g. the Small Business Regulatory Enforcement Fairness Act of 1996).

In final paragraph (c), the requirements for first aid kits are specified. OSHA proposed to require that the contents of the first aid kit(s) be chosen by a physician who, in consultation with the employer, would customize the first aid kit to fit the hazards to be encountered. OSHA received considerable comment suggesting that the requirement that a physician customize the first aid kit was unnecessary and burdensome (Exs. NMSA *et al.*, PMA *et al.*, 6–1, 6–16a, 6–29a, 6–30, 6–31a, 6–36, CH Tr. p.160). After careful consideration of the comments received, OSHA has modified the final rule's approach to the use and selection of first aid kits to recognize that a person who is certified in first aid and familiar with the hazards found in marine cargo handling operations is qualified to select and restock a first aid kit. Accordingly, OSHA has revised § 1918.97(c) so that it reads:

* * * The contents of each kit shall be determined by a person certified in first aid and cognizant of the hazards found in marine cargo handling operations. The contents shall be checked at intervals that allow prompt replacement of expended items.

OSHA believes that allowing first-aid trained individuals rather than requiring physicians to stock the kit will provide employers with greater flexibility while maintaining employee protections unchanged. OSHA notes that small employers may seek guidance from ANSI guidelines on this issue—ANSI Z308.1–1978, ''minimum requirements for industrial unit-type first aid kits''. These guidelines are currently being updated.

Final § 1918.97(d) addresses specific requirements for the strength, design characteristics, and positioning of emergency stretchers (Stokes baskets). Two commenters stated that the provision of Stokes baskets is the responsibility of the vessel and should not be required in part 1918 (Exs. 6–16, 6–31). In response to these commenters, OSHA notes that these provisions have always been a part of the Agency's longshoring requirements and are also a part of the marine terminal requirements. Generally, the Stokes basket(s) is attached to the shoreside crane in a marine terminal. However, since longshoring operations can also take place in the middle of a river or at a facility that is considered a production facility rather than a marine terminal, Stokes baskets are also required in the final Longshoring Standard. Another commenter stated that only trained and qualified personnel should move an injured person (Ex. 6–30). OSHA strongly agrees with that position, but notes that Stokes baskets are specifically designed to lift an injured person securely, vertically if necessary. This may be needed if the injured person has fallen into a narrow space, such as between a column of containers and the hold of a ship. OSHA believes that a Stokes basket is necessary equipment that should be available for trained personnel to use. As with first aid kits and sanitation requirements, if a Stokes basket is available to longshore workers shoreside in accordance with part 1917, this will satisfy the parallel requirement in part 1918. Sections 1917.26 (c) and (d) of OSHA's marine terminal regulations are being revised in the present rulemaking to mirror the final Longshoring Standard's requirements for first aid kits and emergency stretchers.

Final paragraph (e) addresses life-rings and requires that a sufficient number of Coast Guard-approved rings be available to rescue personnel who have fallen into the water. Means of communication are required by paragraph (f) of the final rule to be readily available to obtain emergency and other sources of aid when necessary.

Final § 1918.98 sets out requirements for the qualifications of machinery operators (i.e. crane or winch operators, industrial truck drivers, conveyor operators, etc.) and training requirements for supervisory personnel (i.e. gang supervisors, stevedore superintendents, etc.) in accident prevention. These same provisions can be found in the Marine Terminals Standard (§ 1917.27). Paragraph (a) only permits workers to operate a crane, winch, or other power-operated cargo handling apparatus or any power-operated vehicle or give signals to the operator of any hoisting apparatus if the employer has determined that they are competent, through training or experience; that they know the signs, notices, and operating instructions of the equipment; and that they are familiar with the signal code being used. The only exception to this rule is that employees who are being trained and supervised by a designated person may operate such machinery or give signals to operators during their training.

At paragraph (a)(2), the final rule provides that employees with defective eyesight or hearing that has not been corrected are not permitted to operate certain equipment (i.e., cranes, winches, other power-operated cargo handling apparatus, or power-operated vehicles). In addition, employees suffering medical ailments that may suddenly incapacitate them are not permitted to operate such equipment. This provision includes heart disease and epilepsy as examples of medical ailments that could, in some cases, be suddenly incapacitating. OSHA stresses, however, that nothing in this provision requires employers to exclude from operating machinery all employees who have heart disease or epilepsy or a history of such conditions. Rather, OSHA intends that employees with medical ailments, such as heart disease and epilepsy, should be excluded from operating the specified machine only if their particular medical condition poses a high probability that they could become suddenly incapacitated and only if there is no reasonable accommodation that would eliminate or reduce the risk of direct threat of harm to the employee or others.

For purposes of this standard, OSHA defines ''*suddenly incapacitating*'' medical ailments as those that pose a *direct threat* of *substantial harm* to the health or safety of the employee or others that cannot be eliminated or reduced by some form of *reasonable accommodation*. *Direct threat* refers to those risks that are *significant, specific*, and *imminent* or *current*. In addition, *direct threat* is limited to those situations in which there is a *high probability* that substantial harm might occur. This provision does not apply to medical ailments, including heart disease and epilepsy, that pose a speculative or remote risk of harm. Likewise, this provision is not intended to include medical ailments that pose only a slightly increased risk of harm.

In determining whether there is a direct threat to the health or safety of the employee or others, the employer should identify the *specific* risk posed by the employee as well as the particular *aspect* of the ailment that would pose a direct threat. There are certain factors the employer should consider when determining whether the employee poses the type of direct threat anticipated by this provision:

1. The *duration* of the risk;
2. The *nature* and *severity* of the potential harm;
3. The *likelihood* that the potential harm will occur; and
4. The *imminence* of the potential harm.

The determination of the seriousness and imminence of the potential harm must also be based on the employee's *current* medical condition and the employee's *current ability to perform the job*. The determination is not to be based on mere speculation or predictions of the employee's future medical condition or ability to perform the job at some future date.

Determinations of whether an employee poses a direct threat of substantial harm must be made on a *case-by-case basis*. The determination must be based on the *best available objective data* or other *factual evidence* and/or medical analyses regarding the *particular employee*. The determination must be based upon *reasonable medical judgment* that relies on *current* medical knowledge and not generalized or out-of-date assumptions about the risks that are assumed to be associated with certain disabilities. It is not proper to base determinations on mere speculation, subjective perceptions, irrational fear, patronizing attitudes, or stereotypes. Relevant evidence, for example, may include input from the employee; the employee's experience in previous similar positions; and opinions of physician, rehabilitation counselors, or physical therapists who have expertise in the medical ailment in question and/or direct knowledge of the employee.

Where the employer does determine that the employee's medical ailment poses a significant risk of substantial harm, the employer must also consider whether reasonable accommodations are available that would eliminate or reduce the risk so that it is below the level of direct threat.

OSHA has noted in the standard in both § 1917.27(a)(2) (marine terminals) and § 1918.98(a)(2) (longshoring) that it has defined OSHA suddenly incapacitating medical ailments consistent with the Americans with Disabilities Act (ADA), 42 U.S.C. 12101 (1990). Therefore, employers who act in accordance with the employment provisions (Title I) of the ADA (42 U.S.C. 12111–12117), the regulations implementing Title I (29 CFR part 1630), and the Technical Assistance Manual for Title I issued by the Equal Employment Opportunity Commission (Publication number: EEOC—M1A), will be considered as being in compliance with this paragraph.

Paragraph 1918.98(b) addresses supervisory accident prevention proficiency and requires immediate supervisors of cargo handling operations that involve more than 5 persons to complete a course in accident prevention within 2 years after the publication of this standard. Employees who are newly assigned to supervisory duties after that date must receive such training within 90 days of being assigned to those duties. The content of the accident prevention course must be relevant to the particular work operations being supervised by the supervisor. The final rule's criteria for the content of the accident prevention course are performance-based and allow for the instruction to be tailored to the particular operation(s). The recommended topics included as a footnote are considered rudimentary to most shipboard cargo handling operations. Throughout the public hearings, testimony was presented concerning the training done in the marine cargo handling industry and its effectiveness. The supervisory training phase-in periods in the final Longshoring Standard are the same as those in the Marine Terminals Standard (two years after the promulgation of the final rule and after that date 90 days after supervisory assignment. The provisions in § 1918.98(b) received widespread support (NMSA *et al.*).

Section 1918.99 of the final rule is entitled, ''Retention of DOT markings, placards and labels.'' This section concerns the removal of Department of Transportation-required labels and placards on packages, freight containers, rail freight cars, motor vehicles, or transport vehicles of hazardous materials (see 49 CFR parts 171 through 180). Paragraphs (a) and (b) requires employers who receive packages, containers, or vehicles labeled in accordance with these DOT requirements to retain those markings, labels, and placards until the package, container, or vehicle has been cleaned or purged so that it presents no hazard to employees. Paragraph (c) requires employers to maintain markings, placards, and labels in a manner that ensures that they will remain visible, and paragraph (d) states that non-bulk packages that will not be re-shipped will be considered to satisfy these provisions if the label or other acceptable marking is attached to the package as required by OSHA's Hazard Communication Standard (29 CFR 1910.1200). The provisions in this section of the final rule that are required by DOT's Hazardous Materials Regulations, were published by OSHA in the **Federal Register** (59 FR 36700, July 19, 1994). Similar language has been included in the Marine Terminals Standard (see § 1917.29).

The regulatory text of final § 1918.100, ''Emergency action plans,'' which was discussed in the Summary and Explanation for subpart A, is included here. It stipulates that this section applies to all action plans required by a particular OSHA standard, and contains requirements covering the elements of the action plan, alarm systems, the evacuation of employees in emergencies, and the training of persons to assist in evacuation of employees. These requirements parallel those for emergency action plans in OSHA's general industry standards.

Subpart J—Personal Protective Equipment

This subpart is based upon the requirements for personal protective equipment (PPE) found in the shoreside requirements for marine cargo handling (§§ 1917.91 through 1917.95). The hazards addressed by this subpart are those that can cause physical injury to the eyes, respiratory system, head, feet, or other body parts of employees. The subpart also addresses protection from the hazard of drowning associated with working around or above water. The use of the personal protective equipment required in this subpart can reduce or eliminate physical injury to employees caused by exposure to certain maritime workplace hazards. This subpart received widespread support, as evidenced by a number of comments (Exs. NMSA *et al.*, PMA *et al.*).

OSHA has updated references to the American National Standards Institute (ANSI) standards incorporated by reference in this subpart. The ANSI standards for eye protection, head protection and foot protection referenced were the most current editions of those standards available at the time this subpart was published. OSHA believes that the more current editions of the ANSI standards can be adopted by reference in the final rule for both the Marine Terminals Standards and the Longshoring Standard without substantively changing the OSHA regulations.

With this rulemaking, OSHA is consistently applying previous guidelines for determining when employers would be expected to pay for PPE and when employees would be expected to pay.

On October 18, 1994, OSHA issued a memorandum to its field offices which stated as follows:

> OSHA has interpreted its general PPE standard, as well as specific standards, to require employers to provide and to pay for personal protective equipment required by the company for the worker to do his or her job safely and in compliance with OSHA standards. Where equipment is very personal in nature and is usable by workers off the job, the matter of payment may be left to labor-management negotiations. Examples of PPE that would not normally be used away from the worksite include, but are not limited to: welding glasses, wire mesh gloves, respirators, hard hats, specialty glasses and goggles (designed for laser or ultraviolet radiation protection), specialty foot protection (such as metatarsal shoes and linemen's shoes with built in gaffs), face shields and rubber gloves, blankets and cover-ups and hot sticks and other live-line

tools used by power generation workers. Examples of PPE that is personal in nature and often used away from the worksite include non-specialty safety glasses, safety shoes, and cold-weather outer wear of the type worn by construction workers. However, shoes or outer wear subject to contamination by carcinogens or other toxic or hazardous substances which cannot be safely worn off-site must be paid for by the employer. Failure of the employer to pay for PPE that is not personal and not used away from the job is a violation and shall be cited. (Ex. 1–157.)

Although the equipment used in marine cargo handling operations often differs from that mentioned in the October 18 memorandum, the same policy considerations apply in the Longshore and Marine Terminals Standard PPE context. Therefore, OSHA will apply the above-stated policy when determining whether the employer is required to pay for a particular kind of PPE.

In § 1918.101, Eye protection, OSHA maintains the language from the proposal. This section requires that employers provide employees with eye protection that meets the requirements of the American National Standards Institute, ANSI Z–87.1–1989, ''Practice for Occupational and Educational Eye and Face Protection.'' The section also requires that employees use the equipment and that it be cleaned and disinfected before issuance to another employee. In addition, for employees wearing corrective spectacles, paragraph (a)(2) states that the required eye protection equipment must be capable of being worn over the spectacles, unless prescription-ground safety lenses that provide equivalent protection are substituted.

In § 1918.102, Respiratory protection, OSHA incorporates by reference the OSHA General Industry Standard for respiratory protection found in 29 CFR 1910.134 by referencing § 1918.1(b)(12) of the Longshoring Standard. Section 1918.1(b)(12) refers to 29 CFR 1910.134. On November 11, 1994, OSHA published a proposed rule that would revise the respiratory protection rules (59 FR 58884). When this standard is published as a final rule, it will apply, by reference, to both the Marine Terminals and Longshoring Standards (§ 1917.1(a)(2)(x) and § 1918.1(b)(8)).

Final § 1918.103, Head protection, is unchanged from the proposal. This section provides that employers require employees who are exposed to hazards associated with direct head impact or electric shock or burns to the head wear head protection. Such head protection must meet the requirements of the American National Standards Institute, ANSI Z–89.1–1986, ''Personnel Protection-Protective Headwear for Industrial Workers-Requirements.'' The section also requires that employees use the equipment and that it be cleaned and disinfected before issuance to another employee.

Final § 1918.104, foot protection, is also unchanged from the proposal. This section requires that employers provide employees exposed to puncture or impact hazards associated with the foot with safety footwear meeting the requirements of the American National Standards Institute, ANSI Z–41–1991, ''American National Standard for Personal Protection-Protective Footwear.'' The section also requires that employees use the equipment provided.

In final § 1918.105, other protective measures, OSHA is mandating a general approach that requires the employer to provide and ensure the proper use of any additional personal protective equipment that may be necessary to protect other parts of an employee's body. Paragraphs (a)(1) and (a)(2) are unchanged from the proposal. These paragraphs require the employer to provide and require the wearing of any additional special personal protective equipment that may be necessary to protect employees from recognized hazards in the workplace. It also requires that such equipment be cleaned and disinfected before reissuance to other employees.

Paragraph (b) of § 1918.105 addresses the use of personal flotation devices (PFDs). The employer is required to provide for and ensure the wearing of PFDs by all employees whose work may expose them to falls into water. This paragraph received several comments. For example, one witness at the Seattle hearing stated:

> We question paragraph * * * [1918.105(b)(1)], which requires personal flotation equipment to be worn when working on the deck of a barge. Almost all of our barges are outfitted with a safety fence consisting of stanchions and two courses of wire rope; that the vessel is alongside the dock and there is not a chance for a person to fall between the barge and the dock, and have proper means of access through a ladder or a gangway with handrails is provided and there is a safety fence on the barge, this proposed safety regulation appears to be superfluous * * * My concern was * * * that * * * it would be viewed as a rule that if you're working on the deck of a barge, you must wear an PFD regardless of if there is a proper safety fence. (SEA Tr. pp. 622–623.)

Another commenter argued that the current regulation, which requires the wearing of PFD's when working on log booms and barges on the Mississippi River, was sufficient and should be retained (Ex. 6–16a). Other commenters argued that OSHA should modify these requirements by deleting proposed paragraphs (b)(1)(i) through (b)(1)(iv) of § 1918.105, which specified situations where PFDs had to be worn (Exs. 8–8, NMSA, *et al.*). These commenters believed that the performance language of § 1918.105(b)(1) adequately addressed employee safety and allowed flexibility in the means of compliance. OSHA agrees that paragraph (b)(1) adequately addresses safety concerns and has modified the language of the final rule accordingly. OSHA believes that the specification language contained in the proposal would limit worker protection by not including non-specified situations where PFDs are needed.

An area of concern that was not addressed directly in the proposal relates to the wearing of PFDs while working on log rafts. During questioning by OSHA at the Seattle hearing, one witness agreed that PFDs should be specifically required for employees engaged in logging operations (SEA Trans. pp. 447–449). OSHA believes that the wearing of PFDs is essential in logging operations because of the continuous exposure to water when working on rafts, and has added this requirement in § 1918.88, ''Log operations''.

As discussed above, paragraph (b) sets requirements for PFDs. Some of the language in the final rule has been editorially revised to reflect the language used in the U.S. Coast Guard's standard for approved lifesaving equipment (46 CFR part 160). OSHA's existing § 1915.154(a) specifies that the above-cited U.S. Coast Guard requirements for this equipment shall be followed. The OSHA final rule provides clarification on what constitutes an acceptable PFD and uses terminology that is consistent with current U.S. Coast Guard requirements.

Final paragraph (b)(3) addresses the inspection of PFDs for dry rot, chemical damage, or other defects (such as tears, punctures, missing or nonfunctioning components) that affect their strength and buoyancy. Final paragraph (b)(3) also includes the proposed language to the effect that all personal flotation devices must be maintained in a safe and serviceable condition.

Appendices

There are five appendices that follow the regulatory text of this rulemaking. Appendix I, which is non-mandatory, titled ''Cargo Gear Register and Certificates,'' is a sample cargo gear register and certificates that are in the international standard form that complies with ILO Convention number 152, as required by subpart B.

Appendix II, which is mandatory, titled ''Tables for Selected Miscellaneous Auxiliary Gear,'' contains tables that are to be used when manufacturers' specifications or gear certificates are not immediately available at the worksite for determining the Safe Working Load for various synthetic and wire ropes slings, chain slings, and shackles; allowable chain link wear; and the minimum number and spacing of wire rope clips.

Appendix III, which is non-mandatory, titled ''Conventional Cargo Gear,'' provides guidance to employers and employees on how to correctly rig conventional ship's gear (two cargo derricks with married falls).

Appendix IV, which is non-mandatory, titled ''Summary Chart for Testing Special Stevedoring Gear,'' provides all the requirements found in § 1917.50(c)(5) and § 1918.61 for testing special cargo gear and container spreaders in one chart.

Appendix V, which is non-mandatory, titled ''Basic Elements of a First Aid Training Program,'' outlines the basic elements of a first aid program, including universal precautions to prevent the spread of bloodborne diseases.

V. Other Issues

1. OSHA raised as an issue the possible harmful effects of diesel exhaust on marine cargo handling employees, especially those employees who work Ro-Ro vessels where exposure to such exhaust is probably the greatest. In response to questions raised during the hearings, NIOSH provided the following data in a post hearing submission:

> Recent animal studies in rats and mice confirm an association between the induction of cancer and exposure to whole diesel exhaust. The lung is the primary site identified with carcinogenic or tumorigenic responses following inhalation exposures. Limited epidemiologic evidence suggests an association between occupational exposure to diesel engine emissions and lung cancer. The consistency of these toxicologic and epidemiologic findings suggests that a potential occupational carcinogenic hazard exists in human exposure to diesel exhaust. (Ex. 81.)

Although studies have been conducted concerning the effects of diesel exhaust by the Mine Safety and Health Administration (MSHA) in the mining industry, no specific studies relating to the longshoring industry had been completed when OSHA published this final rule. Diesel exhaust particulates, which have been identified by OSHA as a priority for further study by the Priority Planning Process, may be the subject of a future rulemaking, during which OSHA anticipates the availability of more conclusive scientific data. Consequently, OSHA has decided to defer any regulatory action on this issue in this rulemaking.

2. Prior to the proposal, OSHA learned of accidents reported in West Coast ports that were associated with picking up the chassis and fifth wheel [9] along with the container (due to the failure of the container and chassis to separate during a loading operation). However, OSHA did not have information regarding: (1) the frequency of occurrence of such accidents, (2) the availability, effectiveness, and feasibility of devices which would shut the crane down once the device detects the fifth wheel being raised off the ground, and (3) the existence of other ways to eliminate the problem (such as better ''monitoring'' of the chassis twist locks under the hook through training and work practices, or requiring the driver to get out of the cab until the container is lifted clear of the chassis). Due to this lack of information, OSHA raised this issue in the proposal.

In response, OSHA received one comment from a manufacturer of safety devices that prevent the inadvertent lifting of the fifth wheel with the container. These devices shut down the container gantry crane when they detect the uneven balance to the load that occurs when a fifth wheel is lifted. The experience of this commenter suggests that administrative work practices are not fully effective (Ex. 6–3).

This issue received very little attention during the hearings and public comment period. However, OSHA believes that the wider use of SATLs will help to prevent accidents caused by the inadvertent lifting of the chassis and container together. When SATLs are being used, as explained earlier, the longshore workers remain on the quay to place the SATLs on the bottom of the container after it is lifted only a foot or two off the chassis. In contrast, when manual twist locks are in use, they are inserted on the ship; lifts of the container from the chassis in this situation are usually much quicker and much higher, since the crane operator does not have to stop after a foot or two to allow the SATLs to be inserted. Although a lift of this magnitude is enough to allow the fifth wheel to disengage and depart, the lift would not be a substantial lift of twenty to fifty feet, but a limited lift of only a few feet. With a two foot lift, even if the chassis does not disengage from the container, the injury potential would be greatly reduced. Because this rulemaking will increase the use of SATLs in this industry, OSHA has decided not to take any further regulatory action on the fifth wheel hoisting issue at this time. It is OSHA's intention to monitor the frequency of this operation further and engage in joint studies with the assistance of the Maritime Advisory Committee for Occupational Safety and Health (MACOSH) to assess the need to address such accidents in the future.

3. Specific questions were raised in the proposal to elicit information OSHA believed would be helpful in determining appropriate elements for comprehensive occupational safety and health (COSH) programs in the marine cargo handling industry. Although this is an industry that, historically, has been in the forefront in the development of safety and health programs (particularly safety training programs), several commenters argued that OSHA should not promulgate rules governing COSH programs (Ex. NMSA *et al.*). The employee participation element of such programs was also discussed at length at the Seattle hearing (SEA Tr. pp. 435–436). Several responders (Exs. 6–5, 6–20, 6–23, and 6–25) opted not to comment at this time but stated that they would reserve comment until a future rulemaking specifically on this subject. OSHA will continue to review all available information in determining the need for and contents of the proposed requirements for safety and health programs in this industry.

4. In the proposal, OSHA sought information on hazards related to the increased usage of newly developed Flexible Intermediate Bulk Containers (FIBC's) used to handle bulk chemicals. Although several commenters (Ex. NMSA et al.) acknowledged the increased use of FIBCs, their experience with this type of container did not uncover any unique hazards that had not already been addressed in the Longshoring Standard. In addition, Mr. Signorino of Universal Maritime Service Corporation, pointed out that the Department of Transportation, Research and Special Programs Administration (RSPA) already has regulations (59 FR 38040) that address the safe transport of hazardous materials in such containers (Ex. 6–35). OSHA has thus concluded that the Agency does not need to pursue regulatory action at this time.

5. OSHA issued a standard for the control of hazardous energy sources (lockout/tagout) that applies to general

[9] A fifth wheel is a unique power unit designed primarily for moving and spotting trailers in truck, rail, and marine terminals. Other names for a fifth wheel are: yard hustler; jockey truck; yard goat; and UTR (utility tractor). Most fifth wheels are not designed or equipped for public highway or street use.

industry employment (29 CFR 1910.147 (54 FR 36645)). This standard addresses practices and procedures that are necessary to disable machinery or equipment and to prevent the release of potentially hazardous energy while maintenance and servicing activities are being done. The standard requires that lockout be used for equipment designed with a lockout capacity, and allows tags to be used to ''tag out'' equipment that was not designed to be locked out. Marine terminal activities involve work operations (e.g. container repair shops and warehouses) where lockout/tagout hazards are present and are similar in nature to those posed by General Industry repair shop and warehouse operations. Many commenters (Exs. 6–35, 6–16c) contended that the current Marine Terminals Standard contains requirements (most broadly applied in § 1917.151(b)(7)) for lockout/tagout that are more protective than those in the General Industry Standard, and that these requirements should be applied to longshoring operations.

For the most part, repairs to shipboard equipment are normally accomplished by the crew of the vessel and are only infrequently performed by longshore workers. However, to provide protection in those instances where longshore workers may do repairs that would require the locking out of equipment, and to assure regulatory consistency with marine cargo handling operations, OSHA is including the same lockout/tagout provisions of § 1917.151(b)(7) in the Longshoring Standards (codified at § 1918.96(e)).

6. As indicated earlier, OSHA contracted with a safety expert, A.J. Scardino, to conduct a study of the fall hazards associated with the cargo handling of intermodal containers. In his study, he recommended:

> * * * that the location of the fixed anchorage point in relation to the working surface shall be located ''above'' the head of the employee. Every effort should be made to assure that the attachment point for the system is located no lower than the vertical height position of the harness ''D'' ring. According to ''Humanscale 7a'', for the 50th percentile male, this would be 1.4 meters (55.4 inches). (Ex. 1–139.)

He further recommended that:

> The use of systems that are at foot level, thereby creating a tripping hazard, should be discouraged. If these systems are to be used, then, the components that make up the system should be of a high visibility color. (Ex. 1–139.)

The final container top fall protection provisions are crafted in performance-oriented language to promote innovation and flexibility in providing fall protection. The key performance tests that a fall protection system must meet are that it (1) be rigged to reduce free-fall distance so that the employee will not contact any lower level stowage or vessel structure; and (2) be designed so that the fall will not produce an arresting force on an employee that exceeds 1800 pounds (8kN) (See § 1918.85(k) (3) and (4)).

Although elevated anchorage points are important considerations in the design of fall protection systems, these provisions of the final rule focus on the performance criteria for such systems rather than their specific design aspects. Consequently, OSHA has determined that it would not be appropriate to include this single design consideration in the final rule.

VI. Summary of the Final Economic Analysis and Regulatory Flexibility Analysis

As required by Executive Order 12866, OSHA has prepared an economic analysis of the final standards for longshoring and marine terminals. Neither standard is a ''significant'' rule under that Executive Order nor a ''major'' rule under the Small Business Regulatory Enforcement Fairness Act. In addition, as required by the Regulatory Flexibility Act of 1980 (as amended in 1996), the Agency has assessed the potential impacts of these two marine cargo-handling rules on small entities and has determined that they will not have a significant economic impact on a substantial number of small entities. Because this standard does not impose annual costs of $100 million or more, will not significantly affect small governments, and is not a significant federal intergovernmental mandate, the Agency has no obligations to conduct analyses of these rules under the Unfunded Mandates Reform Act.

This section of the Preamble presents a summary of the Economic Analysis and the screening analysis for small-business impacts. The entire analysis has been placed in the rulemaking docket for the two final standards.

The purpose of this Final Economic Analysis is to:

- Describe the need for a revision of the existing standards for longshoring and marine terminals;
- Identify the establishments, industries, and employees potentially affected by the standard;
- Estimate the costs, benefits, economic impacts and small business impacts of the standard on affected firms;
- Assess the technological and economic feasibility of the standard for affected establishments, industries, and small businesses;
- Evaluate potential non-regulatory approaches to control the pertinent risks to workers in the affected industries; and
- Describe alternatives adopted in the final standard that are designed to reduce the impact of the standard on small firms while meeting the objectives of the OH Act

These standards affect employers and employees in many industries. The Marine Cargo Handling industry, classified as SIC 4491 in the Standard Industrial Classification Manual, is the industry most directly affected. SIC 4491 is composed of both stevedores and marine terminal operators, both businesses that are exclusively engaged in marine cargo handling. Marine cargo handling activities in other industries are also impacted: for example, manufacturers who load or unload raw materials or finished products from vessels and electric utilities than unload coal from barges also fall within the scope of the revised final standards.

A. Evaluation of Risks and Estimation of Benefits

The transport of marine cargo has changed significantly since OSHA's Longshoring Standard was adopted in the early 1970s and even since the Marine Terminals Standard was revised in the early 1980s. Low-cost transport of cargo by standardized intermodal containers (referred to simply as containers hereafter) has become the dominant mode of shipping manufactured goods. To transport vehicles, specialized ''roll on/roll off'' vessels have been developed. Freighters have therefore been designed with efficient container transfer and ease of intermodal movement as the dominant criteria. Shipment by intermodal container has replaced shipment of ''break bulk'' cargo which came in many sizes and modes. As a result, cargo handling has become a more capital intensive and mechanized industry in the past 20 years. For example, although the weight of transported cargo (U.S. exports and imports) has remained roughly constant between 1980 and 1990, the amount shipped via intermodal containers has more than doubled. Over the same period, employment in SIC 4491 has declined from about 88,000 to 55,000.

The change in the technology of cargo transport has altered the risks that employees face on the docks and aboard ships. Although mechanization has reduced injuries due to overexertion and lifting, new risks have arisen, such as falls from containers stacked as high

as 60 feet and being struck by forklifts or ''fifth wheeler'' tractor trailers moving containers.

Because the final standard requires longshore employers to load and unload containers secured to each other with positive container securing devices, e.g., semi-automatic twist locks, where feasible, the shipping industry is also potentially affected, since ship owners must purchase these container connectors. The standards' effect on the U.S. shipping industry and international trade (and foreign shippers) is discussed below.

The Bureau of Labor Statistics 1992 injury rate for SIC 449 (Service Incidental to Water Transportation) was 14.0 for every 100 FTE workers, based on a 2000 hour work-year, compared with 8.9 for all of private industry (''Occupational Injuries and Illnesses: Counts, Rates, and Characteristics, 1992,'' published May 1995). The lost workday and non-lost workday injury rates per 100 FTE workers in SIC 449 were each 7.0. The median number of lost workdays due to injury in SIC 449 was 15 per case as compared to 6 for all of the manufacturing sector. For SIC 4491, the average number of lost workdays was 38.9 lost workdays per lost workday injury. These statistics clearly indicate that marine cargo handling continues to be a highly hazardous industry.

An estimated 7,593 injuries and 18 fatalities occur annually during all marine cargo handling activities. The final Longshoring and Marine Terminals Standards are expected to result in the prevention of 1,262 injuries and 3 fatalities, annually. Many additional fatalities and injuries would be prevented if employers were in full compliance with requirements that have been in place in the Agency's Longshoring and Marine Terminals standards for years and that have been retained in these final standards. In particular, the Agency believes that an additional one to three fatalities may be avoided each year when all affected establishments comply with OSHA's requirements for engineering controls and fall protection on intermodal containers. However, because the Agency's existing Longshoring standard has been interpreted as requiring fall protection at heights over eight feet (see Preamble of the proposed rule, 59 FR 28611, June 2, 1994), the Agency did not claim the benefits or estimate the costs potentially associated with the final rules' clarified requirements for fall protection on containers in this final economic analysis. In the affected industries, confusion over OSHA's existing container top fall protection requirements and their interpretation and non-uniform enforcement have resulted in currently low compliance levels for fall protection on containers.

The deaths and injuries estimated to be prevented by this revised standard are in addition to those that would be prevented by full compliance with OSHA's existing marine-cargo handling rules. OSHA estimates that, of the injuries potentially averted by the revised standards under the revised rules, about 800 are lost workday cases. Since a lost workday injury results in almost 40 missed days of work, on average, in SIC 4491, the 800 lost workday cases amount to a savings of more than 30,000 lost workdays annually. The potential economic savings of these avoided injuries alone is approximately $7 million annually. Thus the final standards for Longshoring and Marine Terminals are clearly needed to reduce the continuing significant risk of falls and other hazards posed to marine cargo handling workers employed in these industries.

B. Affected Industries, Establishments, and Employees

The requirements of the final standards apply to all establishments that perform marine cargo handling. Affected industries include the marine cargo handling industry itself (classified in the 1987 Standard Industrial Classification manual as SIC 4491), which includes both marine terminal operators and stevedores, as well as any other industries and establishments that handle marine cargoes, such as electric utilities that unload coal from barges or grain elevators that load grain onto barges. The Agency estimates that there are 3,700 establishments affected by both the Longshoring Standard and the Marine Terminals Standard. Table 1 shows how these establishments are distributed across affected industries for both standards. Based on employment data from the Table 1 Bureau of the Census and OSHA inspection data, 93,427 workers are estimated to be affected by the Longshoring and Marine Terminals standards, about 73,000 of whom are employed in establishments classified in SIC 4491.

TABLE 1.—NUMBER OF ESTABLISHMENTS AFFECTED BY THE FINAL LONGSHORING AND MARINE TERMINALS STANDARDS, BY INDUSTRY

Industry	Number of establishments
SIC 4491—Marine Cargo Handling	746
Manufacturing	1,660
Transportation, Communications, and Electric, Gas and Sanitary Services	662
Wholesale Trade	273
Other SICs [1]	359
Total	3,700

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis, based on Centaur [I, Chapter 2].

[1] Other SICs include SIC 13 (Oil and Gas Extraction), SIC 15 (Building Construction sectors under SIC 44 (Water Transportation) other than SIC 4491.

C. The Final Standards and Their Estimated Costs

The Preliminary Regulatory Impact Analysis identified 21 provisions of the proposed rules that were likely to generate costs of compliance for employers. In response to comments and public testimony by stakeholders during the rulemaking, the Agency revised several provisions in the final standards that will affect estimated costs. Better information acquired from the industry during the rulemaking has also resulted in revisions of the costs estimated for particular provisions.

The most significant change to the final rule since the proposed standard for longshoring was issued has been made in the requirement for fall protection when working on top of any intermodal container. The proposed standard would have required fall protection when the fall height was 10 feet or more (containers are usually less than 10 feet tall); the final rule, however, requires such protection when a fall hazard exists at a height of 8 feet. Because the Agency has required fall protection for workers on containers for years (see paragraph 1918.32(b) of the existing Longshoring Standard) this provision of the final rule does not impose new costs on the regulated community.

Changes to three provisions that were proposed have resulted in the elimination of the costs that were projected to be associated with these provisions. In the final standard, the Agency has substituted performance language for the specification language proposed for the selection and maintenance of first aid kits and for the provision of the proper number of

sanitary facilities. Comments in the record indicated that the industry was currently providing adequate facilities in these two areas, and thus that detailed specifications were not necessary. The final standard also does not require that fall protection systems be certified by a registered professional engineer; employers may rely on the guarantee/certification generally provided by manufacturers of this personal protective equipment instead. These three provisions in the final standard are estimated to impose no new costs for employers, and the Agency believes that the changes made to the final rule have not reduced employee protections.

The proposal would have permitted containers to be lifted only by a purely vertical lift from at least four top fittings. In the final standard, non-vertical lifts are allowed as long as the lift angle is at least 80 degrees and other protective conditions are met. This change will allow employers with non-gantry container cranes to avoid the purchase of box spreader beams and maintain greater productivity with the simpler spreader bars generally in use. Again, OSHA believes, and the record supports, that this change will not diminish employee protection.

In the final standard, regulations for special stevedoring gear remain similar to those in the proposal. The Agency has revised its estimate of the cost imposed on the regulated community to test gear every four years, based on comments in the record.

Anti-two-blocking devices are required by the final rule on all cranes used to lift personnel. This provision is unchanged from the proposal; however, the Agency inadvertently overlooked the costs potentially associated with this provision at the time of the proposal. Lifting personnel by cranes other than container-handling gantry cranes is reported to be infrequent in the cargo handling industry, and the impact of these provisions is likely to be felt only by employers in the South Florida and Gulf areas. The cost estimate for anti-two-blocking devices is included in Table 2 below, which provides the estimated annual cost of provisions in the proposed and final standard.

TABLE 2.—ESTIMATED ANNUAL COSTS OF FINAL LONGSHORING STANDARD, BY PROVISION (1993 DOLLARS)

Source	Annualized costs* projected by the preliminary regulatory analysis	Annualized costs* estimated by the final economic analysis ($)
Workplace Analysis	68,959	183,890
General Training:		
Supervisor Time	67,370	67,370
Instruction	95,779	95,779
Subpart C:		
6'' sideboards: dockboards/ramps	151,940	139,955
2–3/4 inch sideboards (final stnd)		
Subpart G:		
4-yr. testing of special gear	37,583	704,300
Lockout/tagout: powered conveyors	2,684	2,684
Anti-two blocks	0	21,300
Subpart H:		
Vertical lifts	156,412	11,360
Certification: fall protection	95,565	0
Secondary safety cage attachments	2,249	2,249
Marking RO-RO ramps	1,911	1,911
Marking flat bed/low boy trailers	2,811	2,811
High visibility vests	266,260	1,275,799
Separation of vehicles/pedestrians on RO-RO ramps	87,801	87,801
Logging: rescue boats	0	3,550
Training:		
Supervisor Time	14,768	14,768
Instructor	3,815	3,815
Rescue boats	0	3,557
Subpart I:		
Sanitation	1,560	0
First aid kits	646,143	0
Accident prevention training	107,710	107,710
Stretchers	52,240	52,540
Subpart J:		
Personal flotation devices	151,405	151,405
Total	$2,014,965	$2,934,554

Source: U.S. Department of Labor OSHA, based on Kearney/Centaur [1.Chapter 4].
*Annualized over 10 years using a 7% interest rate.

In logging operations, powered rescue boats are required by the final standard when the situation warrants it. The proposed standard only required that rescue boats be ''immediately available'' rather than capable of ''immediate rescue.'' This provision of the final rule will therefore impose higher costs on the regulated community than the simpler provision proposed, and the Final Economic Analysis takes account of this new cost.

The Agency has revised its cost estimates for some provisions since the PRIA. Based on comments received from stakeholders on the estimated costs of providing high-visibility vests for employees engaged in container and roll

on/roll off operations, the Agency has substantially revised the costs estimated for this provision. In addition, the Agency has increased its estimate of the amount of time necessary for establishments to analyze and adjust to the impact of the new standards on their workplaces. Finally, the proposed standard would have required six-inch sideboards for bridge plates and ramps; in the final standard, sideboards must be at least 2¾ inches when the distance spanned is 3 feet or greater. Because the final provision is consistent with current industry practice, the Agency has revised the estimated costs for this provision downward.

The final Longshoring Standard is estimated to impose costs on employers of $2.9 million annually, in 1993 dollars, to comply with all of the final rule's provisions, and the Marine Terminals Standard is estimated to cost about $0.2 million annually. Table 2 provides a comparison of the estimated costs of the proposed and the final Longshoring Standard. The estimated costs to marine terminals, which are little changed since the proposal, are presented in Table 3. The total costs of the final standards are estimated at about $3.1 million annually. Nearly all of these costs are due to the Longshoring standard and are associated with compliance efforts by establishments in SIC 4491, which includes marine terminal operators and stevedores.

TABLE 3.—ESTIMATED ANNUAL COSTS OF FINAL MARINE TERMINALS STANDARD (1993 DOLLARS)

	Annualized cost*
Workplace Analysis	91,945
General Training:	
Supervisor Time	25,288
Instructor	23,955
Seatbelts	17,537
Total	$158,725

Source: U.S. Department of Labor OSHA, based on Kearney/Centaur Report to ORA, Reference 1 in Economic Analysis, Chapter 4.

*Annualized over 10 years using a 7% interest rate.

D. Technological Feasibility, Economic Impacts, and Economic Feasibility

All of the requirements of the final standards can be met using currently available equipment, facilities, tests, inspections, supplies, and work practices. OSHA's analysis of the technological requirements of each provision indicates that none of the final provisions will create any problem of supply or availability of equipment, facilities, or personnel. Thus the Agency concludes that the standards are technologically feasible for employers in these industries.

In the rulemaking, questions were raised about the technological feasibility of providing fall protection on top of intermodal containers.[10] However, the final standard exempts employers from providing fall protection when it is impossible to do so or when doing so would create a greater hazard. Some commenters questioned whether it was technologically feasible to install anti-two-blocking devices on shore-based cranes. However, industry experts testified that it was possible to do so and further that, when cranes are not lifting personnel, the anti-two-blocking device can be turned off or by-passed for duty cycle work. For one type of shore-based crane, those with two hoist blocks, the addition of anti-two-blocking devices were said to make the crane more difficult to operate. The Agency has concluded that the anti-two-blocking devices can be turned off when these cranes are doing duty-cycle work (the devices must only work when hoisting personnel). In any event, there are alternative means for personnel to reach elevated work areas. Other commenters noted that when positioning containers in some vessels, it was not possible to perform absolutely vertical lifts in some situations. The Agency agreed with this view, and the final rule allows non-vertical lifts of containers under certain circumstances.

The total annual revenues and profits of longshoring operations are estimated to be approximately $7.8 billion and $388.9 million, respectively. The estimated costs of compliance with the final Longshoring and Marine Terminals Standards are $3.1 million annually. Since these costs will mainly be generated by compliance efforts by stevedores and marine terminal operators, and since the compliance costs of marine terminals will be passed on to stevedores, the Agency has concluded that the best measure of the standards' economic impact is to compare costs of compliance with the revenues and profits of longshoring operations. Thus, the annual costs of compliance with the final rule represent less than 0.04 percent of the revenues and 0.8 percent of the profits of establishments in the longshoring industry. Costs of this magnitude are unlikely to threaten the viability even of marginal firms.

Current practices in the marine cargo handling industry (SIC 4491) indicate that the requirements of the final standards can be met without significant hardship. Many employers already comply with the final rule's requirements, as the record indicates.

Compliance with the requirements of the final Longshoring and Marine Terminals Standards is not expected to produce any significant adverse economic impacts. The costs of these rules are expected to impose only a minimal burden on affected establishments and will be more than offset by the economic benefits of avoided deaths and injuries. Taken alone, the estimated compliance costs would represent an average increase in the cost of shipping a loaded container in or out of U.S. ports of less than 50 cents; the current cost of shipping such a container from the U.S. to Europe now averages about $3000 (about $150 for stevedoring services). On the whole, the costs of marine cargo handling operations for society would decrease as a result of the final rules, because fewer accidents mean less lost time and wages and fewer medical and legal resources spent on cargo shipping and handling. The estimated benefits anticipated from the final standards include unquantified reductions in pain and suffering, plus estimated economic savings of more than $7 million annually from reducing lost workdays due to injuries. The Agency therefore has determined that the final Longshoring and Marine Terminal Standards are economically feasible for establishments in the affected industries.

E. Screening Analysis to Identify Small-Business Impacts and Certification of No Significant Impact

Pursuant to the Regulatory Flexibility Act of 1980, as amended in 1996, OSHA has assessed the impact of the revised standards on small entities in the marine cargo handling industry, using the Small Business Administration (SBA) size standard for SIC 4491. SBA has defined a small business in SIC 4491 as one with annual revenues of $18.5 million or less (61 FR 3291). OSHA estimates that this corresponds to 90% of all establishments in SIC 4491. As noted earlier, the costs of compliance amount to less than 0.04 percent of sales in the marine cargo handling industry. Because the magnitude of these compliance costs is so small, and because the final rules reflect practices that are currently being followed by many employers throughout the marine cargo handling industry, the Agency certifies that these final rules will not have a significant impact on a substantial number of small entities.

[10] For an analysis of comments received and Agency responses, see the Summary and Explanation, above.

Several provisions in the final standards have been written or revised in order to avoid imposing unnecessary burden on small businesses while still remaining consistent with OSHA's mandate to protect employee safety. For example, when establishments do not have container gantry cranes, as is the case for many smaller establishments that service freighters with mixed cargoes, the final Longshoring standard does not require the use of positive container securing devices, although doing so was considered by the Agency. In addition, establishments that use shore-based, single wire cranes for handling containers are allowed under the final rule to lift containers with non-vertical lifts, provided that they conform to other handling conditions designed to protect marine cargo handling employees. These firms also will not have to purchase box spreader beams and can continue to use their simpler spreader beams, a change to the standard that will enhance container top safety as well as productivity. In addition, in the final standard all existing special stevedoring gear with a capacity greater than 5 short tons will only have to be tested every four years and an employer's designated person will be allowed to perform the testing (rather than an OSHA accredited agency). Finally, employers will not be required by the final rules to have a professional engineer certify the adequacy of fall protection systems but can instead rely on a qualified person. All of the above provisions provide regulatory relief to smaller as well as larger employers, and all are consistent with the mandate of the OSH Act.

F. Non-Regulatory Alternatives

The Agency considered relying on the incentives created by workers' compensation programs and the threat of private tort suits to reduce the number of fatalities and injuries to workers in the affected industries. The Agency determined, however, that government regulation is needed because of the significant risk of job-related injury or death that continues to exist in these industries. Private markets fail to provide sufficient safety and health resources due to the externalization of part of the social cost of worker injuries and deaths. The longshore workers' compensation system does not offer an adequate remedy because premiums to employers do not reflect specific workplace risk, and liability claims are restricted by statutes that prevent employees from suing their employers. The Agency is also aware that in some cases union and employer agreements include many of the provisions that are contained in the final standards. However, a large fraction of the affected employees are not subject to these agreements. Further, these agreements are neither consistent nor comprehensive, and they do not provide an enforceable framework for workplace safety. Accordingly, bargaining between employers and employees cannot be relied on to achieve an adequately protective solution.

G. Impact Upon International Trade

OSHA has determined that compliance with the final Longshoring and Marine Terminals Standards will not have a significant impact upon international trade. The compliance costs of the standards are minimal and are not expected to affect prices of exports or imports or international competitiveness. To the extent that compliance with the final rules increases cargo handling efficiency and reduces the number of injuries and fatalities associated with these operations, shipping costs may be reduced and international trade encouraged.

The requirement for engineering controls where feasible for ships to load or discharge containers (e.g. semi-automatic twist locks or cell guides) will not affect shippers' costs or, therefore, international trade. Wherever possible most shippers have already converted to the use of these engineering controls since there are clear cost advantages to doing so. Approximately 75 percent of foreign-owned vessels that call at U.S. ports use these engineering controls already. Not all ships will convert to using these engineering controls since these are only required where container lifting is done with container gantry cranes and some marine terminals and longshoring work is still performed with single-wire cranes or forklifts.

VII. Environmental Impact

The final Longshoring and Marine Terminals Standards have been reviewed in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq.*), the regulations of the Council on Environmental Quality (CEQ) (40 CFR Part 1500), and DOL NEPA Procedures (29 CFR Part 11). No significant negative impact is foreseen on air, water or soil quality, plant or animal life, the use of land or sea, or other aspects of the environment as a result of these standards.

VIII. Recordkeeping and Paperwork Requirements

The Agency has estimated the paperwork burden of the Longshoring and Marine Terminal Standards under the guidelines of the Paperwork Reduction Act of 1995. Under that Act, burden is defined as the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. The Agency has concluded that the following elements of these two standards potentially could create a paperwork burden for the affected industries:

1917.25(g) warranty of fumigated tobacco
1917.26(d)(7) labelling of stretcher closets
1917.50(i)(2) labelling of cargo handling gear
1917.71(f)(4) marking of trailers 1918.22(g) labelling gangway hazards 1918.74(i)(1) tagging ladders 1918.61(b)(2) labelling gear
1918.86(g) labelling trailers

Collections of Information: Request for Comments

The Department of Labor, as part of its continuing effort to reduce paperwork and respondent burden, conducts a preclearance consultation program to provide the general public and Federal agencies with an opportunity to comment on proposed and/or continuing collections of information in accordance with the Paperwork Reduction Act of 1995 (PRA95)(44 U.S.C. 3506(c)(2)(A)). This program helps to ensure that requested data can be provided in the desired format, reporting burden (time and financial resources) is minimized, collection instruments are clearly understood, and the impact of collection requirements on respondents can be properly assessed. Therefore, OSHA is soliciting comments concerning the proposed approval for the paperwork requirements of the final Longshoring and Marine Terminal Standards. Written comments should:

- Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;
- Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;
- Enhance the quality, utility, and clarity of the information to be collected; and
- Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or

other forms of information technology, e.g. permitting electronic submissions of responses.

OSHA must obtain Office of Management and Budget (OMB) approval of the paperwork requirements of this final rule. As part of that approval process OSHA will be submitting a Paperwork Reduction Act Submission (OMB 83–1) along with a supporting statement responding to specific questions from OMB. After a review of OSHA's submission, OMB will either approve, reject, or request revision of the identified paperwork requirements. A full copy of OSHA's submission to OMB is included in the docket for this rulemaking and is available in the docket for public inspection and copying. The public is asked to review and offer comments on OSHA's paperwork package. Comments may be submitted to the rulemaking docket, S–025. The following information is provided as a summary of the information contained in OSHA's submission to OMB:

Type of review: Revision of a currently approved collection.

Agency: Occupational Safety and Health Administration (OSHA).

Title: Longshoring and Marine Terminals.

OMB Control No.: 1218–0196.

Agency Docket No.: S–025.

Frequency: On occasion.*Affected Public:* Business or other for profit, Federal government, State and local governments.

Number of respondents: 3,700.

Estimated time per respondent: Varies.

Total estimated annual recurring costs: $12,750.00.

Total estimated first year, one-time costs: $1,573,350.00.

Total estimated annual recurring burden hours: 250 hours annually.

Total estimated first year, one-time burden hours: 30,850 hours.

Comments submitted in response to this request will be summarized and included in OSHA's request for Office of Management and Budget approval of the paperwork burden. The comments will also become a matter of public record.

IX. State Plan Requirements

This **Federal Register** document issues new rules addressing longshoring and marine terminal operations regulated in 29 CFR parts 1910, 1917, and 1918. The new rules promulgated today will be codified into the applicable section of the Code of Federal Regulations.

The 25 States or U.S. Territories with their own OSHA approved occupational safety and health plans must develop a comparable standard applicable to both the private and public (state and local government employees) sectors within six months of the publication date of a permanent final Federal rule or show OSHA why there is no need for action, e.g. because an existing state standard covering this area is already ''at least as effective as'' the new Federal standard.

Currently five states (California, Minnesota, Oregon, Vermont and Washington) with their own state plans cover private sector onshore maritime activities. Federal OSHA enforces maritime standards offshore in all states and provides onshore coverage of maritime activities in Federal OSHA states and in the following State Plan states: Alaska, Arizona, Connecticut (plan covers only state and local government employees), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Nevada, New Mexico, New York (plan covers only state and local government employees), North Carolina, Puerto Rico, South Carolina, Tennessee, Utah, Virginia, Virgin Islands, and Wyoming.

X. Federalism

This standard has been reviewed in accordance with Executive Order 12612, 52 FR 41685 (October 30, 1987), regarding Federalism. This Order requires that agencies, to the extent possible, refrain from limiting State policy options, consult with States prior to taking any actions that would restrict State policy options, and take such actions only when there is a clear constitutional authority and the presence of a problem of national scope. The Order provides for preemption of State law only if there is a clear Congressional intent for the Agency to do so. Any such preemption is to be limited to the extent possible.

Section 18 of the Occupational Safety and Health Act (OSH Act), expresses Congress' clear intent to preempt State laws with respect to which Federal OSHA has promulgated occupational safety or health standards. Under the OSH Act, a State can avoid preemption only if it submits, and obtains Federal approval of, a plan for the development of such standards and their enforcement. Occupational safety and health standards developed by such State Plan-States must, among other things, be at least as effective in providing safe and healthful employment and places of employment as the Federal standards. Where such standards are applicable to products distributed or used in interstate commerce, they may not unduly burden commerce and must be justified by compelling local conditions (See section 18(c)(2)).

The final Longshoring and Marine Terminals Standards are drafted so that employees in every State will be protected by general, performance-oriented standards, except in those cases in which employee safety would be enhanced by more specific requirements. States with occupational safety and health plans approved under section 18 of the OSH Act will be able to develop their own State standards to deal with any special problems which might be encountered in a particular state. Moreover, the performance nature of this standard, of and by itself, allows for flexibility by States and employers to provide as much leeway as possible using alternative means of compliance.

These final Longshoring and Marine Terminals Standards address safety and health problems related to the hazards found in the marine cargo handling industry which is national in scope.

Those States which have elected to participate under section 18 of the OSH Act would not be preempted by this regulation and will be able to deal with special, local conditions within the framework provided by this standard while ensuring that their standards are at least as effective as the Federal Standard.

XI. Unfunded Mandates

For the purposes of the Unfunded Mandates Reform Act of 1995, as well as Executive Order 12875, this rule does not include any federal mandate that may result in increased expenditures by State, local, and tribal governments, or increased expenditures by the private sector of more that $100 million.

List of Subjects in 29 CFR Parts 1910, 1917, and 1918

Cargo, Cargo gear certification, Intermodal container, Hazardous materials, Incorporation by reference, Longshoring, Maritime, Marine cargo handling, Marine terminal, Labeling, Occupational safety and health, Protective equipment, Respiratory protection, Signs and symbols.

Authority: This document has been prepared under the direction of Greg R. Watchman, Acting Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue, NW, Washington, D.C. 20210. Pursuant to sections 4, 6 and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657), section 41 of the Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941), Secretary of Labor's Order No. 6–96 (62 FR 111); and 29 CFR part 1911, parts 1910, 1917 and 1918 of Title 29 of the Code of Federal Regulations are amended as set forth below.

Signed at Washington, D.C. this 18th day of July, 1997.

Greg R. Watchman,

Acting Assistant Secretary of Labor.

Alexis M. Herman,

Secretary of Labor.

PART 1910—GENERAL INDUSTRY SAFETY AND HEALTH REGULATIONS [AMENDED]

1. The authority citation for subpart B of part 1910 is revised to read as follows:

Authority: Secs. 4, 6, and 8 of the Occupational Safety and Health Act, 29 U.S.C. 653, 655, 657; Walsh-Healey Act, 41 U.S.C. 35 *et seq.*; Service Contract Act of 1965, 41 U.S.C. 351 *et seq.*; Sec.107, Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333; Sec. 41, Longshore and Harbor Workers' Compensation Act, 33 U.S.C. 941; National Foundation of Arts and Humanities Act, 20 U.S.C. 951 *et seq.*; Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 1911), 9–83 (48 FR 35736), 1–90 (55 FR 9033), or 6-96 (62 FR 111), as applicable.

2. Paragraphs (a), (b), and (c)(4) of § 1910.16 are revised to read as follows:

§ 1910.16 Longshoring and marine terminals.

(a) *Safety and health standards for longshoring.* (1) Part 1918 of this chapter shall apply exclusively, according to the provisions thereof, to all employment of every employee engaged in longshoring operations or related employment aboard any vessel. All cargo transfer accomplished with the use of shore-based material handling devices shall be governed by part 1917 of this chapter.

(2) Part 1910 does not apply to longshoring operations except for the following provisions:

(i) *Access to employee exposure and medical records.* Subpart Z, § 1910.1020;

(ii) *Commercial diving operations.* Subpart T;

(iii) *Electrical.* Subpart S when shore-based electrical installations provide power for use aboard vessels;

(iv) *Hazard communication.* Subpart Z, § 1910.1200;

(v) *Ionizing radiation.* Subpart Z, § 1910.1096;

(vi) *Noise.* Subpart G, § 1910.95;

(vii) *Nonionizing radiation.* Subpart G, § 1910.97;

Note to paragraph (a)(2)(vii): Exposures to nonionizing radiation emissions from commercial vessel transmitters are considered hazardous under the following conditions: (1) where the radar is transmitting, the scanner is stationary, and the exposure distance is 18.7 feet (6 m.) or less; or (2) where the radar is transmitting, the scanner is rotating, and the exposure distance is 5.2 feet (1.8 m.) or less,

(viii) *Respiratory protection.* Subpart I, § 1910.134;

(ix) *Toxic and hazardous substances.* Subpart Z applies to marine cargo handling activities except for the following:

(A) When a substance or cargo is contained within a sealed, intact means of packaging or containment complying with Department of Transportation or International Maritime Organization requirements;[1]

(B) Bloodborne pathogens, § 1910.1030;

(C) Carbon monoxide, § 1910.1000 (See § 1918.94 (a)); and

(D) Hydrogen sulfide, § 1910.1000 (See § 1918.94 (f)).

(b) *Safety and health standards for marine terminals.* Part 1917 of this chapter shall apply exclusively, according to the provisions thereof, to employment within a marine terminal, except as follows:

(1) The provisions of part 1917 of this chapter do not apply to the following:

(i) Facilities used solely for the bulk storage, handling, and transfer of flammable and combustible liquids and gases.

(ii) Facilities subject to the regulations of the Office of Pipeline Safety of the Research and Special Programs Administration, Department of Transportation (49 CFR chapter I, subchapter D), to the extent such regulations apply to specific working conditions.

(iii) Fully automated bulk coal handling facilities contiguous to electrical power generating plants.

(2) Part 1910 does not apply to marine terminals except for the following:

(i) *Abrasive blasting.* Subpart G, § 1910.94(a);

(ii) *Access to employee exposure and medical records.* Subpart Z, § 1910.1020;

(iii) *Commercial diving operations.* Subpart T;

(iv) *Electrical.* Subpart S;

(v) *Grain handling facilities.* Subpart R, § 1910.272;

(vi) *Hazard communication.* Subpart Z, § 1910.1200;

(vii) *Ionizing radiation.* Subpart Z, § 1910.1096;

(viii) *Noise.* Subpart G, § 1910.95;

(ix) *Nonionizing radiation.* Subpart G, § 1910.97.

(x) *Respiratory protection.* Subpart I, § 1910.134.

(xi) *Safety requirements for scaffolding.* Subpart D, § 1910.28;

(xii) *Servicing multi-piece and single piece rim wheels.* Subpart N, § 1910.177; and

(xiii) *Toxic and hazardous substances.* Subpart Z applies to marine cargo handling activities except for the following:

(A) When a substance or cargo is contained within a sealed, intact means of packaging or containment complying with Department of Transportation or International Maritime Organization requirements; [2]

(B) Bloodborne pathogens, § 1910.1030;

(C) Carbon monoxide, § 1910.1000 (See § 1917.24(a)); and

(D) Hydrogen sulfide, § 1910.1000 (See § 1917.73(a)(2)).

(c) * * *

(4) *Marine terminal* means wharves, bulkheads, quays, piers, docks and other berthing locations and adjacent storage or adjacent areas and structures associated with the primary movement of cargo or materials from vessel to shore or shore to vessel including structures which are devoted to receiving, handling, holding, consolidation and loading or delivery of waterborne shipments or passengers, including areas devoted to the maintenance of the terminal or equipment. The term does not include production or manufacturing areas having their own docking facilities and located at a marine terminal nor does the term include storage facilities directly associated with those production or manufacturing areas.

PART 1917—MARINE TERMINALS

1. The authority citation for part 1917 is revised to read as follows:

Authority: Sec. 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), 9–83 (48 FR 35736), or 6–96 (62 FR 111), as applicable; 29 CFR part 1911.

Section 1917.28 also issued under 5 U.S.C. 553.

Subpart A—Scope and Definitions

2. Section 1917.1 is amended by revising the introductory text of paragraph (a), paragraphs (a)(2)(i) through (a)(2)(x) and by adding paragraphs (a)(2)(xi) through (a)(2)(xiii) and (b) to read as follows:

[1] The International Maritime Organization publishes the International Maritime Dangerous Goods Code to aid compliance with the international legal requirements of the International Convention for the Safety of Life at Sea, 1960.

[2] The International Maritime Organization publishes the International Maritime Dangerous Goods Code to aid compliance with the international legal requirements of the International Convention for the Safety of Life at Sea, 1960.

§ 1917.1 Scope and applicability.

(a) The regulations of this part apply to employment within a marine terminal as defined in § 1917.2(u), including the loading, unloading, movement or other handling of cargo, ship's stores or gear within the terminal or into or out of any land carrier, holding or consolidation area, any other activity within and associated with the overall operation and functions of the terminal, such as the use and routine maintenance of facilities and equipment. All cargo transfer accomplished with the use of shore-based material handling devices shall be regulated by this part.

(1) * * *

(2) * * *

(i) *Abrasive blasting.* Subpart G, § 1910.94(a);

(ii) *Access to employee exposure and medical records.* Subpart Z, § 1910.1020;

(iii) *Commercial diving operations.* Subpart T of part 1910;

(iv) *Electrical.* Subpart S of part 1910;

(v) *Grain handling facilities.* Subpart R, § 1910.272;

(vi) *Hazard communication.* Subpart Z, § 1910.1200;

(vii) *Ionizing radiation.* Subpart Z, § 1910.1096;

(viii) *Noise.* Subpart G, § 1910.95;

(ix) *Nonionizing radiation.* Subpart G, § 1910.97;

(x) *Respiratory protection.* Subpart I, § 1910.134;

(xi) *Safety requirements for scaffolding.* Subpart D, § 1910.28;

(xii) *Servicing multi-piece and single piece rim wheels.* Subpart N, § 1910.177; and

(xiii) *Toxic and hazardous substances.* Subpart Z applies to marine cargo handling activities except for the following:

(A) When a substance or cargo is contained within a sealed, intact means of packaging or containment complying with Department of Transportation or International Maritime Organization requirements; [1]

(B) Bloodborne pathogens, § 1910.1030;

(C) Carbon monoxide, § 1910.1000 (See § 1917.24(a)); and

(D) Hydrogen sulfide, § 1910.1000 (See § 1917.73(a)(2)).

(b) [Reserved]

3. In § 1917.2, the letter designations to each definition are removed and the definitions are placed in alphabetical order and the definitions for the terms intermodal container and marine terminal are revised to read as follows:

§ 1917.2 Definitions.

* * * * *

Intermodal container means a reusable cargo container of a rigid construction and rectangular configuration; fitted with devices permitting its ready handling, particularly its transfer from one mode of transport to another; so designed to be readily filled and emptied; intended to contain one or more articles of cargo or bulk commodities for transportation by water and one or more other transport modes. The term includes completely enclosed units, open top units, fractional height units, units incorporating liquid or gas tanks and other variations fitting into the container system. It does not include cylinders, drums, crates, cases, cartons, packages, sacks, unitized loads or any other form of packaging.

* * * * *

Marine terminal means wharves, bulkheads, quays, piers, docks and other berthing locations and adjacent storage or adjacent areas and structures associated with the primary movement of cargo or materials from vessel to shore or shore to vessel including structures which are devoted to receiving, handling, holding, consolidating and loading or delivery of waterborne shipments or passengers, including areas devoted to the maintenance of the terminal or equipment. The term does not include production or manufacturing areas nor does the term include storage facilities directly associated with those production or manufacturing areas.

* * * * *

4. A new § 1917.3 is added to subpart A to read as follows:

§ 1917.3 Incorporation by reference.

(a) (1) The standards of agencies of the U.S. Government, and organizations which are not agencies of the U.S. Government which are incorporated by reference in this part, have the same force and effect as other standards in this part. Only the mandatory provisions (i.e. provisions containing the word ''shall'' or other mandatory language) of standards incorporated by reference are adopted as standards under the Occupational Safety and Health Act.

(2) Any changes in the standards incorporated by reference in this part and an official historic file of such changes are available for inspection at the national office of the Occupational Safety and Health Administration, U.S. Department of Labor, Washington, DC 20210.

(3) The materials listed in paragraph (b) 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 (IBRs) were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.

(4) Copies of the following standards that are issued by the respective private standards organizations may be obtained from the issuing organizations. The materials are available for purchase at the corresponding addresses of the private standards organizations noted in paragraph (b) of this section. In addition, all are available for inspection at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington DC, and through the OSHA Docket Office, room N2625, U.S. Department of Labor, 200 Constitution Ave., Washington, DC 20210, or any of OSHA's regional offices.

(b) The following material is available for purchase from the American National Standards Institute (ANSI), 11 West 42nd St., New York, NY 10036:

(1) ANSI A14.1–1990, Safety Requirements for Portable Wood Ladders; BR approved for § 1917.119(c).

(2) ANSI A14.2–1990, Safety Requirements for Portable Metal Ladders; BR approved for § 1917.119(c).

(3) ANSI A14.5–1992, Safety Requirements for Portable Reinforced Plastic Ladders; IBR approved for § 1917.119(c).

(4) ANSI Z–87.1–1989, Practice for Occupational and Educational Eye and Face Protection; IBR approved for § 1917.91(a)(1).

(5) ANSI Z–89.1–1986, Personnel Protection-Protective Headwear for Industrial Workers-Requirements; IBR approved for § 1917.93(b).

(6) ANSI Z–41–1991, American National Standard for Personal Protection-Protective Footwear; IBR approved for § 1917.94(b).

Subpart B—Marine Terminal Operations

5. Section 1917.11 is amended by adding a new paragraph (d) to read as follows:

§ 1917.11 Housekeeping.

* * * * *

(d) Dunnage, lumber, or shoring material in which there are visibly protruding nails shall be removed from the immediate work area or if left in the

[1] The International Maritime Organization publishes the International Maritime Dangerous Goods Code to aid compliance with the international legal requirements of the International Convention for the Safety of Life at Sea, 1960.

area, the nails shall be rendered harmless.

6. Section 1917.13 is amended by revising paragraph (g) and by adding new paragraphs (h) and (i) to read as follows:

§ 1917.13 Slinging.

* * * * *

(g) Intermodal containers shall be handled in accordance with § 1917.71(f).

(h) The employer shall require employees to stay clear of the area beneath overhead drafts or descending lifting gear.

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

7. Section 1917.17 is amended by revising paragraphs (i), (j), and (k) to read as follows:

§ 1917.17 Railroad facilities.

* * * * *

(i) If powered industrial trucks are used to open railcar doors, the trucks or the railcar doors shall be equipped with door opening attachments. Employees shall stand clear of the railcar doors while they are being opened and closed.

(j) Only railcar door openers or powered industrial trucks equipped with door opening attachments shall be used to open jammed doors.

(k) Employees shall not remain in or on gondolas or flat cars when drafts that create overhead, caught-in, caught-between or struck-by hazards are being landed in or on the railcar; end gates, if raised, shall be secured.

* * * * *

8. Section 1917.20 is revised to read as follows:

§ 1917.20 Interference with communications.

Cargo handling operations shall not be carried on when noise-producing, maintenance, construction or repair work interferes with the communication of warnings or instructions.

9. Section 1917.23 is amended by revising the heading and paragraphs (b)(1) and (d) introductory text to read as follows:

§ 1917.23 Hazardous atmospheres and substances (See also § 1917.2(r)).

* * * * *

(b) *Determination of hazard.* (1) When the employer is aware that a room, building, vehicle, railcar, or other space contains or has contained a hazardous atmosphere, a designated and appropriately equipped person shall test the atmosphere before employee entry to determine whether a hazardous atmosphere exists.

* * * * *

(d) *Entry into hazardous atmospheres.* Only designated persons shall enter hazardous atmospheres, in which case the following shall apply:

* * * * *

10. Section 1917.24, is amended by revising paragraph (a) to read as follows:

§ 1917.24 Carbon monoxide.

(a) *Exposure limits.* The carbon monoxide content of the atmosphere in a room, building, vehicle, railcar, or any enclosed space shall be maintained at not more than 50 parts per million (ppm) (0.005%) as an eight hour average area level and employees shall be removed from the enclosed space if the carbon monoxide concentration exceeds a ceiling of 100 ppm (0.01%).

* * * * *

11. Section 1917.25 is amended by revising paragraphs (a) and (c) and adding a new paragraph (g) to read as follows:

§ 1917.25 Fumigants, pesticides, insecticides and hazardous preservatives (See also § 1917.2(p)).

(a) At any time that the concentration in any space reaches the level specified as hazardous by the fumigant manufacturer or by Table Z-1 of 29 CFR 1910.1000, whichever is lower, all employees shall be removed from the space and shall not be permitted to re-enter until such time as tests demonstrate that the atmosphere is safe.

* * * * *

(c) Results of any tests shall be available for at least 30 days. Such records may be entered on any retrievable medium, and shall be available for inspection.

* * * * *

(g) In the case of containerized shipments of fumigated tobacco, the contents of the container shall be aerated by opening the container doors for a period of 48 hours after the completion of fumigation and prior to loading. When tobacco is within shipping cases having polyethylene or similar bag liners, the aeration period shall be 72 hours. The employer shall obtain a written warranty from the fumigation facility stating that the appropriate aeration period has been met.

12. Section 1917.26 is amended by revising paragraphs (c) and (d) to read as follows:

§ 1917.26 First aid and lifesaving facilities.

* * * * *

(c) *First aid kit.* First aid kits shall be weatherproof and shall contain individual sealed packages for each item that must be kept sterile. The contents of each kit shall be determined by a person certified in first aid and cognizant of the hazards found in marine cargo handling operations. The contents shall be checked at intervals that allow prompt replacement of expended items.

(d) *Stretchers.* (1) There shall be available for each vessel being worked one Stokes basket stretcher, or its equivalent, permanently equipped with bridles for attaching to the hoisting gear.

(2) Stretchers shall be kept close to vessels and shall be positioned to avoid damage to the stretcher.

(3) A blanket or other suitable covering shall be available.

(4) Stretchers shall have at least four sets of effective patient restraints in operable condition.

(5) Lifting bridles shall be of adequate strength, capable of lifting 1,000 pounds (454 kg) with a safety factor of five, and shall be maintained in operable condition. Lifting bridles shall be provided for making vertical patient lifts at container berths. Stretchers for vertical lifts shall have foot plates.

(6) Stretchers shall be maintained in operable condition. Struts and braces shall be inspected for damage. Wire mesh shall be secured and have no burrs. Damaged stretchers shall not be used until repaired.

(7) Stretchers in permanent locations shall be mounted to prevent damage and shall be protected from the elements if located out-of-doors. If concealed from view, closures shall be marked to indicate the location of the life saving equipment.

* * * * *

13. Section 1917.27 is amended by revising paragraph (a)(2) and adding a note to read as follows:

§ 1917.27 Personnel.

(a) * * *

(2) No employee known to have defective uncorrected eyesight or hearing, or to be suffering from heart disease, epilepsy, or similar ailments that may suddenly incapacitate the employee, shall be permitted to operate a crane, winch or other power-operated cargo handling apparatus or a power-operated vehicle.

Note to paragraph (a)(2): OSHA is defining suddenly incapacitating medical ailments consistent with the Americans with Disabilities Act (ADA), 42 U.S.C. 12101 (1990). Therefore, employers who act in accordance with the employment provisions (Title I) of the ADA (42 U.S.C. 12111–12117), the regulations implementing Title I (29 CFR part 1630), and the Technical Assistance Manual for Title I issued by the Equal Employment Opportunity Commission (Publication number: EEOC—M1A), will be

considered as being in compliance with this paragraph.

* * * * *

14. Section 1917.28 is amended by removing the regulatory text and revising the section heading to read as follows:

§ 1917.28 Hazard communication (See also § 1917.1(a)(2)(vi)).

15. A new section 1917.30, *Emergency action plans,* is added to subpart B to read as follows:

§ 1917.30 Emergency action plans.

(a) *Emergency action plans.* (1) *Scope and application.* This paragraph (a) requires all employers to develop and implement an emergency action plan. The emergency action plan shall be in writing (except as provided in the last sentence of paragraph (a)(5)(iii) of this section) and shall cover those designated actions employers and employees must take to ensure employee safety from fire and other emergencies.

(2) *Elements.* The following elements, at a minimum, shall be included in the plan:

(i) Emergency escape procedures and emergency escape route assignments;

(ii) Procedures to be followed by employees who remain to operate critical plant operations before they evacuate;

(iii) Procedures to account for all employees after emergency evacuation has been completed;

(iv) Rescue and medical duties for those employees who are to perform them;

(v) The preferred means of reporting fires and other emergencies; and

(vi) Names or regular job titles of persons or departments that can be contacted for further information or explanation of duties under the plan.

(3) *Alarm system*. The employer shall establish an employee alarm system that provides warning for necessary emergency action and for reaction time for safe escape of employees from the workplace or the immediate work area.

(4) *Evacuation.* The employer shall establish the types of evacuation to be used in emergency circumstances.

(5) *Training.* (i) Before implementing the emergency action plan, the employer shall designate and train a sufficient number of persons to assist in the safe and orderly emergency evacuation of employees.

(ii) The employer shall review the plan with each employee covered by the plan at the following times:

(A) Initially when the plan is developed;

(B) Whenever the employee's responsibilities or designated actions under the plan change; and

(C) Whenever the plan is changed.

(iii) The employer shall review with each employee upon initial assignment those parts of the plan that the employee must know to protect the employee in the event of an emergency. The written plan shall be kept at the workplace and be made available for employee review.

(iv) Employers with 10 or fewer employees may communicate the plan orally to employees and need not maintain a written plan

(b) [Reserved]

Subpart C—Cargo Handling Gear and Equipment

16. Section 1917.42 is amended by revising paragraphs (b)(4), (Table C–1 remains unchanged), (c)(1) and (d), adding (g)(2)(vi), and revising (h)(4), (h)(5), and (j)(1) to read as follows:

§ 1917.42 Miscellaneous auxiliary gear.

* * * * *

(b) * * *

(4) Where wire rope clips are used to form eyes, the employer shall adhere to the manufacturers' recommendations, which shall be made available for inspection. If ''U'' bolt clips are used and the manufacturers' recommendations are not available, Table C–1 shall be used to determine the number and spacing of the clips. ''U'' bolts shall be applied with the ''U'' section in contact with the dead end of the rope.

* * * * *

(c) * * *

(1) The employer shall ascertain the manufacturers' ratings for the specific natural fiber rope used and have such ratings available for inspection. The manufacturers' ratings shall be adhered to and a minimum design safety factor of five maintained.

* * * * *

(d) *Synthetic rope.* (1) The employer shall adhere to the manufacturers' ratings and use recommendations for the specific synthetic fiber rope used and shall make such ratings available for inspection.

(2) Unless otherwise recommended by the manufacturer, when synthetic fiber ropes are substituted for fiber ropes of less than three inches (7.62 cm) in circumference, the substitute shall be of equal size. Where substituted for fiber rope of three inches or more in circumference, the size of the synthetic rope shall be determined from the formula:

$C=\sqrt{0.6Cs^2+0.4C_m^2}$

Where C= the required circumference of the synthetic rope in inches, Cs= the circumference to the nearest one-quarter inch of a synthetic rope having a breaking strength not less than that of the size fiber rope that is required by paragraph (c) of this section and Cm= the circumference of the fiber rope in inches that is required by paragraph (c) of this section. In making such substitution, it shall be ascertained that the inherent characteristics of the synthetic fiber are suitable for hoisting.

* * * * *

(g) * * *

(2) * * *

(vi) Display of visible warning threads or markers designed to indicate excessive wear or damage.

* * * * *

(h) * * *

(4) Chains shall be repaired only under qualified supervision. Links or portions of chain defective under any of the criteria of paragraph (h)(3)(iii) of this section shall be replaced with properly dimensioned links or connections of material similar to those of the original chain. Before repaired chains are returned to service, they shall be tested to the proof load recommended by the manufacturer of the original chain. Tests shall be performed by the manufacturer or shall be certified by an agency accredited for the purpose under part 1919 of this chapter. Test certificates shall be available for inspection.

(5) Wrought iron chains in constant use shall be annealed or normalized at intervals not exceeding six months. Heat treatment certificates shall be available for inspection. Alloy chains shall not be annealed.

* * * * *

(j) *Hooks other than hand hooks.* (1) The manufacturers' recommended safe working loads for hooks shall not be exceeded. Hooks other than hand hooks shall be tested in accordance with § 1917.50(c)(6).

* * * * *

17. Section 1917.43 is amended by revising paragraphs (e)(1)(i), (e)(6)(iii), and by adding a new paragraph (f)(3) to read as follows:

§ 1917.43 Powered industrial trucks.

* * * * *

(e) *Fork lift trucks.* (1) *Overhead guards.* (i) When operators are exposed to overhead falling hazards, fork lift trucks shall be equipped with securely attached overhead guards. Guards shall be constructed to protect the operator

from falling boxes, cartons, packages, or similar objects.

* * * * *

(6) *Lifting of employees.* * * *

(iii) An employee shall be at the truck's controls whenever employees are elevated.

* * * * *

(f) * * *

(3) After July 26, 1999 bulk cargo-moving vehicles shall be equipped with rollover protection of such design and construction as to prevent the possibility of the operator being crushed because of a rollover or upset.

* * * * *

18. Section 1917.44 is amended by revising paragraphs (a), (i), (o)(3)(i), (o)(3)(ii) introductory text, and (o)(4) introductory text to read as follows:

§ 1917.44 General rules applicable to vehicles.[4]

(a) The requirements of this section apply to general vehicle use within marine terminals. *Exception:* The provisions of paragraphs (c) and (l) of this section do not apply when preempted by applicable regulations of the Department of Transportation.[5]

* * * * *

(i) A distance of not less than 20 feet (6.1 m) shall be maintained between the first two vehicles in a check-in, check-out, roadability, or vessel loading/discharging line. This distance shall be maintained between any subsequent vehicles behind which employees are required to work.

* * * * *

(o) * * *

(3) * * *

(i) Only employees trained in the procedures required in paragraph (o)(4) of this section and who have demonstrated their ability to service multi-piece rim wheels shall be assigned such duties.

(ii) Employees assigned such duties shall have demonstrated their ability by the safe performance of the following tasks: * * *

(4) *Servicing procedures.* The following procedures shall be followed:

* * * * *

19. Section 1917.45 is amended by revising the section heading, paragraphs (f)(4)(iii), (f)(5), (f)(7), (f)(13)(ii), (f)(13)(iii)(A), (i)(5)(i) introductory text, (j)(1)(iii)(D), and (j)(2), and by adding new paragraphs (g)(11), (j)(9) and (j)(10), to read as follows:

§ 1917.45 Cranes and derricks (See also § 1917.50).

* * * * *

(f) * * *

(4) * * *

(iii) Stairways on cranes shall be equipped with rigid handrails meeting the requirements of § 1917.112(e).

* * * * *

(5) *Operator's station.* (i) The cab, controls and mechanism of the equipment shall be so arranged that the operator has a clear view of the load or signalman, when one is used. Cab glass, when used, shall be safety plate glass or equivalent. Cranes with missing, broken, cracked, scratched, or dirty glass (or equivalent) that impairs operator visibility shall not be used. Clothing, tools and equipment shall be stored so as not to interfere with access, operation, and the operator's view.

(ii) A seat (lap) belt, meeting the requirements of 49 CFR 571.208–210 for a Type 1 seat belt assembly, shall be installed on the operator's seat of high speed container gantry cranes where the seat trolleys.

* * * * *

(7) *Outriggers.* Outriggers shall be used according to the manufacturers' specifications or design data, which shall be available. Floats, when used, shall be securely attached to the outriggers. Wood blocks or other support shall be of sufficient size to support the outrigger, free of defects that may affect safety and of sufficient width and length to prevent the crane from shifting or toppling under load.

* * * * *

(13) * * *

(ii) Each independent hoisting unit of a crane, except worm geared hoists, the angle of whose worm is such as to prevent the load from accelerating in the lowering direction, shall, in addition to a holding brake, be equipped with a controlled braking means to control lowering speeds.

(iii) * * *

(A) 125 percent when used with an other than mechanically controlled braking means; or

* * * * *

(g) * * *

(11) Limit switch bypass systems shall be secured during all cargo operations. Such bypass systems shall not be used except in an emergency or during non-cargo handling operations such as stowing cranes or derricks or performing repairs. When a situation requiring the use of a bypass system or the readjustment of a limit switch arises, it shall be done only under the direction of a crane mechanic.

* * * * *

(i) * * *

(5) *Operating near electric power lines.* (i) *Clearance.* Unless electrical distribution and transmission lines are de-energized and visibly grounded at the point of work, or unless insulating barriers not a part of or attached to the crane have been erected to prevent physical contact with lines, cranes may be operated near power lines only in accordance with the following:

* * * * *

(j) * * *

(1) * * *

(iii) * * *

(D) Equipped with a device to prevent access doors, when used, from opening accidentally;

* * * * *

(2) Except in an emergency, the hoisting mechanism of all cranes or derricks used to hoist personnel shall operate only in power up and power down, with automatic brake application when not hoisting or lowering.

* * * * *

(9) Employees shall not be hoisted on intermodal container spreaders while a load is engaged.

(10) All cranes and derricks used to hoist personnel shall be equipped with an anti-two-blocking device.

* * * * *

20. Section 1917.46 is amended by revising the heading and paragraphs (a)(1)(ii) and (a)(1)(viii)(A) to read as follows:

§ 1917.46 Load indicating devices.

(a) * * *

(1) * * *

(ii) The accuracy of the load indicating device, weight-moment device, or overload protection device shall be such that any indicated load (or limit), including the sum of actual weight hoisted and additional equipment or ''add ons'' such as slings, sensors, blocks, etc., is within the range between 95 percent (5 percent underload) and 110 percent (10 percent overload) of the actual true total load. Such accuracy shall be required over the range of daily operating variables reasonably anticipated under the conditions of use.

* * * * *

(viii) * * *

(A) Of trolley equipped bridge type or overhead type while handling intermodal containers known to be identified as empty, or loaded, and in

---

[4] The United States Coast Guard at 33 CFR 126.15(d) and (e) has additional regulations applicable to vehicles in terminals.

[5] Department of Transportation regulations in 49 CFR part 393, Subpart C–Brakes, address the immobilization of trailer road wheels prior to disconnection of the trailer and until braking is again provided. Section 49 CFR 393.84 addresses the condition of flooring. These DOT rules apply when the motor carrier is engaged in interstate commerce or in the transport of certain hazardous items wholly within a municipality or the commercial zone thereof.

either case in compliance with the provisions of § 1917.71, or while hoisting other lifts by means of a lifting beam supplied by the crane manufacturer for the purpose, and in all cases within the crane rating;

* * * * *

21. Section 1917.48 is amended by revising paragraph (d)(2) to read as follows:

§ 1917.48 Conveyors.

* * * * *

(d) * * *

(2) Conveyors using electrically released brakes shall be constructed so that the brakes cannot be released until power is applied, and so that the brakes are automatically engaged if the power fails or the operating control is returned to the ''stop'' position.

* * * * *

22. Section 1917.50 is amended by revising the heading and paragraph (c)(5), by redesignating paragraph (i) as new paragraph (j), and revising it, and by adding a new paragraph (i) to read as follows:

§ 1917.50 Certification of marine terminal material handling devices (See also mandatory Appendix IV, part 1918 of this chapter).

* * * * *

(c) * * *

(5) *Special gear.* (i) Special stevedoring gear provided by the employer, the strength of which depends upon components other than commonly used stock items such as shackles, ropes, or chains, and that has a Safe Working Load (SWL) greater than five short tons (10,000 lbs or 4.5 metric tons) shall be inspected and tested as a unit before initial use (see Table A of this section).

(ii) Special stevedoring gear provided by the employer that has a SWL of five short tons (10,000 or 4.5 metric tons) or less shall be inspected and tested as a unit before initial use according to paragraphs (d) and (e) of this section or by a designated person (see Table A).

TABLE A

Safe working load	Proof load
Up to 20 short tons (18.1 metric tons).	25 percent in excess.
From 20 through 50 short tons (18.1 to 45.3 metric tons).	5 short tons in excess.
Over 50 short tons (45.3 metric tons).	10 percent in excess.

(iii) Every spreader that is not a part of ship's gear and is used for handling intermodal containers shall be inspected and tested before initial use to a proof load equal to 25 percent greater than its rated capacity. In addition, any spreader that suffers damage necessitating structural repair shall be inspected and retested after repair and before being returned to service.

(iv) All cargo handling gear covered by this section with a SWL greater than five short tons (10,000 lbs. or 4.5 metric tons) shall be proof load tested according to table A of this section every 4 years in accordance with paragraph (b) of this section or by a designated person.

(v) Certificates and inspection and test records attesting to the tests required by this section shall be available for inspection.

* * * * *

(i) *Safe working load.* (1) The safe working load of gear as specified in this section shall not be exceeded.

(2) All cargo handling gear provided by the employer with a safe working load greater than five short tons (10,000 lbs. or 4.5 metric tons) shall have its safe working load plainly marked on it.

(j) *Exceptions:* The certification requirements of this section do not apply to the following equipment:

(1) Small industrial crane trucks as described and illustrated in ANSI B56.1, 1959, ''Safety Code for Powered Industrial Trucks'', and powered industrial trucks; and

(2) Any straddle truck not capable of straddling two or more intermodal containers 16 feet (4.8 m) in width.

* * * * *

23. Section 1917.71 is amended by revising paragraphs (b)(6), (b)(7), (c), (e), and (f)(1)(i) and adding new paragraphs (b)(8), (f)(4) and (f)(5) to read as follows:

§ 1917.71 Terminals handling intermodal containers or roll-on roll-off operations.

* * * * *

(b) * * *

(6) Closed dry van containers carrying vehicles are exempted from paragraph (b)(4) of this section provided that:

(i) The container carries only completely assembled vehicles and no other cargo;

(ii) The container is marked on the outside in such a manner that an employee can readily discern that the container is carrying vehicles; and

(iii) The vehicles were loaded into the container at the marine terminal.

(7) The weight of loaded inbound containers from foreign ports shall be determined by weighing or by the method of calculation described in paragraph (b)(4)(ii) of this section or by shipping documents.

(8) Any scale used within the United States to weigh containers for the purpose of the requirements of this section shall meet the accuracy standards of the state or local public authority in which the scale is located.

(c) No container or containers shall be hoisted if their actual gross weight exceeds the weight marked as required in paragraph (a)(2) of this section, or if it exceeds the capacity of the crane or other hoisting device intended to be used.

* * * * *

(e) Each employee working in the immediate area of container handling equipment or in the terminal's traffic lanes shall wear a high visibility vest (or equivalent protection).[7]

Note to paragraph (3e): High visibility vests or equivalent protection means high visibility/retroreflective materials which are intended to provide conspicuity of the user by day through the use of high visibility (fluorescent) material and in the dark by vehicle headlights through the use of retroreflective material. The minimum area of material for a vest or equivalent protection is .5 m^2 (760 $in.^2$) for fluorescent (background) material and .13m^2 (197 $in.^2$) for retroreflective material.

(f) * * *

(1) * * *

(i) When hoisting containers by the top fittings, the lifting forces shall be applied vertically from at least four such fittings. A less than vertical lift is permitted only under the following conditions:

(A) The container being lifted is an ISO closed box container;

(B) The condition of the box is sound;

(C) The speed of hoisting and lowering is moderated when heavily ladened containers[8] are encountered;

(D) The lift angle is at 80 to 90 degrees;

(E) The distance between the lifting beam and the load is at least 8 feet and 2.4 inches (2.5 m); and

(F) The length of the spreader beam is at least 16.3 feet (5 m) for a 20-foot container, and at least 36.4 feet (11 m) for a 40-foot container.

* * * * *

(4) After July 27, 1998, flat bed, low boy trailers (mafis) and other similar equipment used to transport containers shall be marked with their cargo capacities and shall not be overloaded.

(5) Each tractor shall have all brake air lines connected when pulling trailers equipped with air brakes and shall have the brakes tested before commencing operations.

* * * * *

[7] Decals on hard hats will not be considered equivalent protection for the purposes of this paragraph.

[8] A heavily laden container is one that is loaded to within 20 percent of its rated capacity.

24. Section 1917.73 is amended by revising the section heading as follows:

§ 1917.73 Terminal facilities handling menhaden and similar species of fish (See also § 1917.2, definition of hazardous cargo, materials, substance, or atmosphere).

* * * * *

25. Section 1917.91 is amended by revising paragraph (a)(1) and revising the section heading to read as follows:

§ 1917.91 Eye and face protection.

(a)(1) The employer shall ensure that each affected employee uses appropriate eye and/or face protection where there are exposures to eye and/or face hazards. Such equipment shall comply with American National Standards Institute, ANSI Z–87.1–1989, ''Practice for Occupational and Educational Eye and Face Protection.''

* * * * *

26. Section 1917.93 is amended by revising paragraphs (a) and (b) to read as follows:

§ 1917.93 Head protection.

(a) 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.

(b) Such equipment shall comply with American National Standards Institute, ANSI Z–89.1–1986, ''Personnel Protection-Protective Headwear for Industrial Workers-Requirements.''

* * *

27. Section 1917.94 is revised to read as follows:

§ 1917.94 Foot protection.

(a) 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) Such equipment shall comply with American National Standards

Institute, ANSI Z–41–1991, ''American National Standard for Personal Protection-Protective Footwear.''

28. Section 1917.95 is amended by revising paragraph (b)(2) to read as follows:

§ 1917.95 Other protective measures.

* * * * *

(b) * * *

(2) Personal flotation devices (PFD) (life preservers, life jackets, and work vests) worn by each affected employee shall be any United States Coast Guard (USCG) approved and marked Type I PFD, Type II PFD or Type III PFD; or shall be a USCG approved Type V PFD that is marked for use as a work vest, for commercial use, or for use on vessels. USCG approval is pursuant to 46 CFR part 160, Coast Guard Lifesaving Equipment Specifications.

* * * * *

29. Section 1917.112 is amended by revising paragraph (a)(1) to read as follows:

§ 1917.112 Guarding of edges.

(a) * * *

(1) Vehicle curbs, bull rails, or other effective barriers at least six inches (15.24 cm) in height shall be provided at the waterside edges of aprons and bulkheads, except where vehicles are prohibited. Curbs or bull rails installed after October 3, 1983, shall be at least 10 inches (25.4 cm) in height.

* * * * *

30. Section 1917.118 is amended by revising paragraphs (d)(2)(i) and (f)(2) to read as follows:

§ 1917.118 Fixed ladders.

* * * * *

(d) * * *

(2)(i) Ladders installed before October 3, 1983, shall have rungs evenly spaced from nine to 16½ inches (22.9 to 41.9 cm) apart, center to center.

* * * * *

(f) * * *

(2) Form a continuous ladder, uniformly spaced vertically from 12 inches to 16 inches (30.5 to 41 cm) apart, with a minimum width of 10 inches (25.4 cm) and projecting at least 4½ inches (11.43 cm) from the wall;

* * * * *

31. Section 1917.119 is amended by revising paragraphs (b)(1), (c), (d)(2), and (f)(4) to read as follows:

§ 1917.119 Portable ladders.

* * * * *

(b) * * *

(1) Rungs of manufactured portable ladders obtained before October 3, 1983, shall be capable of supporting a 200-pound (890 N) load without deformation.

* * * * *

(c) *Standards for manufactured portable ladders.* Portable manufactured ladders obtained after January 21, 1998 shall bear identification indicating that they meet the appropriate ladder construction requirements of the following standards:

ANSI A14.1–1990, Safety Requirements for Portable Wood Ladders

ANSI A14.2–1990, Safety Requirements for Portable Metal Ladders

ANSI A14.5–1992, Safety Requirements for Portable Reinforced Plastic Ladders

(d) * * *

(2) Are capable of supporting a 250-pound (1120 N) load without deformation; and

* * * * *

(f) * * *

(4) Individual sections from different multi-sectional ladders or two or more single straight ladders shall not be tied or fastened together to achieve additional length.

* * * * *

32. Section 1917.121 is amended by revising paragraph (b)(3) to read as follows:

§ 1917.121 Spiral stairways.

* * * * *

(b) * * *

(3) Minimum loading capability shall be 100 pounds per square foot (4.79 kN), and minimum tread center concentrated loading shall be 300 pounds (1334 N);

* * * * *

32a. Section 1917.123 is amended by redesignating footnote 7 as footnote 9.

33. Section 1917.124 is amended by adding new paragraphs (c)(5), (c)(6), and (d)(5) and revising the section heading and paragraph (d)(1) to read as follows:

§ 1917.124 Dockboards (car and bridge plates).

* * * * *

(c) * * *

(5) Be designed, constructed, and maintained to prevent vehicles from running off the edge.[10]

(6) Dockboards shall be well maintained.

* * * * *

(d) *Ramps.* (1) Ramps shall be strong enough to support the loads imposed on them and be designed, constructed, and maintained to prevent vehicles from running off the edge.[11]

* * * * *

(5) Ramps shall be well maintained.

34. Section 1917.126 is amended by revising paragraph (b) to read as follows:

§ 1917.126 River banks.

* * * * *

(b) Where working surfaces at river banks slope so steeply that an employee could slip or fall into the water, the outer perimeter of the working surface shall be protected by posting or other portable protection such as roping off. In these situations, employees must wear a personal flotation device meeting the requirements of § 1917.95(b).

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[10] When the gap to be bridged to greater than 36 inches (.91 m), an acceptable means of preventing vehicles from running off the edge is a minimum side board height of two and three-quarter inches.

[11] When the gap to be bridged is greater than 36 inches (.91 m), an acceptable means of preventing vehicles from running off the edge is a minumum side board height of two and three-quarter inches.

35. Section 1917.152 is amended by revising the section heading and redesignating footnote 8 as footnote 12 to read as follows:

§ 1917.152 Welding, cutting and heating (hot work)[12] (See also § 1917.2, definition of Hazardous cargo, materials, substance, or atmosphere).

* * * * *

36. Section 1917.153 is amended by revising the section heading to read as follows:

§ 1917.153 Spray painting (See also § 1917.2, definition of Hazardous cargo, materials, substance, or atmosphere).

* * * * *

37. Section 1917.156 is amended by revising paragraph (b)(3)(iii)(D) to read as follows:

§ 1917.156 Fuel handling and storage.

* * * * *

(b) * * *

(3) * * *

(iii) * * *

(D) Leakage at valves or connections; and

* * * * *

38. Section 1917.157 is amended by revising paragraph (n) to read as follows:

§ 1917.157 Battery charging and changing.

* * * * *

(n) Chargers shall be turned off when leads are being connected or disconnected.

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PART 1918—[REVISED]

Part 1918 is revised to read as follows:

PART 1918—SAFETY AND HEALTH REGULATIONS FOR LONGSHORING

Authority: Secs. 4, 6, and 8 of the Occupational Safety and Health Act, 29 U.S.C. 653, 655, 657; Walsh-Healey Act, 41 U.S.C. 35 *et seq.*; Service Contract Act of 1965, 41 U.S.C. 351 *et seq.*; Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333; Sec. 41, Longshore and Harbor Workers' Compensation Act, 33 U.S.C. 941; National Foundation of Arts and Humanities Act, 20 U.S.C. 951 *et seq.*; Secretary of Labor's Order No. 6–96 (62 FR 111).

Subpart A—Scope and Definitions

§ 1918.1 Scope and application.

(a) The regulations of this part apply to longshoring operations and related employments aboard vessels. All cargo transfer accomplished with the use of shore-based material handling devices is covered by part 1917 of this chapter.

(b) Part 1910 of this chapter does not apply to longshoring except for the following provisions:

(1) *Access to employee exposure and medical records.* Subpart Z, § 1910.1020;

(2) *Commercial diving operations.* Subpart T;

(3) *Electrical.* Subpart S when shore-based electrical installations provide power for use aboard vessels;

(4) *Hazard communication.* Subpart Z, § 1910.1200;

(5) *Ionizing radiation.* Subpart Z, § 1910.1096;

(6) *Noise.* Subpart G, § 1910.95;

(7) *Nonionizing radiation.* Subpart G, § 1910.97;

Note to paragraph (b)(7): Exposures to nonionizing radiation emissions from commercial vessel radar transmitters are considered hazardous under the following situations: (a) where the radar is transmitting, the scanner is stationary, and the exposure distance is 19 feet (6 m) or less; or (b) where the radar is transmitting, the scanner is rotating, and the exposure distance is 5 feet (1.8 m.) or less.

(8) *Respiratory protection.* Subpart I, § 1910.134; and

(9) *Toxic and hazardous substances.* Subpart Z applies to marine cargo

[12] The U.S. Coast Guard, at 33 CFR 126.15(c), requires prior permission of the Captain of the Port if welding or other hot work is to be carried out at a facility where dangerous cargoes as defined by 33 CFR 126.07 are located or being handled.

handling activities except for the following:

(i) When a substance or cargo is contained within a sealed, intact means of packaging or containment complying with Department of Transportation or International Maritime Organization requirements;[1]

(ii) Bloodborne pathogens, § 1910.1030;

(iii) Carbon monoxide, § 1910.1000 (See § 1918.94(a)); and

(iv) Hydrogen sulfide, § 1910.1000 (See § 1918.94(f)).

§ 1918.2 Definitions.

Barge means an unpowered, flatbottomed, shallow draft vessel including river barges, scows, carfloats, and lighters. It does not include ship shaped or deep draft barges.

Bulling means the horizontal dragging of cargo across a surface with none of the weight of the cargo supported by the fall.

Danger zone means any place in or about a machine or piece of equipment where an employee may be struck by or caught between moving parts, caught between moving and stationary objects or parts of the machine, caught between the material and a moving part of the machine, burned by hot surfaces or exposed to electric shock. Examples of danger zones are nip and shear points, shear lines, drive mechanisms, and areas underneath counterweights.

Designated person means a person who possesses specialized abilities in a specific area and is assigned by the employer to do a specific task in that area.

Dockboards (car and bridge plates) mean devices for spanning short distances between, for example, two barges, that is not higher than four feet (1.2 m) above the water or next lower level.

Employee means any longshore worker or other person engaged in longshoring operations or related employments other than the master, ship's officers, crew of the vessel, or any person engaged by the master to load or unload any vessel of less than 18 net tons.

Employer means a person that employs employees in longshoring operations or related employments, as defined in this section.

Enclosed space means an interior space in or on a vessel that may contain or accumulate a hazardous atmosphere due to inadequate natural ventilation. Examples of enclosed spaces are holds, deep tanks and refrigerated compartments.

Fall hazard means the following situations:

(1) Whenever employees are working within three feet (.9 m) of the unprotected edge of a work surface that is 8 feet or more (2.4 m) above the adjoining surface and twelve inches (.3 m) or more, horizontally, from the adjacent surface; or

(2) Whenever weather conditions may impair the vision or sound footing of employees working on top of containers.

Fumigant is a substance or mixture of substances, used to kill pests or prevent infestation, that is a gas or is rapidly or progressively transformed to the gaseous state, although some nongaseous or particulate matter may remain and be dispersed in the treatment space.

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.

Hatch beam or *strongback* mean a portable transverse or longitudinal beam placed across a hatchway that acts as a bearer to support the hatch covers.

Hazardous cargo, materials, substance or atmosphere means:

(1) Any substance listed in 29 CFR part 1910, subpart Z;

(2) Any material in the Hazardous Materials Table and Hazardous Materials Communications Regulations of the Department of Transportation, 49 CFR part 172;

(3) Any article not properly described by a name in the Hazardous Materials Table and Hazardous Materials Communication Regulations of the Department of Transportation, 49 CFR part 172, but which is properly classified under the definitions of those categories of dangerous articles given in 49 CFR part 173; or

(4) Any atmosphere with an oxygen content of less than 19.5 percent or greater than 23 percent.

Intermodal container means a reusable cargo container of a rigid construction and rectangular configuration; fitted with devices permitting its ready handling, particularly its transfer from one mode of transport to another; so designed to be readily filled and emptied; intended to contain one or more articles of cargo or bulk commodities for transportation by water and one or more other transport modes. The term includes completely enclosed units, open top units, fractional height units, units incorporating liquid or gas tanks and other variations fitting into the container system. It does not include cylinders, drums, crates, cases, cartons, packages, sacks, unitized loads or any other form of packaging.

Longshoring operations means the loading, unloading, moving or handling of cargo, ship's stores, gear, or any other materials, into, in, on, or out of any vessel.

Mississippi River System includes the Mississippi River from the head of navigation to its mouth, and navigable tributaries including the Illinois Waterway, Missouri River, Ohio River, Tennessee River, Allegheny River, Cumberland River, Green River, Kanawha River, Monongahela River, and such others to which barge operations extend.

Public vessel means a vessel owned and operated by a government and not regularly employed in merchant service.

Ramp means other flat surface devices for passage between levels and across openings not covered under the term *dockboards.*

Related employments means any employments performed incidental to or in conjunction with longshoring operations, including, but not restricted to, securing cargo, rigging, and employment as a porter, clerk, checker, or security officer.

River towboat means a shallow draft, low freeboard, self-propelled vessel designed to tow river barges by pushing ahead. It does not include other towing vessels.

Small trimming hatch means a small hatch or opening, pierced in the between deck or other intermediate deck of a vessel, and intended for the trimming of dry bulk cargoes. It does not refer to the large hatchways through which cargo is normally handled.

Vessel includes every description of watercraft or other artificial contrivance used or capable of being used for transportation on water, including special purpose floating structures not primarily designed for or used for transportation on water.

Vessel's cargo handling gear includes that gear that is a permanent part of the vessel's equipment and used for the handling of cargo other than bulk liquids. The term covers all stationary or mobile cargo handling appliances used on board ship for suspending, raising or lowering loads or moving them from one position to another while suspended or supported. This includes, but is not limited to, cargo elevators, forklifts, and other powered industrial equipment. It does not include gear used only for handling or holding hoses, handling ship's stores or handling the gangway, or boom conveyor belt systems for the self-unloading of bulk cargo vessels.

[1] The International Maritime Organization publishes the International Maritime Dangerous Goods Code to aid compliance with the international legal requirements of the International Convention for the Safety of Life at Sea, 1960.

§ 1918.3 Incorporation by reference.

(a) (1) The standards of agencies of the U.S. Government, and organizations which are not agencies of the U.S. Government which are incorporated by reference in this part, have the same force and effect as other standards in this part. Only the mandatory provisions (i.e. provisions containing the word ''shall'' or other mandatory language) of standards incorporated by reference are adopted as standards under the Occupational Safety and Health Act.

(2) Any changes in the standards incorporated by reference in this part and an official historic file of such changes are available for inspection at the national office of the Occupational Safety and Health Administration, U.S. Department of Labor, Washington, DC 20210.

(3) The materials listed in paragraph (b) 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 (IBRs) were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.

(4) Copies of the following standards that are issued by the respective private standards organizations may be obtained from the issuing organizations. The materials are available for purchase at the corresponding addresses of the private standards organizations noted in paragraph (b) of this section. In addition, all are available for inspection at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington DC, and through the OSHA Docket Office, room N2625, U.S. Department of Labor, 200 Constitution Ave., Washington, DC 20210, or any of OSHA's regional offices.

(b) The following material is available for purchase from the American National Standards Institute (ANSI), 11 West 42nd St., New York, NY 10036:

(1) ANSI A14.1–1990, Safety Requirements for Portable Wood Ladders; IBR approved for § 1918.24(g)(1).

(2) ANSI A14.2–1990, Safety Requirements for Portable Metal Ladders; IBR approved for § 1918.24(g)(2).

(3) ANSI A14.5–1992, Safety Requirements for Portable Reinforced Plastic Ladders; IBR approved for § 1918.24(g)(3).

(4) ANSI Z–87.1–1989, Practice for Occupational and Educational Eye and Face Protection; IBR approved for § 1918.101(a)(1).

(5) ANSI Z–89.1–1986, Personnel Protection-Protective Headwear for Industrial Workers-Requirements; IBR approved for § 1918.103(b).

(6) ANSI Z–41–1991, American National Standard for Personal Protection-Protective Footwear; IBR approved for § 1918.104(b).

Subpart B—Gear Certification

§ 1918.11 Gear certification (See also §§ 1918.2, definition of ''Vessel's cargo handling gear'' and 1918.51).

(a) The employer shall not use the vessel's cargo handling gear until it has been ascertained that the vessel has a current and valid cargo gear register and certificates that in form and content are in accordance with the recommendations of the International Labor Office, as set forth in Appendix I of this part, and as provided by International Labor Organization Convention No. 152, and that shows that the cargo gear has been tested, examined and heat treated by or under the supervision of persons or organizations defined as competent to make register entries and issue certificates pursuant to paragraphs (b) and (c) of this section.

(1) Annual thorough examinations under ILO 152 are required after July 27, 1998.

(2) Testing under ILO 152 is required after July 16, 2001.

(3) In the interim period(s), prior to the effective dates noted in paragraph (a) (1) and (2), vessels with cargo gear and a cargo gear register according to ILO 32 are deemed to meet the requirements of this paragraph (a).

(b) Public vessels and vessels holding a valid Certificate of Inspection issued by the U.S. Coast Guard pursuant to 46 CFR part 91 are deemed to meet the requirements of paragraph (a) of this section.

(c) With respect to U.S. vessels not holding a valid Certificate of Inspection issued by the U.S. Coast Guard, entries in the registers and the issuance of certificates required by paragraph (a) of this section shall be made only by competent persons currently accredited by the U.S. Department of Labor (OSHA) for full function vessels or loose gear and wire rope testing, as appropriate, as provided in part 1919 of this chapter.

(d) With respect to vessels under foreign registries, persons or organizations competent to make entries in the registers and issue the certificates required by paragraph (a) of this section shall be:

(1) Those acceptable as such to any foreign nation;

(2) Those acceptable to the Commandant of the U.S. Coast Guard; or

(3) Those currently accredited by the U.S. Department of Labor (OSHA), for full function vessels or loose gear and wire rope testing, as appropriate and as provided in part 1919 of this chapter.

Subpart C—Gangways and Other Means of Access

§ 1918.21 General requirements.

The employer shall not permit employees to board or leave any vessel, except a barge or river towboat, until all of the applicable requirements of this subpart have been met.

(a) If possible, the vessel's means of access shall be located so that suspended loads do not pass over it. In any event, suspended loads shall not be passed over the means of access while employees or others are on it.

(b) When the upper end of the means of access rests on or is flush with the top of the bulwark, substantial steps, properly secured, trimmed and equipped with at least one substantial handrail, 33 inches (.84 m) in height, shall be provided between the top of the bulwark and the deck.

(c) The means of access shall be illuminated for its full length in accordance with § 1918.92.[2]

§ 1918.22 Gangways.

(a) Whenever practicable, a gangway of not less than 20 inches (.51 m) in width, of adequate strength, maintained in safe repair and safely secured shall be used. If a gangway is not practicable, a straight ladder meeting the requirements of § 1918.24 that extends at least 36 inches (.91 m) above the upper landing surface and is secured against shifting or slipping shall be provided. When conditions are such that neither a gangway nor straight ladder can be used, a Jacob's ladder meeting the requirements of § 1918.23 may be used.

(b) Each side of the gangway, and the turntable, if used, shall have a hand rail with a minimum height of 33 inches (.84 m) measured perpendicularly from rail to walking surfaces at the stanchion, with a midrail. Rails shall be of wood, pipe, chain, wire, rope or materials of equivalent strength and shall be kept taut always. Portable stanchions supporting railings shall be supported or secured to prevent accidental dislodgement.

(c) The gangway shall be kept properly trimmed.

(d) When a fixed flat tread accommodation ladder is used, and the angle is low enough to require employees to walk on the edge of the

[2] § 1918.92 requires, along with other requirements, an average light intensity of five foot-candles (54 lux).

treads, cleated duckboards shall be laid over and secured to the ladder.

(e) When the gangway overhangs the water so that there is danger of employees falling between the ship and the dock, a net or suitable protection shall be provided to prevent employees from receiving serious injury from falls to a lower level.

(f) If the foot of a gangway is more than one foot (.30 m) away from the edge of the apron, the space between them shall be bridged by a firm walkway equipped with a hand rail with a minimum height of approximately 33 inches (.84 m) with midrails on both sides.

(g) Gangways shall be kept clear of supporting bridles and other obstructions, to provide unobstructed passage. If, because of design, the gangway bridle cannot be moved to provide unobstructed passage, then the hazard shall be properly marked to alert employees of the danger.

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

(i) Handrails and walking surfaces of gangways shall be maintained in a safe condition to prevent employees from slipping or falling.

(j) Gangways on vessels inspected and certificated by the U.S. Coast Guard are deemed to meet the requirements of this section.

§ 1918.23 Jacob's ladders.

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

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

(c) When a Jacob's ladder is used as the means of access to a barge being worked, spacers (bumpers) shall be hung between the vessel, barge, or other structure to which the barge is tied alongside, or other equally effective means shall be provided to prevent damage to the bottom rungs of the ladder.

(d) When a Jacob's ladder is being used so that there is a danger of an employee falling or being crushed between the vessel, barge, or other structure (pier), suitable protection shall be provided.

§ 1918.24 Fixed and portable ladders.

(a) There shall be at least one safe and accessible ladder for each gang working in a single hatch. An effective means of gaining a handhold shall be provided at or near the head of each vertical fixed ladder. No more than two ladders are required in any hatch regardless of the number of gangs present.

(b) When any fixed ladder is visibly unsafe (or known to be unsafe), the employer shall identify such ladder and prohibit its use by employees.

(c) Where portable straight ladders are used, they shall be of sufficient length to extend three feet (.91 m) above the upper landing surface, and be positively secured or held against shifting or slipping. When conditions are such that a straight ladder cannot be used, Jacob's ladders meeting the requirements of § 1918.23 may be used.

(d) For vessels built after July 16, 2001, when six inches (15.2 cm) or more clearance does not exist behind the rungs of a fixed ladder, the ladder shall be deemed ''unsafe'' for the purposes of this section. Alternate means of access (for example, a portable ladder) must be used.

(e)(1) Where access to or from a stowed deckload or other cargo is needed and no other safe means is available, ladders or steps of adequate strength shall be furnished and positively secured or held against shifting or slipping while in use. Steps formed by the cargo itself are acceptable when the employer demonstrates that the nature of the cargo and the type of stowage provides equivalent safe access.

(2) Where portable straight ladders are used they shall be of sufficient length to extend at least three feet (.91 m) above the upper landing surface.

(f) The following standards for existing manufactured portable ladders must be met:

(1) Rungs of manufactured portable ladders obtained before January 21, 1998 shall be capable of supporting a 200-pound (890 N) load without deformation.

(2) Rungs shall be evenly spaced from nine to sixteen and one-half inches (22.9 to 41.9 cm), center to center.

(3) Rungs shall be continuous members between rails. Each rung of a double-rung ladder (two side rails and a center rail) shall extend the full width of the ladder.

(4) Width between side rails at the base of the ladder shall be at least 12 inches (30 cm) for ladders 10 feet (3.05 m) or less in overall length, and shall increase at least one-fourth inch (0.6 cm) for each additional two feet (0.61 m) of ladder length.

(g) Portable manufactured ladders obtained after January 21, 1998 shall bear identification showing that they meet the appropriate ladder construction requirements of the following standards:

(1) ANSI A14.1–1990, Safety Requirements for Portable Wood Ladders;

(2) ANSI A14.2–1990, Safety Requirements for Portable Metal Ladders;

(3) ANSI A14.5–1992, Safety Requirements for Portable Reinforced Plastic Ladders.

(h) Job-made ladders shall:

(1) Have a uniform distance between rungs of at least 12 inches (30 cm) center to center;

(2) Be capable of supporting a 250-pound (1100 N) load without deformation; and

(3) Have a minimum width between side rails of 12 inches (30 cm) for ladders 10 feet (3.05 m) or less in height. Width between rails shall increase at least one-fourth inch (0.6 cm) for each additional two feet (0.61 m) of ladder length.

(i) The employer shall:

(1) Maintain portable ladders in safe condition. Ladders with the following defects shall not be used, and shall either be tagged as unusable if kept on board, or shall be removed from the vessel:

(i) Broken, split or missing rungs, cleats or steps;

(ii) Broken or split side rails;

(iii) Missing or loose bolts, rivets or fastenings;

(iv) Defective ropes; or

(v) Any other structural defect.

(2) Ladders shall be inspected for defects before each day's use, and after any occurrence, such as a fall, which could damage the ladder.

(j) Ladders shall be used in the following manner:

(1) Ladders shall be securely positioned on a level and firm base.

(2) Ladders shall be fitted with slip-resistant bases and/or be positively secured or held in place to prevent slipping or shifting while in use.

(3) Except for combination ladders, self-supporting ladders shall not be used as single straight ladders.

(4) Unless intended for cantilever operation, non-self-supporting ladders shall not be used to climb above the top support point.

(5) Ladders shall not be used:

(i) As guys, braces or skids; or

(ii) As platforms, runways or scaffolds.

(6) Metal and wire-reinforced ladders (even with wooden side rails) shall not be used when employees on the ladder might contact energized electrical conductors.

(7) Individual sections from different multi-sectional ladders or two or more single straight ladders shall not be tied or fastened together to achieve additional length.

(8) Single rail ladders (i.e. made by fastening rungs or devices across a single rail) shall not be used.

§ 1918.25 Bridge plates and ramps (See also § 1918.86).

(a) *Bridge and car plates (dockboards).* Bridge and car plates used afloat shall be well maintained and shall:

(1) Be strong enough to support the loads imposed on them;

(2) Be secured or equipped with devices to prevent their dislodgement;

(3) Be equipped with hand holds or other effective means to permit safe handling; and

(4) Be designed, constructed, and maintained to prevent vehicles from running off the edge.[3]

(b) *Portable ramps.* Portable ramps used afloat shall be well maintained and shall:

(1) Be strong enough to support the loads imposed on them;

(2) Be equipped with a railing meeting the requirements of § 1918.21(b), if the slope is more than 20 degrees to the horizontal or if employees could fall more than four feet (1.2 m);

(3) Be equipped with a slip resistant surface;

(4) Be properly secured; and

(5) Be designed, constructed, and maintained to prevent vehicles from running off the edge.[4]

§ 1918.26 Access to barges and river towboats.

(a) With the exception of § 1918.25(b)(2), ramps used solely for vehicle access to or between barges shall meet the requirements of § 1918.25.

(b) When employees cannot step safely to or from the wharf and a float, barge, or river towboat, either a ramp meeting the requirements of paragraph (a) of this section or a safe walkway meeting the requirements of § 1918.22(f) shall be provided. When a ramp or walkway cannot be used, a straight ladder meeting the requirements of § 1918.24 and extending at least three feet (.91 m) above the upper landing surface and adequately secured or held against shifting or slipping shall be provided. When neither a walkway nor a straight ladder can be used, a Jacob's ladder meeting the requirements of § 1918.23 shall be provided. Exception: For barges operating on the Mississippi River System, where the employer shows that these requirements cannot reasonably be met due to local conditions, other safe means of access shall be provided.

[3] When the gap to be bridged is greater than 36 inches (.91m), an acceptalbe means of preventing vehicles from running off the edge is a minimum side board height of two and three-quarter inches.

[4] When the gap to be bridged is greater than 36 inches (.91m), an acceptable means of preventing vehicles from running off the edge is a minimum side board height of two and three-quarter inches.

(c) When a barge or raft is being worked alongside a larger vessel, a Jacob's ladder meeting the requirements of § 1918.23 shall be provided for each gang working alongside unless other safe means of access is provided. However, no more than two Jacob's ladders are required for any single barge or raft being worked.

(d) When longshoring operations are in progress on barges, the barges shall be securely made fast to the vessel, wharf, or dolphins.

Subpart D—Working Surfaces

§ 1918.31 Hatch coverings.

(a) No cargo, dunnage, or other material shall be loaded or unloaded by means requiring the services of employees at any partially opened intermediate deck unless either the hatch at that deck is sufficiently covered or an adequate landing area suitable for the prevailing conditions exists. In no event shall such work be done unless the working area available for such employees extends for a distance of 10 feet (3.05 m) or more fore and aft and athwartships.

(b) Cargo shall not be landed on or handled over a covered hatch or 'tween-decks unless all hatch beams are in place under the hatch covers.

(c) Missing, broken, or poorly fitting hatch covers that would not protect employees shall be reported at once to the officer in charge of the vessel. Pending replacement or repairs by the vessel, work shall not be performed in the section containing the unsafe covers or in adjacent sections unless the flooring is made safe.

(d) Hatch covers and hatch beams not of uniform size shall be placed only in the hatch, deck, and section in which they fit properly.

(e) Small trimming hatches in intermediate decks shall be securely covered or guarded while work is going on in the hatch in which they are found, unless they are actually in use.

§ 1918.32 Stowed cargo and temporary landing surfaces.

(a) Temporary surfaces on which loads are to be landed shall be of sufficient size and strength to permit employees to work safely.

(b) When the edge of a hatch section or of stowed cargo may constitute a fall hazard to an employee, the edge shall be guarded by a vertical safety net, or other means providing equal protection, to prevent an employee from falling. When the employer can demonstrate that vertical nets or other equally effective means of guarding cannot be used due to the type of cargo, cargo stowage, or other circumstances, a trapeze net shall be rigged at the top edge of the elevation or other means shall be taken to prevent injury if an employee falls. Safety nets shall be maintained in good condition and be of adequate strength for the purpose intended.

(c) When two gangs are working in the same hatch on different levels, a vertical safety net shall be rigged and securely fastened to prevent employees or cargo from falling. Safety nets shall be maintained in good condition and be of adequate strength for the purpose intended.

§ 1918.33 Deck loads.

(a) Employees shall not be permitted to pass over or around deck loads unless there is a safe route of passage.

(b) Employees giving signals to crane operators shall not be permitted to walk over deck loads from rail to coaming unless there is a safe route of passage. If it is necessary to stand or walk at the outboard or inboard edge of the deck load having less than 24 inches (.61 m) of bulwark, rail, coaming, or other protection, those employees shall be provided with protection against falling from the deck load.

§ 1918.34 Other decks.

(a) Cargo shall not be worked on decks that were not designed to support the load being worked.

(b) Grated decks shall be properly placed, supported, maintained and designed to support employees.

§ 1918.35 Open hatches.

Open weather deck hatches around which employees must work that are not protected to a height of 24 inches (.61 m) by coamings shall be guarded by taut lines or barricades at a height of 36 to 42 inches (.91 to 1.07 m) above the deck, except on the side on which cargo is being worked. Any portable stanchions or uprights used shall be supported or secured to prevent accidental dislodgement.

§ 1918.36 Weather deck rails.

Removable weather deck rails shall be kept in place except when cargo operations require them to be removed, in which case they shall be replaced as soon as such cargo operations are completed.

§ 1918.37 Barges.

(a) Walking shall be prohibited along the sides of covered lighters or barges with coamings or cargo more than five feet (1.5 m) high unless a three-foot (.91 m) clear walkway or a grab rail or taut handline is provided.

(b) Walking or working shall be prohibited on the decks of barges to be

loaded unless the walking or working surfaces have been determined by visual inspection to be structurally sound and maintained properly. If, while discharging a barge, an unsound deck surface is discovered, work shall be discontinued and shall not be resumed until means have been taken to ensure a safe work surface.

Subpart E—Opening and Closing Hatches

§ 1918.41 Coaming clearances.

(a) *Weather decks.* If a deck load (such as lumber or other smooth sided deck cargo) more than five feet (1.5 m) high is stowed within three feet (.91 m) of the hatch coaming and employees handling hatch beams and hatch covers are not protected by a coaming at least 24-inch (.61 m) high, a taut handline shall be provided along the side of the deckload. The requirements of § 1918.35 are not intended to apply in this situation.

(b) *Intermediate decks.* (1) There shall be a three-foot (.91 m) working space between the stowed cargo and the coaming at both sides and at one end of the hatches with athwartship hatch beams, and at both ends of those hatches with fore and aft hatch beams, before intermediate deck hatch covers and hatch beams are removed or replaced. Exception: The three-foot (.91 m) clearance is not required on the covered portion of a partially open hatch, nor is it required when lower decks have been filled to hatch beam height with cargo of such a nature as to provide a safe surface upon which employees may work.

(2) For purposes of paragraph (b)(1) of this section, fitted gratings that are in good condition shall be considered a part of the decking when properly placed within the three-foot (.91 m) area.

(c) Grab rails or taut handlines shall be provided for the protection of employees handling hatch beams and hatch covers, when bulkheads, lockers, reefer compartments or large spare parts are within three feet (.91 m) of the coaming.

(d) The clearances in this section do not apply to hatches opened or closed solely by hydraulic or other mechanical means; except that, in all cases in which the three-foot (.91 m) clearance does not exist, cargo that is stowed within three feet (.91 m) of the edge of the hatch shall be adequately secured to prevent cargo from falling into the hold.

§ 1918.42 Hatch beam and pontoon bridles.

(a) Hatch beam and pontoon bridles shall be:

(1) Long enough to reach the holes, rings, or other lifting attachments on the hatch beams and pontoons easily;

(2) Of adequate strength to lift the load safely; and

(3) Properly maintained, including covering or blunting of protruding ends in wire rope splices.

(b) Bridles for lifting hatch beams shall be equipped with toggles, shackles, or hooks, or other devices of such design that they cannot become accidentally dislodged from the hatch beams with which they are used. Hooks other than those described in this section may be used only when they are hooked into the standing part of the bridle. Toggles, when used, shall be at least one inch (2.5 cm) longer than twice the largest diameter of the holes into which they are placed.

(c) Bridles used for lifting pontoons and plugs shall have the number of legs required by the design of the pontoon or plug, and all of which shall be used. Where any use of a bridle requires fewer than the number of legs provided, idle legs shall be hung on the hook or ring, or otherwise prevented from swinging free.

(d) At least two legs of all strongback and pontoon bridles shall be equipped with a lanyard at least eight feet (2.4 m) long and in good condition. The bridle end of the lanyard shall be of chain or wire.

§ 1918.43 Handling hatch beams and covers.

Paragraphs (f)(2), (g), and (h) of this section apply only to folding, sliding, or hinged metal hatch covers or to those hatch covers handled by cranes.

(a) (1) When hatch covers or pontoons are stowed on the weather deck abreast of hatches, they shall be arranged in stable piles not closer to the hatch coaming than three feet (.91 m). Exception: On the working side of the hatch, hatch covers or pontoons may be spread one high between the coaming and bulwark with no space between them, provided the height of the hatch coaming is no less than 24 inches (.61 m). Under no circumstances shall hatch covers or pontoons be stacked higher than the hatch coaming or bulwark on the working side of the hatch.

(2) On seagoing vessels, hatch boards or similar covers removed from the hatch beams in a section of partially opened hatch during cargo handling, cleaning or other operations shall not be stowed on the boards or covers left in place within that section.

(b) Hatch beams shall be laid on their sides, or stood on an edge close together and lashed. Exception: This paragraph (b) shall not apply in cases where hatch beams are of such design that:

(1) The width of the flange is 50 percent or more of the height of the web; and

(2) The flange rests flat on the deck when the hatch beam is stood upright.

(c) Strongbacks, hatch covers, and pontoons removed from hatch openings and placed on the weather deck shall not obstruct clear fore-and-aft or coaming-to-bulwark passageways and shall be lashed or otherwise secured to prevent accidental dislodgement. Dunnage or other suitable material shall be used under and between tiers of strongbacks and pontoons to prevent them from sliding when stowed on steel decks.

(d) Hatch covers unshipped in an intermediate deck shall be placed at least three feet (.91 m) from the coaming or they shall be removed to another deck. Strongbacks unshipped in an intermediate deck shall not be placed closer than six inches (15.2 cm) from the coaming and, if placed closer than three feet (.91 m), shall be secured so that they cannot be tipped or dragged into a lower compartment. If such placement or securement is not possible, strongbacks shall be removed to another deck.

(e) Any hatch beam or pontoon left in place next to an open hatch section being worked shall be locked or otherwise secured, so that it cannot be accidentally displaced. All portable, manually handled hatch covers, including those bound together to make a larger cover, shall be removed from any working section, and adjacent sections, unless securely lashed.

(f)(1) The roller hatch beam at the edge of the open section of the hatch shall be lashed or pinned back so that it cannot be moved toward the open section.

(2) Rolling, sectional or telescopic hatch covers of barges that open in a fore and aft direction shall be secured against unintentional movement while in the open position.

(g) Hinged or folding hatch covers normally stowed in an approximately vertical position shall be positively secured when in the upright position, unless the design of the system otherwise prevents unintentional movement.

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

(i) All materials such as dunnage, lashings, twist locks, or stacking cones shall be removed from the hatch cover or be secured to prevent them from falling off the cover before the hatch cover is moved.

(j) When a hatch is to be covered, hatch covers or night tents shall be used. Any covering that only partially covers the hatch, such as alternate hatch covers or strips of dunnage, shall not be covered by a tarpaulin. Exception: A tarpaulin may be used to cover an open or partially open hatch to reduce dust emissions during bulk cargo loading operations, if positive means are taken to prevent employees from walking on the tarpaulin.

Subpart F—Vessel's Cargo Handling Gear

§ 1918.51 General requirements (See also § 1918.11 and Appendix III of this part).

(a) The safe working load specified in the cargo gear certification papers or marked on the booms shall not be exceeded. Any limitations imposed by the certificating authority shall be followed.

(b) All components of cargo handling gear, including tent gantlines and associated rigging, shall be inspected by the employer or a designated person before each use and at appropriate intervals during use. Any gear that is found unsafe shall not be used until it is made safe.

(c) The employer shall determine the load ratings shown on the vessel's wire rope certificates for all wire rope and wire rope slings comprising part of ship's gear and shall observe these load ratings.

(d) The following limitations shall apply to the use of wire rope as a part of the ship's cargo handling gear:

(1) Eye splices in wire ropes shall have at least three tucks with a whole strand of the rope and two tucks with one-half of the wire cut from each strand. Other forms of splices or connections that the employer demonstrates will provide the same level of safety may be used;

(2) Except for eye splices in the ends of wires, each wire rope used in hoisting or lowering, in guying derricks, or as a topping lift, preventer, segment of a multi-part preventer, or pendant, shall consist of one continuous piece without knot or splice; and

(3) Wire rope or wire rope slings exhibiting any of the defects or conditions specified in § 1918.62(b)(4) (i) through (vi) shall not be used.

(e) Natural and synthetic fiber rope slings exhibiting any of the defects or conditions specified in § 1918.62(e) (1) through (7) shall not be used.

(f) Synthetic web slings exhibiting any of the defects or conditions specified in § 1918.62(g)(2) (i) through (v) shall not be used.

(g) Chains, including slings, exhibiting any of the defects or conditions specified in § 1918.62 (h)(3) (iii), (iv), or (h)(6) shall not be used.

§ 1918.52 Specific requirements.

(a) *Preventers.* (1) When preventers are used they shall be of sufficient strength for the intended purpose. They shall be secured to the head of the boom independent of working guys unless, for cast fittings, the strength of the fitting exceeds the total strength of all lines secured to it. Any tails, fittings, or other means of making the preventers fast on the deck shall provide strength equal to that of the preventer itself.

(2) Wire rope clips or knots shall not be used to form eyes in, nor to join sections of, preventer guys.

(b) *Stoppers.* (1) Chain topping lift stoppers shall be in good condition, equipped with fiber tails, and long enough to allow not fewer than three half-hitches in the chain.

(2) Chain stoppers shall be shackled or otherwise secured so that their links are not bent by being passed around fittings. The point of attachment shall be of sufficient strength and so placed that the stoppers are in line with the normal topping lift lead at the time the stopper is applied.

(3) Patent stoppers of the clamp type shall be appropriate for the size of the rope used. Clamps shall be in good condition and free of any substance that would prevent their being drawn tight.

(c) *Falls.* (1) The end of the winch fall shall be secured to the drum by clamps, U-bolts, shackles, or other equally strong methods. Fiber rope fastenings shall not be used.

(2) Winch falls shall not be used with fewer than three turns on the winch drum.

(3) Eyes in the ends of wire rope cargo falls shall not be formed by knots and, in single part falls, shall not be formed by wire rope clips.

(4) When the design of the winch permits, the fall shall be wound on the drum so that the cargo hook rises when the winch control lever is pulled back and lowers when the lever is pushed forward.

(d) *Heel blocks.* (1) When an employee works in the bight formed by the heel block, a preventer at least three-quarters of an inch (1.9 cm) diameter wire rope shall be securely rigged, or equally effective means shall be taken, to hold the block and fall if the heel block attachments fail. Where physical limitations prohibit the fitting of a wire rope preventer of the required size, two turns of a one-half inch (1.3 cm) diameter wire rope shall be sufficient.

(2) If the heel block is not so rigged as to prevent its falling when not under strain, it shall be secured to prevent alternate raising and dropping of the block. This requirement shall not apply when the heel block is at least 10 feet (3.0 m) above the deck when at its lowest point.

(e) *Coaming rollers.* Portable coaming rollers shall be secured by wire preventers in addition to the regular coaming clamps.

(f) *Cargo hooks.* Cargo hooks shall be as close to the junction of the falls as the assembly permits, but never farther than two feet (.61 m) from it. Exception: This provision shall not apply when the construction of the vessel and the operation in progress are such that fall angles are greater than 120 degrees. Overhaul chains shall not be shortened by bolting or knotting.

§ 1918.53 Cargo winches.

(a) Moving parts of winches and other deck machinery shall be guarded.

(b) Winches shall not be used if control levers operate with excessive friction or excessive play.

(c) Double gear winches or other winches equipped with a clutch shall not be used unless a positive means of locking the gear shift is provided.

(d) There shall be no load other than the fall and cargo hook assembly on the winch when changing gears on a two-gear winch.

(e) Any defect or malfunction of winches that could endanger employees shall be reported immediately to the officer in charge of the vessel, and the winch shall not be used until the defect or malfunction is corrected.

(f) Temporary seats and shelters for winch drivers that create a hazard to the winch operator or other employees shall not be used.

(g) Except for short handles on wheel type controls, winch drivers shall not be permitted to use winch control extension levers unless they are provided by either the ship or the employer. Such levers shall be of adequate strength and securely fastened with metal connections at the fulcrum and at the permanent control lever.

(h) Extension control levers that tend to fall due to their own weight shall be counterbalanced.

(i) Winch brakes shall be monitored during use. If winch brakes are unable to hold the load, the winch shall be removed from service.

(j) Winches shall not be used when one or more control points, either hoisting or lowering, are not operating properly. Only authorized personnel shall adjust control systems.

(k) When winches are left unattended, control levers shall be placed in the neutral position and the power shall be shut off or control levers shall be locked at the winch or the operating controls.

§ 1918.54 Rigging gear.

(a) *Guy and preventer placement.* Each guy or preventer shall be placed to prevent it from making contact with any other guy, preventer, or stay.

(b) *Guys.* When alternate positions for securing guys are provided, the guys shall be so placed as to produce a minimum stress and not permit the boom to jackknife.

(c) *Boom placement.* The head of the midship boom shall be spotted no farther outboard of the coaming than is necessary for control of the load.

(d) *Preventers.* (1) Preventers shall be properly secured to suitable fittings other than those to which the guys are secured, and shall be as nearly parallel to the guys as the fittings will permit.

(2) Unless the cleat is also a chock and the hauling part is led through the chock opening, the leads of preventers to cleats shall be such that the direction of the line pull of the preventer is as parallel as possible to the plane of the surface on which the cleat is mounted.

(3) Guys and associated preventers shall be adjusted to share the load as equally as possible where cargo operations are being conducted by burtoning. Exception: Where guys are designed and intended for trimming purposes only, and the preventer is intended to do the function of the guy, the guy may be left slack.

(e) *Cargo falls.* Cargo falls under load shall not be permitted to chafe on any standing or other running rigging. Exception: Rigging shall not be construed to mean hatch coamings or other similar structural parts of the vessel.

(f) *Bull wire.* (1) Where a bull wire is taken to a gypsy head for lowering or topping a boom, the bull wire shall be secured to the gypsy head by shackle or other equally strong method. Securing by fiber rope fastening does not meet this requirement.

(2) When, in lowering or topping a boom, it is not possible to secure the bull wire to the gypsy head, or when the topping lift itself is taken to the gypsy head, at least five turns of wire shall be used.

(g) *Trimming and deckloads.* When deck loads extend above the rail and there is less than 12 inches (30.48 cm) horizontal clearance between the edge of the deck load and the inside of the bulwark or rail, a pendant or other alternate device shall be provided to allow trimming of the gear and to prevent employees from going over the side.

§ 1918.55 Cranes (See also § 1918.11).

The following requirements shall apply to the use of cranes forming part of a vessel's permanent equipment.

(a) *Defects.* Cranes with a visible or known defect that affects safe operation shall not be used. Defects shall be reported immediately to the officer in charge of the vessel.

(b) *Operator's station.* (1) Cranes with missing, broken, cracked, scratched, or dirty glass (or equivalent) that impairs operator visibility shall not be used.

(2) Clothing, tools and equipment shall be stored so as not to interfere with access, operation or the operator's view.

(c) *Cargo operations.* (1) Accessible areas within the swing radius of the body of a revolving crane or within the travel of a shipboard gantry crane shall be physically guarded or other equally effective means shall be taken during operations to prevent an employee from being caught between the body of the crane and any fixed structure, or between parts of the crane. Verbal warnings to employees to avoid the dangerous area do not meet this requirement.

(2) Limit switch bypass systems shall be secured during all cargo operations. Such bypass systems shall not be used except in an emergency or during non-cargo handling operations such as stowing cranes or derricks or performing repairs. Any time a bypass system is used, it shall be done only under the direction of an officer of the vessel.

(3) Under all operating conditions, at least three full turns of rope shall remain on ungrooved drums, and two full turns on grooved drums.

(4) Crane brakes shall be monitored during use. If crane brakes are unable to hold the load, the crane shall not be used.

(5) Cranes shall not be used if control levers operate with excessive friction or excessive play.

(6) When cranes are equipped with power down capability, there shall be no free fall of the gear when a load is attached.

(7) When two or more cranes hoist a load in unison, a designated person shall direct the operation and instruct personnel in positioning, rigging of the gear and movements to be made.

(d) *Unattended cranes.* When cranes are left unattended between work periods, § 1918.66(b) (4)(i) through (v) shall apply.

Subpart G—Cargo Handling Gear and Equipment Other Than Ship's Gear

§ 1918.61 General (See also Appendix IV of this part).

(a) *Employer provided gear inspection.* All gear and equipment provided by the employer shall be inspected by the employer or designated person before each use and, when appropriate, at intervals during its use, to ensure that it is safe. Any gear that is found upon such inspection to be unsafe shall not be used until it is made safe.

(b) *Safe working load.* (1) The safe working load of gear as specified in §§ 1918.61 through 1918.66 shall not be exceeded.

(2) All cargo handling gear provided by the employer with a safe working load greater than five short tons (10,000 lbs. or 4.5 metric tons) shall have its safe working load plainly marked on it.

(c) *Gear weight markings.* The weight shall be plainly marked on any article of stevedoring gear hoisted by ship's gear and weighing more than 2,000 lbs. (.91 metric tons).

(d) *Certification.* The employer shall not use any material handling device listed in paragraphs (f) and (g) of this section until the device has been certificated, as evidenced by current and valid documents attesting to compliance with the requirements of paragraph (e) of this section.

(e) *Certification procedures.* Each certification required by this section shall be performed in accordance with part 1919 of this chapter, by a person then currently accredited by OSHA as provided in that part.

(f) *Special gear.* (1) Special stevedoring gear provided by the employer, the strength of which depends upon components other than commonly used stock items such as shackles, ropes, or chains, and that has a Safe Working Load (SWL) greater than five short tons (10,000 lbs or 4.5 metric tons) shall be inspected and tested as a unit before initial use (see Table A).

(2) Special stevedoring gear provided by the employer that has a SWL of five short tons (10,000 or 4.5 metric tons) or less shall be inspected and tested as a unit before initial use according to paragraphs (d) and (e) of this section or by a designated person (see Table A).

TABLE A

Safe working load	Proof load
Up to 20 short tons (18.1 metric tons)	25 percent in excess.

TABLE A—Continued

Safe working load	Proof load
From 20 through 50 short tons (18.1 to 45.3 metric tons)	5 short tons in excess.
Over 50 short tons (45.3 metric tons)	10 percent in excess.

(g) Every spreader that is not a part of ship's gear and is used for handling intermodal containers shall be inspected and tested before initial use to a proof load equal to 25 percent greater than its rated capacity. In addition, any spreader that suffers damage necessitating structural repair shall be inspected and retested after repair and before being returned to service.

(h) All cargo handling gear covered by this section with a SWL greater than five short tons (10,000 lbs. or 4.5 metric tons) shall be proof load tested according to Table A in paragraph (f) or paragraph (g), as applicable, of this section every four years and in accordance with paragraphs (d) and (e) of this section or by a designated person.

(i) Certificates and inspection and test records attesting to the tests required by this section shall be available for inspection.

§ 1918.62 Miscellaneous auxiliary gear.

(a) *Routine inspection.* (1) At the completion of each use, loose gear such as slings, chains, bridles, blocks and hooks shall be so placed as to avoid damage to the gear. Loose gear shall be inspected and any defects corrected before reuse.

(2) Defective gear, as defined by the manufacturers' specifications (when available), shall not be used. Distorted hooks, shackles or similar gear shall be discarded.

Note to paragraph (a): When manufacturers' specifications are not available to determine whether gear is defective, the employer shall use the appropriate paragraphs of this section to make these determinations.

(b) *Wire rope and wire rope slings.* (1) The employer shall follow the manufacturers' recommended ratings for wire rope and wire rope slings provided for use aboard ship, and shall have such ratings available for inspection. When the manufacturer is unable to supply such ratings, the employer shall use the tables for wire rope and wire rope slings found in Appendix II to this part. A design safety factor of at least five shall be maintained for the common sizes of running wire used as falls in purchases, or in such uses as light load slings.

(2) Wire rope with a safety factor of less than five may be used only as follows:

(i) In specialized equipment, such as cranes, designed to be used with lesser wire rope safety factors;

(ii) According to design factors in standing rigging applications; or

(iii) For heavy lifts or other purposes for which a safety factor of five is not feasible and for which the employer can show that equivalent safety is ensured.

(3) Wire rope or wire rope slings provided by the employer and having any of the following conditions shall not be used:

(i) Ten randomly distributed broken wires in one rope lay or three or more broken wires in one strand in one rope lay;

(ii) Kinking, crushing, bird caging or other damage resulting in distortion of the wire rope structure;

(iii) Evidence of heat damage;

(iv) Excessive wear or corrosion, deformation or other defect in the wire or attachments, including cracks in attachments;

(v) Any indication of strand or wire slippage in end attachments; or

(vi) More than one broken wire close to a socket or swaged fitting.

(4) Protruding ends of strands in splices on slings and bridles shall be covered or blunted. Coverings shall be removable so that splices can be examined. Means used to cover or blunt ends shall not damage the wire.

(5) Where wire rope clips are used to form eyes, the employer shall follow the manufacturers' recommendations, which shall be available for inspection. If ''U'' bolt clips are used and the manufacturers' recommendations are not available, Table 1 of Appendix II to this part shall be used to determine the number and spacing of clips. ''U'' bolts shall be applied with the ''U'' section in contact with the dead end of the rope.

(6) Wire rope shall not be secured by knotting.

(7) Eyes in wire rope bridles, slings, bull wires, or in single parts used for hoisting shall not be formed by wire rope clips or knots.

(8) Eye splices in wire ropes shall have at least three tucks with a whole strand of the rope, and two tucks with one-half of the wire cut from each strand. Other forms of splices or connections that the employer demonstrates to be equivalently safe may be used.

(9) Except for eye splices in the ends of wires and endless rope slings, each wire rope used in hoisting or lowering, or bulling cargo, shall consist of one continuous piece without knot or splice.

(c) *Natural fiber rope.* (1) The employer shall follow the manufacturers' recommended ratings for natural fiber rope and natural fiber rope slings provided for use aboard ship, and shall have such ratings available for inspection.

(2) If the manufacturers' recommended ratings and use recommendations are unavailable, the employer shall use Table 2 of Appendix II to this part to determine safe working loads of natural fiber rope slings comprising part of pre-slung drafts.

(3) Eye splices shall consist of at least three full tucks. Short splices shall consist of at least six tucks, three on each side of the centerline.

(d) *Synthetic rope.* (1) The employer shall follow the manufacturers' ratings and use recommendations for the specific synthetic fiber rope and synthetic fiber rope slings provided for use aboard ship, and shall have such ratings available for inspection.

(2) If the manufacturers' recommended ratings and use recommendations are unavailable, Tables 3A and B of Appendix II to this part shall be used to determine the safe working load of synthetic fiber rope and of synthetic rope slings that comprise this part of pre-slung drafts.

(3) Unless otherwise recommended by the manufacturer, when synthetic fiber ropes are substituted for natural fiber ropes of less than three inches (7.62 cm) in circumference, the substitute shall be of equal size. Where substituted for natural fiber rope of three inches (7.62 cm) or more in circumference, the size of the synthetic rope shall be determined from the formula:

$$C=\sqrt{0.6C_s^2 +0.4C_m^2}$$

Where C=the required circumference of the synthetic rope in inches (centimeters); C_s=the circumference to the nearest one-quarter inch (.6 cm) of a synthetic rope having a breaking strength no less than that of the natural rope that is required by paragraph (c) of this section; and C_m=the circumference of the natural rope in inches (centimeters) that is required by paragraph (c) of this

section. In making each substitution, the employer shall ascertain that the inherent characteristics of the synthetic fiber are suitable for hoisting.

(e) *Removal of natural and synthetic rope from service.* Natural and synthetic rope having any of the following defects shall be removed from service:

(1) Abnormal or excessive wear including heat and chemical damage;

(2) Powdered fiber between strands;

(3) Sufficient cut or broken fibers to affect the capability of the rope;

(4) Variations in the size or roundness of strands;

(5) Discolorations other than stains not associated with rope damage;

(6) Rotting; or

(7) Distortion or other damage to attached hardware.

(f) *Thimbles.* Properly fitting thimbles shall be used when any rope is secured permanently to a ring, shackle or attachment, where practicable.

(g) *Synthetic web slings.* (1) Slings and nets or other combinations of more than one piece of synthetic webbing assembled and used as a single unit (synthetic web slings) shall not be used to hoist loads greater than the sling's rated capacity.

(2) Synthetic web slings shall be removed from service if they exhibit any of the following defects:

(i) Acid or caustic burns;

(ii) Melting or charring of any part of the sling surface;

(iii) Snags, punctures, tears or cuts;

(iv) Broken or worn stitches;

(v) Distortion or damage to fittings; or

(vi) Display of visible warning threads or markers designed to indicate excessive wear or damage.

(3) Defective synthetic web slings removed from service shall not be returned to service unless repaired by a sling manufacturer or an entity of similar competence. Each repaired sling shall be proof tested by the repairer to twice the sling's rated capacity before its return to service. The employer shall retain a certificate of the proof test and make it available for inspection.

(4) Synthetic web slings provided by the employer shall only be used according to the manufacturers' use recommendations, which shall be available.

(5) Fittings shall have a breaking strength at least equal to that of the sling to which they are attached and shall be free of sharp edges.

(h) *Chains and chain slings used for hoisting.* (1) The employer shall follow the manufacturers' recommended ratings for safe working loads for the size of wrought iron and alloy steel chains and chain slings and shall have such ratings available for inspection. When the manufacturer does not provide such ratings, the employer shall use Table 4A of Appendix II to this part to determine safe working loads for alloy steel chains and chain slings only.

(2) Proof coil steel chain, also known as common or hardware chain, and other chain not recommended by the manufacturer for slinging or hoisting shall not be used for slinging or hoisting.

(3)(i) Sling chains, including end fastenings, shall be inspected for visible defects before each day's use and as often as necessary during use to ensure integrity of the sling.

(ii) Thorough inspections of chains in use shall be made quarterly to detect wear, defective welds, deformation or increase in length or stretch. The month of inspection shall be shown on each chain by color of paint on a link or by other equally effective means.

(iii) Chains shall be removed from service when maximum allowable wear, as indicated in Table 4B of Appendix II to this part, is reached at any point of a link.

(iv) Chain slings shall be removed from service when stretch has increased the length of a measured section by more than 5 percent; when a link is bent, twisted or otherwise damaged; or when a link has a raised scarf or defective weld.

(v) Only designated persons shall inspect chains used for slinging and hoisting.

(4) Chains shall only be repaired by a designated person. Links or portions of a chain defective under any of the criteria of paragraph (h)(3)(iv) of this section shall be replaced with properly dimensioned links or connections of material similar to that of the original chain. Before repaired chains are returned to service, they shall be tested to the proof test load recommended by the manufacturer for the original chain. Tests shall be done by the manufacturer or shall be certified by an agency accredited for the purpose under part 1919 of this chapter. Test certificates shall be available for inspection.

(5)(i) Wrought iron chains in constant use shall be annealed or normalized at intervals not exceeding six months. Heat treatment certificates shall be available for inspection. Alloy chains shall not be annealed.

(ii) Any part of a lifting appliance or item of loose gear installed after January 21, 1998 shall not be manufactured of wrought iron.

(6) Kinked or knotted chains shall not be used for lifting. Chains shall not be shortened by bolting, wiring or knotting. Makeshift links or fasteners such as wire, bolts or rods shall not be used.

(7) Hooks, rings, links and attachments affixed to sling chains shall have rated capacities at least equal to those of the chains to which they are attached.

(8) Chain slings shall bear identification of size, grade and rated capacity.

(i) *Shackles.* (1) If the manufacturers' recommended safe working loads for shackles are available, they shall not be exceeded. If the manufacturers' recommendations are not available, Table 5 of Appendix II to this part shall apply.

(2) Screw pin shackles provided by the employer and used aloft shall have their pins positively secured.

(j) *Hooks other than hand hooks.* (1) The manufacturers' recommended safe working loads for hooks shall not be exceeded. Hooks other than hand hooks shall be tested according to the provisions of paragraphs (a), (c) and (d) of § 1919.31 of this chapter.

(2) Bent or sprung hooks shall be discarded.

(3) Teeth of case hooks shall be maintained in safe condition.

(4) Jaws of patent clamp-type plate hooks shall be maintained in condition to grip plates securely.

(5) Loads shall be applied to the throat of the hook only.

(k) *Pallets.* (1) Pallets shall be made and maintained to support and carry loads being handled safely. Fastenings of reusable pallets used for hoisting shall be bolts and nuts, drive screws (helically threaded nails), annular threaded nails or fastenings of equivalent holding strength.

(2) Reusable wing or lip-type pallets shall be hoisted by bar bridles or other suitable gear and shall have an overhanging wing or lip of at least three inches (7.6 cm). They shall not be hoisted by wire slings alone.

(3) Loaded pallets that do not meet the requirements of this paragraph shall be hoisted only after being placed on pallets meeting such requirements, or shall be handled by other means providing equivalent safety.

(4) Bridles for handling flush end or box-type pallets shall be designed to prevent disengagement from the pallet under load.

(5) Pallets shall be stacked or placed to prevent falling, collapsing or otherwise causing a hazard under standard operating conditions.

(6) Disposable pallets intended only for one use shall not be reused for hoisting.

§ 1918.63 Chutes, gravity conveyors and rollers.

(a) Chutes shall be of adequate length and strength to support the conditions of use, and shall be free of splinters and sharp edges.

(b) When necessary for the safety of employees, chutes shall be equipped with sideboards to afford protection from falling objects.

(c) When necessary for the safety of employees, provisions shall be made for stopping objects other than bulk commodities at the delivery end of the chute.

(d) Chutes and gravity conveyor roller sections shall be firmly placed and secured to prevent displacement, shifting, or falling.

(e) Gravity conveyors shall be of sufficient strength to support the weight of materials placed upon them safely. Conveyor rollers shall be installed in a way that prevents them from falling or jumping out of the frame.

(f) Frames shall be kept free of burrs and sharp edges.

§ 1918.64 Powered conveyors.

(a) *Emergency stop.* Readily accessible stop controls shall be provided for use in an emergency. Whenever the operation of any power conveyor requires personnel to work close to the conveyor, the conveyor controls shall not be left unattended while the conveyor is in operation.

(b) *Guarding.* All conveyor and trimmer drives that create a hazard shall be adequately guarded.

(c) *Approved for location.* Electric motors and controls on conveyors and trimmers used to handle grain and exposed to grain dust shall be of a type approved by a nationally recognized testing laboratory for use in Class II, Division I locations. (See § 1910.7 of this chapter.)

(d) *Grain trimmer control box.* Each grain trimmer shall have a control box on the weather deck close to the spout feeding the trimmer.

(e) *Grain trimmer power cable.* Power cables between the deck control box and the grain trimmer shall be used only in continuous lengths without splice or tap between connections.

(f) *Portable conveyors.* Portable conveyors shall be stable within their operating ranges. When used at variable fixed levels, the unit shall be secured at the operating level.

(g) *Delivery and braking.* When necessary for the safety of employees, provisions shall be made for braking objects at the delivery end of the conveyor.

(h) *Electric brakes.* Conveyors using electrically released brakes shall be constructed so that the brakes cannot be released until power is applied and the brakes are automatically engaged if the power fails or the operating control is returned to the ''stop'' position.

(i) *Starting powered conveyors.* Powered conveyors shall not be started until all employees are clear of the conveyor or have been warned that the conveyor is about to start up.

(j) *Loading and unloading.* The area around conveyor loading and unloading points shall be kept clear of obstructions during conveyor operations.

(k) *Lockout/tagout.* (1) Conveyors shall be stopped and their power sources locked out and tagged out during maintenance, repair, and servicing. If power is necessary for testing or for making minor adjustments, power shall only be supplied to the servicing operation.

(2) The starting device shall be locked out and tagged out in the stop position before an attempt is made to remove the cause of a jam or overload of the conveying medium.

(l) *Safe practices.* (1) Only designated persons shall operate, repair or service powered conveyors.

(2) The employer shall ensure that each employee stays off operating conveyors.

(3) Conveyors shall be operated only with all overload devices, guards and safety devices in place and operable.

§ 1918.65 Mechanically powered vehicles used aboard vessels.

(a) *Applicability.* This section applies to every type of mechanically powered vehicle used for material or equipment handling aboard a vessel.

(b) *General.* (1) Modifications, such as adding counterweights that might affect the vehicle's capacity or safety, shall not be done without either the manufacturers' prior written approval or the written approval of a registered professional engineer experienced with the equipment, who has consulted with the manufacturer, if available. Capacity, operation and maintenance instruction plates, tags or decals shall be changed to conform to the equipment as modified.

(2) Rated capacities, with and without removable counterweights, shall not be exceeded. Rated capacities shall be marked on the vehicle and shall be visible to the operator. The vehicle weight, with and without a counterweight, shall be similarly marked.

(3) If loads are lifted by two or more trucks working in unison, the total weight shall not exceed the combined safe lifting capacity of all trucks.

(c) *Guards for fork lift trucks.* (1) Except as noted in paragraph (c)(5) of this section, fork lift trucks shall be equipped with overhead guards securely attached to the machines. The guard shall be of such design and construction as to protect the operator from boxes, cartons, packages, bagged material, and other similar items of cargo that might fall from the load being handled or from stowage.

(2) Overhead guards shall not obstruct the operator's view, and openings in the top of the guard shall not exceed six inches (15.2 cm) in one of the two directions, width or length. Larger openings are permitted if no opening allows the smallest unit of cargo being handled through the guard.

(3) Overhead guards shall be built so that failure of the vehicle's mast tilting mechanism will not displace the guard.

(4) Overhead guards shall be large enough to extend over the operator during all truck operations, including forward tilt.

(5) An overhead guard may be removed only when it would prevent a truck from entering a work space and only if the operator is not exposed to low overhead obstructions in the work space.

(6) Where necessary to protect the operator, fork lift trucks shall be fitted with a vertical load backrest extension to prevent the load from hitting the mast when the mast is positioned at maximum backward tilt. For this purpose, a ''load backrest extension'' means a device extending vertically from the fork carriage frame to prevent raised loads from falling backward.

(d) *Guards for bulk cargo-moving vehicles.* (1) Every crawler type, rider operated, bulk cargo-moving vehicle shall be equipped with an operator's guard of such design and construction as to protect the operator, when seated, against injury from contact with a projecting overhead hazard.

(2) Overhead guards and their attachment points shall be so designed as to be able to withstand, without excessive deflection, a load applied horizontally at the operator's shoulder level equal to the drawbar pull of the machine.

(3) Overhead guards are not required when the vehicle is used in situations in which the seated operator cannot contact projecting overhead hazards.

(4) After July 26, 1999, bulk cargo-moving vehicles shall be equipped with rollover protection of such design and construction as to prevent the possibility of the operator being crushed because of a rollover or upset.

(e) *Approved trucks.* (1) ''Approved power-operated industrial truck'' means one listed as approved for the intended use or location by a nationally

recognized testing laboratory (see § 1910.7 of this chapter).

(2) Approved power-operated industrial trucks shall bear a label or other identification indicating testing laboratory approval.

(3) When the atmosphere in an area is hazardous (see § 1918.2 and § 1918.93), only approved power-operated industrial trucks shall be used.

(f) *Maintenance.* (1) Mechanically powered vehicles shall be maintained in safe working order. Safety devices shall not be removed or made inoperative except where permitted in this section. Vehicles with a fuel system leak or any other safety defect shall not be operated.

(2) Braking systems or other mechanisms used for braking shall be operable and in safe condition.

(3) Replacement parts whose function might affect operational safety shall be equivalent in strength and performance capability to the original parts that they replace.

(4) Repairs to the fuel and ignition systems of mechanically powered vehicles that involve fire hazards shall be conducted only in locations designated as safe for such repairs.

(5) Batteries on all mechanically powered vehicles shall be disconnected during repairs to the primary electrical system except when power is necessary for testing and repair. On vehicles equipped with systems capable of storing residual energy, that energy shall be safely discharged before work on the primary electrical system begins.

(6) Only designated persons shall do maintenance and repair.

(g) *Parking brakes.* All mechanically powered vehicles purchased after January 21, 1998, shall be equipped with parking brakes.

(h) *Operation.* (1) Only stable and safely arranged loads within the rated capacity of the mechanically powered vehicle shall be handled.

(2) The employer shall require drivers to ascend and descend grades slowly.

(3) If the load obstructs the forward view, the employer shall require drivers to travel with the load trailing.

(4) Steering knobs shall not be used unless the vehicle is equipped with power steering.

(5) When mechanically powered vehicles use cargo lifting devices that have a means of engagement hidden from the operator, a means shall be provided to enable the operator to determine that the cargo has been engaged.

(6) No load on a mechanically powered vehicle shall be suspended or swung over any employee.

(7) When mechanically powered vehicles are used, provisions shall be made to ensure that the working surface can support the vehicle and load, and that hatch covers, truck plates, or other temporary surfaces cannot be dislodged by movement of the vehicle.

(8) When mechanically powered vehicles are left unattended, load-engaging means shall be fully lowered, controls neutralized, brakes set and power shut off. Wheels shall be blocked or curbed if the vehicle is on an incline.

(9) When lift trucks or other mechanically powered vehicles are being operated on open deck-type barges, the edges of the barges shall be guarded by railings, sideboards, timbers, or other means sufficient to prevent vehicles from rolling overboard. When such vehicles are operated on covered lighters where door openings other than those being used are left open, means shall be provided to prevent vehicles from rolling overboard through such openings.

(10) Unauthorized personnel shall not ride on mechanically powered vehicles. A safe place to ride shall be provided when riding is authorized.

(11) An employee may be elevated by fork lift trucks only when a platform is secured to the lifting carriage or forks. The platform shall meet the following requirements:

(i) The platform shall have a railing complying with § 1917.112(c) of this chapter.

(ii) The platform shall have toeboards complying with § 1917.112(d) of this chapter, if tools or other objects could fall on employees below.

(iii) When the truck has controls elevated with the lifting carriage, means shall be provided for employees on the platform to shut off power to the vehicle.

(iv) Employees on the platform shall be protected from exposure to moving truck parts.

(v) The platform floor shall be skid resistant.

(vi) An employee shall be at the truck's controls whenever employees are elevated.

(vii) While an employee is elevated, the truck may be moved only to make minor adjustments in placement.

§ 1918.66 Cranes and derricks other than vessel's gear.

(a) *General.* The following requirements shall apply to the use of cranes and derricks brought aboard vessels for conducting longshoring operations. They shall not apply to cranes and derricks forming part of a vessel's permanent equipment.

(1) *Certification.* Cranes and derricks shall be certificated in accordance with part 1919 of this chapter.

(2) *Posted weight.* The crane weight shall be posted on all cranes hoisted aboard vessels for temporary use.

(3) *Rating chart.* All cranes and derricks having ratings that vary with boom length, radius (outreach) or other variables shall have a durable rating chart visible to the operator, covering the complete range of the manufacturers' (or design) capacity ratings. The rating chart shall include all operating radii (outreach) for all permissible boom lengths and jib lengths, as applicable, with and without outriggers, and alternate ratings for optional equipment affecting such ratings. Precautions or warnings specified by the owner or manufacturer shall be included along with the chart.

(4) *Rated loads.* The manufacturers' (or design) rated loads for the conditions of use shall not be exceeded.

(5) *Change of rated loads.* Designated working loads shall not be increased beyond the manufacturers' ratings or original design limitations unless such increase receives the manufacturers' approval. When the manufacturers' services are not available or where the equipment is of foreign manufacture, engineering design analysis shall be done or approved by a person accredited for certificating the equipment under part 1919 of this chapter. Engineering design analysis shall be done by a registered professional engineer competent in the field of cranes and derricks. Any structural changes required by the change in rating shall be carried out.

(6) *Radius indicator.* When the rated load varies with the boom radius, the crane or derrick shall be fitted with a boom angle or radius indicator visible to the operator.

(7) *Operator's station.* The cab, controls and mechanism of the equipment shall be so arranged that the operator has a clear view of the load or signalman, when one is used. Cab glass, when used, shall be safety plate glass or equivalent. Cranes with missing, broken, cracked, scratched, or dirty glass (or equivalent), that impairs operator vision shall not be used. Clothing, tools, and equipment shall be stored so as not to interfere with access, operation, and the operator's view.

(8) *Counterweights or ballast.* Cranes shall be operated only with the specified type and amount of ballast or counterweights. Ballast or counterweights shall be located and secured only as provided in the manufacturers' or design specifications, which shall be available for inspection.

(9) *Outriggers.* Outriggers shall be used according to the manufacturers' specifications or design data, which

shall be available for inspection. Floats, when used, shall be securely attached to the outriggers. Wood blocks or other support shall be of sufficient size to support the outrigger, free of defects that may affect safety, and of sufficient width and length to prevent the crane from shifting or toppling under load.

(10) *Exhaust gases.* Engine exhaust gases shall be discharged away from crane operating personnel.

(11) *Electrical/Guarding.* Electrical equipment shall be so placed or enclosed that live parts will not be exposed to accidental contact. Designated persons may work on energized equipment only if necessary during inspection, maintenance, or repair; otherwise the equipment shall be stopped and its power source locked out and tagged out.

(12) *Fire extinguisher.* (i) At least one portable approved or listed fire extinguisher of at least a 5-B:C rating or equivalent shall be accessible in the cab of the crane or derrick.

(ii) No portable fire extinguisher using carbon tetrachloride or chlorobromomethane extinguishing agents shall be used.

(13) *Rope on drums.* At least three full turns of rope shall remain on ungrooved drums, and two turns on grooved drums, under all operating conditions. Wire rope shall be secured to drums by clamps, U-bolts, shackles or equivalent means. Fiber rope fastenings are prohibited.

(14) *Brakes.* (i) Each independent hoisting unit of a crane shall be equipped with at least one holding brake, applied directly to the motor shaft or gear train.

(ii) Each independent hoisting unit of a crane shall, in addition to the holding brake, be equipped with a controlled braking means to control lowering speeds.

(iii) Holding brakes for hoist units shall have not less than the following percentage of the rated load hoisting torque at the point where the brake is applied:

(A) 125 percent when used with an other than mechanically controlled braking means; or

(B) 100 percent when used with a mechanically controlled braking means.

(iv) All power control braking means shall be capable of maintaining safe lowering speeds of rated loads.

(15) *Operating controls.* Crane and derrick operating controls shall be clearly marked, or a chart showing their function shall be posted at the operator's position.

(16) *Booms.* Cranes with elevatable booms and without operable automatic limiting devices shall be provided with boom stops if boom elevation can exceed maximum design angles from the horizontal.

(17) *Foot pedals.* Foot pedals shall have a non-skid surface.

(18) *Access.* Ladders, stairways, stanchions, grab irons, foot steps or equivalent means shall be provided as necessary to ensure safe access to footwalks, cab platforms, the cab and any portion of the superstructure that employees must reach.

(b) *Operations.* (1) *Use of cranes together.* When two or more cranes hoist a load in unison, a designated person shall direct the operation and instruct personnel in positioning, rigging of the load and movements to be made.

(2) *Guarding of swing radius.* Accessible areas within the swing radius of the body of a revolving crane shall be physically guarded during operations to prevent an employee from being caught between the body of the crane and any fixed structure or between parts of the crane.

(3) *Prohibited usage.* (i) Equipment shall not be used in a way that exerts side loading stresses upon the crane or derrick boom.

(ii) No crane or derrick having a visible or known defect that may affect safe operation shall be used.

(4) *Unattended cranes.* The following steps shall be taken before leaving a crane unattended between work periods:

(i) Suspended loads, such as those hoisted by lifting magnets or clamshell buckets, shall be landed unless the storage position or maximum hoisting of the suspended device will provide equivalent safety;

(ii) Clutches shall be disengaged;

(iii) The power supply shall be shut off;

(iv) The crane shall be secured against accidental travel; and

(v) The boom shall be lowered or secured against movement.

(c) *Protection for employees being hoisted.* (1) No employee shall be hoisted by the load hoisting apparatus of a crane or derrick except on a platform meeting the following requirements:

(i) Enclosed by a railing or other means providing protection equivalent to that described in § 1917.112(c) of this chapter;

(ii) Fitted with toe boards if the platform has open railings;

(iii) A safety factor of four based on ultimate strength;

(iv) Bearing a plate or permanent marking indicating maximum load rating, which shall not be exceeded, and the weight of the platform itself;

(v) Equipped with a device to prevent access doors, when used, from opening accidentally;

(vi) Equipped with overhead protection for employees on the platform if they are exposed to falling objects or overhead hazards; and

(vii) Secured to the load line by means other than wedge and socket attachments, unless the free (bitter) end of the line is secured back to itself by a clamp placed as close above the wedge as possible.

(2) Except in an emergency, the hoisting mechanism of all cranes or derricks used to hoist personnel shall operate only in power up and power down, with automatic brake application when not hoisting or lowering.

(3) All cranes and derricks used to hoist personnel shall be equipped with an anti-two-blocking device.

(4) Variable radius booms of a crane or derrick used to hoist personnel shall be so constructed or secured as to prevent accidental boom movement.

(5) Platforms or devices used to hoist employees shall be inspected for defects before each day's use and shall be removed from service if defective.

(6) Employees being hoisted shall remain in continuous sight of and communication with the operator or signalman.

(7) Operators shall remain at the controls when employees are hoisted.

(8) Cranes shall not travel while employees are hoisted, except in emergencies or in normal tier-to-tier transfer of employees during container operations.

(d) *Routine inspection.* (1) Designated persons shall visually inspect each crane and derrick on each day of use for defects in functional operating components and shall report any defect found to the employer. The employer shall inform the operator of the result of the inspection.

(2) A designated person shall thoroughly inspect all functional components and accessible structural features of each crane or device at monthly intervals.

(3) Any defects found during such inspections that may create a safety hazard shall be corrected before further equipment use. Repairs shall be done only by designated persons.

(4) A record of each monthly inspection shall be maintained for six months in or on the crane or derrick or at the terminal.

(e) *Protective devices.* (1) When exposed moving parts such as gears, chains and chain sprockets present a hazard to employees during crane and derrick operations, those parts shall be securely guarded.

(2) Crane hooks shall be latched or otherwise secured to prevent accidental load disengagement.

(f) *Load-indicating devices.* (1) Unless exempted by the provisions of paragraph (f)(1)(viii) of this section, every crane used to load or discharge cargo into or out of a vessel shall be fitted with a load-indicating device or alternative device in proper working condition that shall meet the following criteria:

(i) The type or model of any load-indicating device used shall be such as to provide:

(A) A direct indication in the cab of actual weight hoisted or a means of determining this by reference to crane ratings posted and visible to the operator, except that the use of a dynamometer or simple scale alone will not meet this requirement; or

(B) An automatic weight-moment device (e.g., a computer) providing indications in the cab according to the radius and load at the moment; or

(C) A device that will prevent an overloaded condition.

(ii) The accuracy of the load-indicating device, weight-moment device, or overload protection device shall be such that any indicated load (or limit), including the sum of actual weight hoisted and additional equipment or ''add ons'' such as slings, sensors, blocks, etc., is within the range between 95 percent (5 percent underload) and 110 percent (10 percent overload) of the actual true total load. Such accuracy shall be required over the range of daily operating variables reasonably anticipated under the conditions of use.

(iii) The device shall enable the operator to decide before making any lift that the load indicating device or alternative device is operative. In the alternative, if the device is not so mounted or attached and does not include such means of checking, it shall be certified by the manufacturer to remain operative for a specific time. The device shall be checked for accuracy, using known values of the load, at the time of every certification survey (see § 1918.11) and at such additional times as may be recommended by the manufacturer.

(iv) When the load indicating device or alternative device is so arranged in the supporting system (crane structure) that its failure could cause the load to be dropped, its strength shall not be the limiting factor of the supporting system (crane structure).

(v) Units of measure in pounds or both pounds and kilograms (or other indicators of measurement, such as colored indicator lights), capacity of the indicating system, accuracy of the indicating system, and operating instructions and precautions shall be conspicuously marked. If the system used provides no readout but automatically ceases crane operation when the rated load limit is reached under any specific condition of use, the marking shall provide the make and model of the device installed, a description of what it does, how it is operated, and any necessary precautions regarding the system. All of these markings shall be readily visible to the operator.

(vi) All load indicating devices shall operate over the full operating radius. Overall accuracy shall be based on actual applied loads and not on full scale (full capacity) load.

Note to paragraph (f)(1)(vi): If the accuracy of the load indicating device is based on full scale loads and the device is arbitrarily set at plus or minus 10 percent, it would accept a reading between 90,000 and 110,000 lbs. at full capacity for a machine with a maximum rating of 100,000 lbs. but would also show a reading of between zero and 20,000 lbs. at that outreach (radius) at which the load would be 10,000 lbs.; this is clearly unacceptable. If, however, the accuracy of the device is based on actual applied loads under the same conditions, the acceptable range would remain the same with the 100,000-lb. load but would show a figure between 9,000 and 11,000 lbs. at the 10,000-lb. load; this is an acceptable reading.

(vii) When a load-indicating device uses the radius as a factor in its use or in its operating indications, the indicated radius (which may be in feet and/or meters, or degrees of boom angle, depending on the system used) shall be within the range between 97 percent and 110 percent of the actual (true) radius. When radius is presented in degrees, and feet or meters are required for necessary determinations, a conversion chart shall be provided.

(viii) The load indicating device requirements of this paragraph do not apply to a crane:

(A) Of the trolley equipped bridge type while handling containers known to be and identified as empty, or loaded, and in either case according to the provisions of § 1918.85(b) of this part, or while hoisting other lifts by means of a lifting beam supplied by the crane manufacturer for the purpose and in all cases within the crane rating;

(B) While handling bulk commodities or cargoes by means of clamshell bucket or magnet;

(C) While used to handle or hold hoses in connection with transfer of bulk liquids, or other hose-handled products; or

(D) While the crane is used exclusively to handle cargo or equipment whose total actual gross weight is marked on the unit or units hoisted, and the total actual gross weight never exceeds 11,200 lbs., and the load is less than the rated capacity of the crane at the maximum outreach possible at the time.

(2) [Reserved]

§ 1918.67 Notifying the ship's officers before using certain equipment.

(a) The employer shall notify the officer in charge of the vessel before bringing aboard ship internal combustion or electric powered tools, equipment or vehicles.

(b) The employer shall also notify the officer in charge of the vessel before using the ship's electric power for the operation of any electric tools or equipment.

§ 1918.68 Grounding.

The frames of portable electrical equipment and tools, other than double insulated tools and battery operated tools, shall be grounded through a separate equipment conductor run with or enclosing the circuit conductors.

§ 1918.69 Tools.

(a) *General.* Employers shall not issue or permit the use of visibly unsafe tools.

(b) *Portable electric tools.* (1) Portable hand-held electric tools shall be equipped with switches of a type that must be manually held in position.

(2) 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.

§§ 1918.70–.80 [Reserved]

Subpart H—Handling Cargo

§ 1918.81 Slinging.

(a) Drafts shall be safely slung before being hoisted. Loose dunnage or debris hanging or protruding from loads shall be removed.

(b) Cargo handling bridles, such as pallet bridles, which are to remain attached to the hoisting gear while hoisting successive drafts, shall be attached by shackles, or other positive means shall be taken to prevent them from being accidentally disengaged from the cargo hook.

(c) Drafts of lumber, pipe, dunnage and other pieces, the top layer of which is not bound by the sling, shall be slung in a way that prevents sliders. Double slings shall be used on unstrapped dunnage, unless, due to the size of hatch or deep tank openings, using them is impracticable.

(d) Case hooks shall be used only with cases designed to be hoisted by these hooks.

(e) Bales of cotton, wool, cork, wood pulp, gunny bags or similar articles shall not be hoisted by straps unless the straps are strong enough to support the weight of the bale. At least two hooks, each in a separate strap, shall be used.

(f) Unitized loads bound by bands or straps may be hoisted by the banding or strapping only if the banding or strapping is suitable for hoisting and is strong enough to support the weight of the load.

(g) Additional means to maintain the unitized loads during hoisting shall be employed to ensure safe lifting of such loads having damaged banding or strapping.

(h) Loads requiring continuous manual guidance during handling shall be guided by guide ropes (tag lines) that are long enough to control the load.

(i) No draft shall be hoisted unless the winch or crane operator(s) can clearly see the draft itself or see the signals of a signalman who is observing the draft's movement.

(j) Intermodal containers shall be handled in accordance with § 1918.85.

(k) The employer shall require that employees stay clear of the area beneath overhead drafts or descending lifting gear.

(l) The employer shall not permit employees to ride the hook or the load, except as provided for in § 1918.85(g).

§ 1918.82 Building drafts.

(a) Drafts shall be built or means shall be taken to prevent cargo from falling from them.

(b) Buckets and tubs used in handling bulk or frozen cargo shall not be loaded above their rims.

§ 1918.83 Stowed cargo; tiering and breaking down.

(a) When necessary to protect personnel working in a hold, the employer shall secure or block stowed cargo that is likely to shift or roll.

(b) In breaking down stowed cargo, precautions shall be taken to prevent remaining cargo from falling.

(c) Employees trimming bulk cargo shall be checked in and out by the job boss. Before securing any reefer compartment, a check shall be made to ensure that no employee remains inside. Frequent checks shall be made to ensure the safety of any employee working alone in a tank or cargo compartment.

§ 1918.84 Bulling cargo.

(a) Bulling cargo shall be done with the bull line led directly from the heel block. However, bulling may be done from the head of the boom when the nature of the cargo and the surface over which it is dragged are such that the load cannot be stalled, or when the winch actually does not have sufficient strength, with the purchase used, to overload the boom.

(b) Snatch blocks shall be used to provide a fair lead for the bull line to avoid unnecessary dragging of the bull line against coamings and obstructions.

(c) Snatch blocks shall not be used with the point of the hook resting on the flange of a beam, but shall be hung from padeyes, straps, or beam clamps. Snatch blocks or straps shall not be made fast to batten cleats or other insecure fittings.

(d) Beam frame clamps shall be so secured as to prevent their slipping, falling, or being pulled from their stationary attachment.

(e) Falls led from cargo booms of vessels shall not be used to move scows, lighters or railcars.

§ 1918.85 Containerized cargo operations.

(a) *Container markings.* Every intermodal container shall be legibly and permanently marked with:

(1) The weight of the container when empty, in pounds;

(2) The maximum cargo weight the container is designed to carry, in pounds; and

(3) The sum of the weight of the container and the maximum cargo weight, in pounds.

(b) *Container weight.* No container shall be hoisted by any lifting appliance unless the following conditions have been met:

(1) The employer shall determine from the carrier whether a container to be hoisted is loaded or empty. Before loading or discharging, empty containers shall be identified in a manner that will inform every supervisor and job boss on the site and in charge of loading or discharging, or every crane or other hoisting equipment operator and signalman, that such container is empty. Methods of identification may include cargo plans, manifests, or markings on the container.

(2) For a loaded container:

(i) The actual gross weight shall be plainly marked and visible to the crane or other hoisting equipment operator or signalman, or to every supervisor or job boss on site and in charge of the operation; or

(ii) The cargo stowage plan or equivalent permanently recorded display serving the same purpose, containing the actual gross weight and the serial number or other positive identification of that specific container, shall be provided to the crane or other hoisting equipment operator and signalman, and to every supervisor and job boss on site and in charge of the operation.

(3) Every outbound container received at a marine terminal ready to load aboard a vessel without further consolidation or loading shall be weighed to obtain the actual gross weight, either at the terminal or elsewhere, before being hoisted.

(4)(i) When container weighing scales are found at a marine terminal, any outbound container with a load consolidated at that terminal shall be weighed to obtain the actual weight before being hoisted.

(ii) If the terminal has no scales, the actual gross weight may be calculated from the container's contents and the container's empty weight. The weights used in the calculation shall be posted conspicuously on the container, with the name of the person making the calculation, and the date.

(5) Open top vehicle-carrying containers, and those built specifically and used solely for the carriage of compressed gases, are excepted from paragraphs (b)(3) and (b)(4) of this section.

(6) Closed dry van containers carrying vehicles are exempted from paragraph (b)(4) of this section if:

(i) The container carries only completely assembled vehicles and no other cargo;

(ii) The container is marked on the outside so that an employee can readily discern that the container is carrying vehicles; and

(iii) The vehicles were loaded into the container at the marine terminal.

(7) The weight of loaded inbound containers from foreign ports shall be determined by weighing, by the method of calculation described in paragraph (b)(4)(ii) of this section or by shipping documents.

(8) Any scale used within the United States to weigh containers for the requirements of this section shall meet the accuracy standards of the state or local public authority in which the scale is found.

(c) *Overloaded containers.* No container shall be hoisted if its actual gross weight exceeds the weight marked as required in paragraph (a)(3) of this section, or it exceeds the capacity of the lifting appliance.

(d) *Container inspection.* (1) Prior to hoisting, each container shall be inspected for any visible defects in structural members and fittings that would make the handling of such container unsafe.

(2) Any container found to have such a defect shall either be handled by a special means to ensure safe handling or shall be emptied before handling.

(e) *Suspended containers.* The employer shall prohibit employees from working beneath a suspended container.

(f) *Lifting fittings.* Containers shall be handled using lifting fittings or other arrangements suitable and intended for the purpose as set forth in paragraphs (f)(1) through (f)(3) of this section, unless damage to an intermodal container makes special means of handling necessary.

(1) *Loaded intermodal containers.* Loaded intermodal containers of 20 feet (6.1 m) or more shall be hoisted as follows:

(i) When hoisting containers by the top fittings, the lifting forces shall be applied vertically from at least four such fittings. A less than vertical lift is permitted only under the following conditions:

(A) The container being lifted is an ISO ''closed box container'';

(B) The condition of the box is sound;

(C) The speed of hoisting and lowering is moderated when heavily ladened containers [5] are encountered;

(D) The lift angle is at 80 to 90 degrees;

(E) The distance between the lifting beam and the load is at least 8 feet, 2.4 inches (2.5 m); and

(F) The length of the spreader beam is at least 16.3 feet (5 m) for a 20-foot container, and at least 36.4 feet (11 m) for a 40-foot container.

(ii) When hoisting containers from bottom fittings, the hoisting connections shall bear on the fittings only, making no other contact with the container. The angles of the four bridle legs shall not be less than 30 degrees to the horizontal for 40-foot (12.2 m) containers; 37 degrees for 30-foot (9.1 m) containers; and 45 degrees for 20-foot (6.1 m) containers.

(iii) Lifting containers by fork lift trucks or grappling arms from above or from one side may be done only if the container is designed for this type of handling.

(iv) Other means of hoisting may be used only if the containers and hoisting means are designed for such use.

(2) *Intermodal container spreaders.* (i) When using intermodal container spreaders that employ lanyards for activation and load disengagement, all possible precautions shall be taken to prevent accidental release of the load.

(ii) Intermodal container spreaders that utilize automatic twist lock systems shall be designed and used so that a suspended load cannot accidentally be released.

(g) *Safe container top access.* A safe means of access shall be provided for each employee required to work on the top of an intermodal container. Unless ladders are used for access, such means shall comply with the requirements of § 1917.45(j) of this chapter.

(h) *Employee hoisting prohibition.* Employees shall not be hoisted on intermodal container spreaders while a load is engaged.

(i) *Portable ladder access.* When other safer means are available, portable ladders shall not be used in gaining access to container stacks more than two containers high.

(j) *Fall protection.* (1) *Containers being handled by container gantry cranes.*

(i) After July 26, 1999, where a container gantry crane is being used to handle containers, the employer shall ensure that no employee is on top of a container. Exception: An employee may be on top of a container only to perform a necessary function that cannot be eliminated by the use of positive container securing devices.[6]

(ii) After July 26, 1999, the employer shall ensure that positive container securing devices, such as semi-automatic twist locks and above deck cell guides, are used wherever container gantry cranes are used to hoist containers.

(iii) The employer shall ensure that each employee on top of a container is protected from fall hazards by a fall protection system meeting the requirements of paragraph (k) of this section.

(2) *Containers being handled by other hoisting devices.* Where containers are being handled by hoisting devices other than container gantry cranes, the employer shall ensure that each employee on top of a container is protected by a fall protection system meeting the requirements of paragraph (k) of this section.

(3) *Other exposure to fall hazards.* The employer shall ensure that each employee exposed to a fall hazard is protected by a fall protection system meeting the requirements of paragraph (k) of this section. Exception: Where the employer can demonstrate that fall protection for an employee would be infeasible or create a greater hazard due to vessel design, container design, container storage, other cargo stowage, container handling equipment, lifting gear, or port conditions, the employer shall alert the affected employee about the fall hazard and instruct the employee in ways to minimize exposure to that hazard.

(k) *Fall protection systems.* When fall protection systems required by paragraph (j) of this section are employed, the following shall apply:

(1) Each fall protection system component, except anchorages, shall have fall arrest/restraint as its only use.

(2) Each fall protection system subjected to impact loading shall be immediately withdrawn from service and not be used again until inspected and determined by a designated person to be undamaged and suitable for use.

(3) Each fall protection system shall be rigged so that a falling employee cannot contact any lower level stowage or vessel structure.

(4) Each fall protection system adopted for use shall have an energy absorbing mechanism that will produce an arresting force on an employee of not greater than 1800 pounds (8 kN).

(5) Each component of a fall protection system shall be designed and used to prevent accidental disengagement.

(6) Each fall protection system's fixed anchorages shall be capable of sustaining a force of 5,000 pounds (22.2 kN) or be certified as capable of sustaining at least twice the potential impact load of an employee's fall. Such certification must be made by a qualified person.[7] When more than one employee is attached to an anchorage, these limits shall be multiplied by the number of employees attached.

(7) When ''live'' (activated) container gantry crane lifting beams or attached devices are used as anchorage points, the following requirements apply:

(i) The crane shall be placed into a ''slow'' speed mode;

(ii) The crane shall be equipped with a remote shut-off switch that can stop trolley, gantry, and hoist functions and that is in the control of the employee(s) attached to the beam; and

[5] A heavily laden container is one that is loaded to within 20 percent of its rated capacity.

[6] Examples of work that may not be eliminated by positive container securing devices and that may require employees to work on top of containers include, but are not limited to: installing or removing bridge clamps; hooking up or detaching over-height containers; or freeing a jammed semi-automatic twist lock.

[7] For the purposes of this paragraph, qualified person means one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation and specifications in the subject work, project, or product.

(iii) A visible or audible indicator shall be present to alert the exposed employee(s) when the remote shut-off is operational.

(8) Fall protection system components, other than the anchorages, shall be certified as a unit of being capable of sustaining at least twice the potential impact load of an employee's fall. Such certification shall be made by a qualified person.[8]

(9) Each fall protection system shall incorporate the use of a full body harness.

(10) Each device, such as a safety cage, used to transport an employee(s) by being attached to a container gantry crane spreader, shall have a secondary means to prevent accidental disengagement and the secondary means shall be engaged.

(11) Each fall protection system shall be inspected before each day's use by a designated person. Any defective components shall be removed from service.

(12) Before using any fall protection system, the employee shall be trained in the use and application limits of the equipment, proper hookup, anchoring and tie-off techniques, methods of use, and proper methods of equipment inspection and storage.

(13) The employer shall establish and implement a procedure to retrieve personnel safely in case of a fall.

(l) *Working along unguarded edges.* The employer shall provide, and ensure that the employee use, fall protection meeting the requirements of paragraph (k) of this section whenever the employee works along an unguarded edge where a fall hazard exists (see § 1918.2).

§ 1918.86 Roll-on roll-off (Ro-Ro) operations[9] (See also § 1918.25).

(a) *Traffic control system.* An organized system of vehicular and pedestrian traffic control shall be established and maintained at each entrance/exit ramp and on ramps within the vessel as traffic flow warrants.

(b) *Ramp load limit.* Each ramp shall be plainly marked with its load capacity. The marked capacity shall not be exceeded.

(c) *Pedestrian traffic.* Stern and side port ramps also used for pedestrian access shall meet the requirements of § 1918.25. Such ramps shall provide a physical separation between pedestrian and vehicular routes. When the design of the ramp prevents physical separation, a positive means shall be established to prevent simultaneous use of the ramp by vehicles and pedestrians.

(d) *Ramp maintenance.* Ramps shall be properly maintained and secured.

(e) *Hazardous routes.* Before the start of Ro-Ro operations, the employer shall identify any hazardous routes or areas that could be mistaken for normal drive-on/drive-off routes. Such hazardous routes shall be clearly marked and barricaded.

(f) *Air brake connections.* Each tractor shall have all air lines connected when pulling trailers equipped with air brakes and shall have the brakes tested before commencing operations.

(g) *Trailer load limits.* After July 27, 1998, flat bed and low boy trailers shall be marked with their cargo capacities and shall not be overloaded.

(h) *Cargo weights.* Cargo to be handled via a Ro-Ro ramp shall be plainly marked with its weight in pounds (kilograms). Alternatively, the cargo stow plan or equivalent record containing the actual gross weight of the load may be used to determine the weight of the cargo.

(i) *Tractors.* Tractors used in Ro-Ro operations shall have:

(1) Sufficient power to ascend ramp inclines safely; and

(2) Sufficient braking capacity to descend ramp inclines safely.

(j) *Safe speeds.* Power driven vehicles used in Ro-Ro operations shall be operated at speeds that are safe for prevailing conditions.

(k) *Ventilation.* Internal combustion engine-driven vehicles shall be operated only where adequate ventilation exists or is provided. (Air contaminant requirements are found in § 1918.94 and part 1910, subpart Z, of this chapter.)

(l) *Securing cargo.* Cargo loaded or discharged during Ro-Ro operations shall be secured to prevent sliding loads.

(m) *Authorized personnel.* Only authorized persons shall be permitted on any deck while loading or discharging operations are being conducted. Such authorized persons shall be equipped with high visibility vests (or equivalent protection[10]).

Note to paragraph (m): High visibility vests or equivalent protection means high visibility/retroreflective materials which are intended to provide conspicuity of the user by day through the use of high visibility (fluorescent) material and in the dark by vehicle headlights through the use of retroreflective material. The minimum area of material for a vest or equivalent protection is .5 m^2 (760 $in.^2$) for fluorescent (background) material and .13m^2 (197 $in.^2$) for retroreflective material.

(n) *Vehicle stowage positioning.* Drivers shall not drive vehicles, either forward or backward, while any personnel are in positions where they could be struck.

§ 1918.87 Ship's cargo elevators.

(a) *Safe working load.* The safe working loads of ship's cargo elevators shall be determined and followed.

(b) *Load distribution.* Loads shall be evenly distributed and maintained on the elevator's platform.

(c) *Elevator personnel restrictions.* Personnel shall not be permitted to ride on the elevator's platform if a fall hazard exists. (See § 1918.2.)

(d) *Open deck barricades.* During elevator operation, each open deck that presents a fall hazard to employees shall be effectively barricaded.

§ 1918.88 Log operations.

(a) *Working in holds.* When loading logs into the holds of vessels and using dumper devices to roll logs into the wings, the employer shall ensure that employees remain clear of areas where logs being dumped could strike, roll upon, or pin them.

(b) *Personal flotation devices.* Each employee working on a log boom shall be protected by a personal flotation device meeting the requirements of § 1918.105(b)(2).

(c) *Footwear.* The employer shall provide each employee that is working logs with appropriate footwear, such as spiked shoes or caulked sandals, and shall ensure that each employee wears appropriate footwear to climb or walk on logs.

(d) *Lifelines.* When employees are working on log booms or cribs, lifelines shall be furnished and hung overside to the water's edge.

(e) *Jacob's ladder.* When a log boom is being worked, a Jacob's ladder meeting the requirements of § 1918.23 shall be provided for each gang working alongside unless other safe means of access (such as the vessel's gangway) is provided. However, no more than two Jacob's ladders are required for any single log boom being worked.

(f) *Life-ring.* When working a log boom alongside a ship, a U.S. Coast Guard approved 30-inch (76.2 cm) life-ring, with no less than 90 feet (27.4 m) of line, shall be provided either on the floating unit itself or aboard the ship close to each floating unit being worked.

[8] For the purposes of this paragraph, qualified person means one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation and specifications in the subject work, project, or product.

[9] Ro-Ro operations occur only on Ro-Ro vessels which are vessels whose cargo is driven on or off the vessel by way of ramps and moved within the vessel by way of ramps and/or elevators.

[10] Decals on hard hats will not be considered equivalent protection for the purposes of this paragraph.

(g) *Rescue boat.* When employees are working on rafts or booms, a rescue boat capable of effecting an immediate rescue shall be available. Powered rescue boats are required when the current exceeds one knot.

(h) *Log rafts.* When an employee is working logs out of the water, walking sticks [11] (safety sticks) shall be provided as follows:

(1) They shall be planked and be no less than 24 inches (.61 m) wide;

(2) They shall extend along the entire length of all rafts on the side(s) of the vessel being worked, and to the means of access to the log raft(s); and

(3) They shall be buoyant enough to keep the walking surface above the waterline when employees are walking on them.

§ 1918.89 Handling hazardous cargo (See also § 1918.2 and § 1918.99).

Hazardous cargo shall be slung and secured so that neither the draft nor individual packages can fall because of tipping of the draft or slacking of the supporting gear.

Subpart I—General Working Conditions.

§ 1918.90 Hazard communication.

See § 1918.1(b)(4).

§ 1918.91 Housekeeping.

(a) *General.* Active work areas shall be kept free of equipment, such as lashing gear, and materials not in use, and clear of debris, projecting nails, strapping and other objects not necessary to the work in progress.

(b) *Slippery surfaces.* The employer shall eliminate conditions causing slippery walking and working surfaces in immediate areas used by employees.

(c) *Free movement of drafts.* Dunnage shall not be placed at any location where it interferes with the free movement of drafts.

(d) *Dunnage height.* Dunnage racked against sweat battens or bulkheads shall not be used when the levels of such racks are above the safe reach of employees.

(e) *Coaming clearance.* Dunnage, hatch beams, tarpaulins or gear not in use shall be stowed no closer than three feet (.91 m) to the port and starboard sides of the weather deck hatch coaming.

(f) *Nails.* (1) Nails that are protruding from shoring or fencing in the work area shall be rendered harmless.

(2) Dunnage, lumber, or shoring material in which there are visibly protruding nails shall be removed from the work area, or, if left in the area, the nails shall be rendered harmless.

(g) *Ice aloft.* Employees shall be protected from ice that may fall from aloft.

§ 1918.92 Illumination.

(a) *Walking, working, and climbing areas.* Walking, working, and climbing areas shall be illuminated. Unless conditions described in the regulations of the U.S. Coast Guard (33 CFR 154.570) exist for specific operations, illumination for cargo transfer operations shall be of a minimum light intensity of five foot-candles (54 lux). Where work tasks require more light to be performed safely, supplemental lighting shall be used.

(b) *Intensity measurement.* The lighting intensity shall be measured at the task/working surface, in the plane in which the task/working surface is present.

(c) *Arrangement of lights.* Lights shall be arranged so that they do not shine into the eyes of winch-drivers, crane operators or hatch tenders. On Ro-Ro ships, stationary lights shall not shine directly into the eyes of drivers.

(d) *Portable lights.* Portable lights shall meet the following requirements:

(1) Portable lights shall be equipped with substantial reflectors and guards to prevent materials from coming into contact with the bulb.

(2) Flexible electric cords used with temporary lights shall be designed by the manufacturer for hard or extra-hard usage. Temporary and portable lights shall not be suspended by their electric cords unless the cords and lights are designed for this means of suspension. Connections and insulation shall be maintained in safe condition.

(3) Electric conductors and fixtures for portable lights shall be so arranged as to be free from contact with drafts, running gear, and other moving equipment.

(4) Portable cargo lights furnished by the employer for use aboard vessels shall be listed as approved for marine use by the U.S. Coast Guard or by a nationally recognized testing laboratory (see § 1910.7).

(e) *Entry into darkened areas.* Employees shall not be permitted to enter dark holds, compartments, decks or other spaces without a flashlight or other portable light. The use of matches or open flames is prohibited.

§ 1918.93 Hazardous atmospheres and substances (See also § 1918.2).

(a) *Purpose and scope.* This section covers areas in which the employer knows, or has reason to believe, that a hazardous atmosphere or substance may exist, except where one or more of the following sections apply: § 1918.94(a), Carbon monoxide; § 1918.94(b), Fumigated grains; § 1918.94(c), Fumigated tobacco; § 1918.94(d), Other fumigated cargoes; § 1918.94(e), Catch of menhaden and similar species of fish.

(b) *Determination of the hazard.* When the employer knows, or has reason to believe, that a space on a vessel contains or has contained a hazardous atmosphere, a designated and appropriately equipped person shall test the atmosphere prior to employee entry to detect whether a hazardous atmosphere exists.

(c) *Testing during ventilation.* When mechanical ventilation is used to maintain a safe atmosphere, tests shall be made by a designated person to ensure that the atmosphere is not hazardous.

(d) *Entry into hazardous atmospheres.* Only designated persons shall enter hazardous atmospheres, in which case the following provisions shall apply:

(1) Persons entering a space containing a hazardous atmosphere shall be protected by respiratory and emergency protective equipment meeting the requirements of subpart J of this part;

(2) Persons entering a space containing a hazardous atmosphere shall be instructed about the hazards, precautions to be taken, and the use of protective and emergency equipment. Standby observers, similarly equipped and instructed, shall continuously monitor the activity of employees within such space;

(3) Except in emergency or rescue operations, employees shall not enter any atmosphere identified as flammable or oxygen-deficient (less than 19.5% oxygen). Persons who may be required to enter flammable or oxygen-deficient atmospheres in emergency operations shall be instructed in the dangers attendant to those atmospheres and be instructed in the use of self-contained breathing apparatus which shall be used for entry.

(4) To prevent inadvertent employee entry into spaces identified as having hazardous, flammable or oxygen-deficient atmospheres, appropriate warning signs or equivalent means shall be posted at all means of access to those spaces.

(e) *Asbestos cargo leak.* When the packaging of asbestos cargo leaks, spillage shall be cleaned up by designated employees protected from the harmful effects of asbestos as required by § 1910.1001 of this chapter.

[11] A ''walking stick'' is two logs bolted or otherwise secured together with two or three planks firmly attached on top that serves as a floating walking and working surface and that is used in the loading of logs onto vessels from the water.

§ 1918.94 Ventilation and atmospheric conditions (See also § 1918.2, definition of Hazardous cargo, materials, substance or atmospheres).

(a) *Ventilation with respect to carbon monoxide.* (1) When internal combustion engines exhaust into a hold, intermediate deck, or any other compartment, the employer shall ensure that the atmosphere is tested as frequently as needed to prevent carbon monoxide (CO) concentrations from exceeding allowable limits. Such tests shall be made in the area in which employees are working by persons competent in the use of the test equipment and procedures. If operations are in a deep tank or refrigerated compartment, the first test shall be made within one half hour of the time the engine starts. To decide the need for further testing, the initial test in all other cargo handling areas shall be taken no later than one hour after the time the engine starts.

(i) The CO content of the atmosphere in a compartment, hold, or any enclosed space shall be maintained at not more than 50 parts per million (ppm) (0.005%) as an eight hour average area level and employees shall be removed from the enclosed space if the CO concentration exceeds a ceiling of 100 ppm (0.01%). Exception: The ceiling shall be 200 ppm (0.02%) instead of 100 ppm (0.01%) for Ro-Ro operations [12]

Note to paragraph (a)(1)(i): The term eight hour average area level means that for any period in which the concentration exceeds 50 parts per million, the concentration shall be maintained for a corresponding period below 50 parts per million.

(ii) When both natural ventilation and the vessel's ventilation system are inadequate to keep the CO concentration within the allowable limits, the employer shall use supplementary means to bring such concentration within allowable limits, as determined by monitoring.

(2) The intakes of portable blowers and any exposed belt drives shall be guarded to prevent injury to employees.

(3) The frames of portable blowers shall be grounded at the source of the current by means of an equipment grounding conductor run with or enclosing the circuit conductors. When the vessel is the source of the current, the equipment grounding conductor shall be bonded to the structure of the vessel. Electric cords shall be free from visible defects.

(b) *Fumigated grains.* (1) Before commencing to handle bulk grain in any compartment of a vessel in which employees will or may be present, the employer shall:

(i) Determine whether the grain has been or will be fumigated at the elevator; and

(ii) Determine whether that compartment, or any cargo within it loaded at a prior berth, has been treated with a fumigant or any other chemical.

(2) If fumigant or chemical treatment has been carried out, or if there is reason to suspect that such treatment has been carried out, it shall be determined by atmospheric testing that the compartment's atmosphere is within allowable limits. (See paragraph (b)(3) of this section.)

(3) A test of the fumigant concentration in the atmosphere of the compartment shall be made after loading begins and before employees enter the compartment. Additional tests shall be made as often as necessary to ensure that hazardous concentrations do not develop.

(i) Tests for fumigant concentration shall be conducted by a designated person, who shall be thoroughly familiar with the characteristics of the fumigant being used, the correct procedure for measurement, the proper measuring equipment to be used, the fumigant manufacturers' recommendations and warnings, and the proper use of personal protective equipment to guard against the specific hazard.

(ii) If the concentration in any compartment reaches the level specified as hazardous by the fumigant manufacturer, or exceeds the permissible exposure limits of part 1910, subpart Z of this chapter, whichever is lower, all employees shall be removed from such compartments and shall not be permitted to reenter until tests prove that the atmosphere is within allowable limits.

(iii) No employee shall be permitted to enter any compartment in which grain fumigation has been carried out, or any compartment immediately next to such a compartment, until it has been determined by testing that the atmosphere in the compartment to be entered is within allowable limits for entry.

(iv) In the event a compartment containing a hazardous or unknown concentration of fumigants must be entered for testing of the atmosphere, or for emergency purposes, each employee entering shall be protected by respiratory protective equipment following the provisions of § 1918.102, and by any protective clothing and other personal protective equipment recommended by the fumigant manufacturer for protection against the particular hazard. At least two other employees shall be stationed outside the compartment as observers, to provide rescue services in case of emergency. The observers shall be equipped with similar personal protective equipment.

(v) One or more employees on duty shall be equipped and trained to provide any specific emergency medical treatment stipulated for the particular fumigant.

(vi) Emergency equipment required by this paragraph shall be readily accessible wherever fumigated grains are being handled.

(4) If a compartment is treated for local infestation before loading grain by a chemical other than a fumigant, the employee applying the treatment, and any other employees entering the compartment, shall be provided with and required to use any personal protective equipment recommended by the manufacturer of the product to protect them against the effects of exposure.

(c) *Fumigated tobacco.* The employer shall not load break-bulk tobacco until the carrier has provided written notification about whether or not the cargo has been fumigated. If break-bulk tobacco cargo has been treated with any toxic fumigant, loading shall not commence until a written warranty has been received from the fumigation facility that the aeration of the cargo has been such as to reduce the concentration of the fumigant to within the level specified as hazardous by the fumigant manufacturer, or does not exceed the permissible exposure limits of part 1910, subpart Z of this chapter, whichever is lower. Such notification and warranty shall be maintained for at least 30 days after the loading of the tobacco has been completed, and shall be available for inspection.

(d) *Other fumigated cargoes.* Before commencing to load or discharge fumigated cargo other than the cargo specifically addressed in paragraphs (b) and (c) of this section, the employer shall determine that the concentration of fumigants is within the level specified as hazardous by the fumigant manufacturer, or does not exceed the permissible exposure limits of part 1910, subpart Z of this chapter, whichever is lower.

(e) *Grain dust.* When employees are exposed to concentrations of grain dust greater than the allowable limit found in subpart Z of part 1910 of this chapter, they shall be protected by suitable respiratory protective equipment as required by § 1918.102.

(f) *Catch of menhaden and similar species of fish.* (1) The provisions of this

[12] Ro-Ro operations occur only on Ro-Ro vessels which are vessels whose cargo is driven on or off the vessel by way of ramps and moved within the vessel by way of ramps and/or elevators.

paragraph shall not apply to vessels having and utilizing refrigerated holds for the carriage of all cargo.

(2) After a vessel has arrived at berth for discharge of menhaden, but before personnel enter the hold, and as frequently thereafter as tests show to be necessary, tests shall be made of the atmosphere in the vessel's hold to ensure a safe work space. The tests shall be done for the presence of hydrogen sulfide and for oxygen deficiency.

(3) Tests required by paragraph (f)(2) of this section shall be made by designated supervisory personnel, trained and competent in the nature of hazards and the use of test equipment and procedures.

(4) Before employees enter a hold it shall be tested for hydrogen sulfide and oxygen deficiency. Employees shall not enter the hold when the hydrogen sulfide level exceeds 20 ppm ceiling or when the oxygen content is less than 19.5 percent, except in emergencies.

§ 1918.95 Sanitation.

(a) *Washing and toilet facilities.* (1) Accessible washing and toilet facilities sufficient for the sanitary requirements of employees shall be readily accessible at the worksite. The facilities shall have:

(i) Running water, including hot and cold or tepid water, at a minimum of one accessible location (when longshoring operations are conducted at locations without permanent facilities, potable water may be provided instead of running water);

(ii) Soap;

(iii) Individual hand towels, clean individual sections of continuous toweling, or warm air blowers; and

(iv) Fixed or portable toilets in separate compartments with latch-equipped doors. Separate toilet facilities shall be provided for male and female employees unless toilet rooms will be occupied by only one person at a time.

(2) Washing and toilet facilities shall be regularly cleaned and maintained in good order.

(b) *Drinking water.* (1) Potable drinking water shall be accessible to employees at all times.

(2) Potable drinking water containers shall be clean, containing only water and ice, and shall be fitted with covers.

(3) Common drinking cups are prohibited.

(c) *Prohibited eating areas.* Consumption of food or beverages in areas where hazardous materials are stowed or being handled is prohibited.

(d) *Garbage and overboard discharges.* Work shall not be conducted close to uncovered garbage or in the way of overboard discharges from the vessel's sanitary lines unless employees are protected from the garbage or discharge by a baffle or splash boards.

§ 1918.96 Maintenance and repair work in the vicinity of longshoring operations.

(a) *Noise interference* (See also § 1918.1(b)(6).) Longshoring operations shall not be carried on when noise interferes with communications of warnings or instructions.

(b) *Falling objects.* Longshoring operations shall not be carried on in the hold or on deck beneath work being conducted overhead whenever such work exposes the employee to a hazard of falling objects.

(c) *Hot work.* Longshoring operations shall not be carried on where the employee is exposed to damaging light rays, hot metal, or sparks from welding or cutting.

(d) *Abrasive blasting and spray painting.* Longshoring operations shall not be carried on in the immediate vicinity of abrasive blasting or spray painting operations.

(e) *Machine guarding.* (See also § 1918.2, definition of ''Danger zone''.)

(1) Danger zones on machines and equipment used by employees shall be guarded.

(2) The power supply to machines shall be turned off, locked out, and tagged out during repair, adjustment, or servicing.

§ 1918.97 First aid and lifesaving facilities. (See Appendix V of this part).

(a) *Injury reporting.* The employer shall require each employee to report every work-related injury, regardless of severity, to the employer.

(b) *First aid.* A first aid kit shall be available at or near each vessel being worked. At least one person holding a valid first aid certificate, such as is issued by the Red Cross or other equivalent organization, shall be available to render first aid when work is in progress.

(c) *First aid kits.* First aid kits shall be weatherproof and shall contain individual sealed packages for each item that must be kept sterile. The contents of each kit shall be determined by a person certified in first aid and cognizant of the hazards found in marine cargo handling operations. The contents shall be checked at intervals that allow prompt replacement of expended items.

(d) *Stretchers.* (1) For each vessel being worked, at least one Stokes basket stretcher, or its equivalent, shall be available to be permanently equipped with bridles for attachment to the hoisting gear.

(2) Stretchers shall be kept close to vessels and shall be positioned to avoid damage to the stretcher.

(3) A blanket or other suitable covering shall be available.

(4) Stretchers shall have at least four sets of effective patient restraints in operable condition.

(5) Lifting bridles shall be of adequate strength, capable of lifting 1,000 pounds (454 kg) with a safety factor of five (lifting capability of 5,000 pounds), and shall be maintained in operable condition. Lifting bridles shall be provided for making vertical patient lifts at container berths. Stretchers for vertical lifts shall have foot plates.

(6) Stretchers shall be maintained in operable condition. Struts and braces shall be inspected for damage. Wire mesh shall be secured and have no burrs. Damaged stretchers shall not be used until repaired.

(7) Stretchers in permanent locations shall be mounted to prevent damage and be protected from the elements if located out-of-doors. If concealed from view, enclosures shall be marked to indicate the location of the lifesaving equipment.

(e) *Life-rings.* (1) The employer shall ensure that there is in the vicinity of each vessel being worked at least one U.S. Coast Guard approved 30-inch (76.2 cm) life-ring with no less than 90 feet (27.4 m) of line attached, and at least one portable or permanent ladder that will reach from the top of the apron to the surface of the water.

(2) In addition, when working a barge, scow, raft, lighter, log boom, or carfloat alongside a ship, a U.S. Coast Guard approved 30-inch (76.2 cm) life-ring, with no less than 90 feet (27.4 m) of line shall be provided either on the floating unit itself or aboard the ship in the immediate vicinity of each floating unit being worked.

(f) *Communication.* Telephone or equivalent means of communication shall be readily available at the worksite.

§ 1918.98 Qualifications of machinery operators and supervisory training.

(a) *Qualification of machinery operators.* (1) Only an employee determined by the employer to be competent by reason of training or experience, and who understands the signs, notices and operating instructions and is familiar with the signal code in use, shall be permitted to operate a crane, winch, or other power-operated cargo handling apparatus, or any power-operated vehicle, or give signals to the operator of any hoisting apparatus. However, an employee being trained and supervised by a designated person may operate such machinery and give signals to operators during training.

(2) No employee known to have defective uncorrected eyesight or hearing, or to be suffering from heart disease, epilepsy, or similar ailments that may suddenly incapacitate the employee, shall be permitted to operate a crane, winch or other power-operated cargo handling apparatus or a power-operated vehicle.

Note to paragraph (a)(2): OSHA is defining suddenly incapacitating medical ailments consistent with the Americans with Disabilities Act (ADA), 42 U.S.C. 12101 (1990). Therefore, employers who act in accordance with the employment provisions (Title I) of the ADA (42 U.S.C. 12111–12117), the regulations implementing Title I (29 CFR part 1630), and the Technical Assistance Manual for Title I issued by the Equal Employment Opportunity Commission (Publication number: EEOC–M1A), will be considered as being in compliance with this paragraph.

(b) *Supervisory accident prevention proficiency.* (1) By July 16, 1999, each immediate supervisor of a cargo handling operation of more than five persons shall satisfactorily complete a course in accident prevention.

(2) Each employee newly assigned to supervisory duties after that date shall be required to meet the provisions of this paragraph within 90 days of such assignment.

(3) The accident prevention course shall consist of instruction suited to the particular operations involved.[13]

§ 1918.99 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's Hazardous Materials Regulations (49 CFR parts 171 through 180) shall retain those markings, labels and placards on the package until the packaging is sufficiently cleaned of residues and purged of vapors to remove any potential hazards.

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

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

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

(e) For the purposes of this section, the term ''hazardous material'' has the same definition as in the Hazardous Materials Regulations (49 CFR parts 171 through 180).

§ 1918.100 Emergency action plans.

(a) *Scope and application.* This section requires all employers to develop and implement an emergency action plan.[14] The emergency action plan shall be in writing (except as provided in the last sentence of paragraph (e)(iii) of this section) and shall cover those designated actions employers and employees must take to ensure employee safety from fire and other emergencies.

(b) *Elements.* The following elements, at a minimum, shall be included in the plan:

(1) Emergency escape procedures and emergency escape route assignments;

(2) Procedures to be followed by employees who remain to operate critical operations before they evacuate;

(3) Procedures to account for all employees after emergency evacuation has been completed;

(4) Rescue and medical duties for those employees who are to perform them;

(5) The preferred means of reporting fires and other emergencies; and

(6) Names or regular job titles of persons or departments that can be contacted for further information or explanation of duties under the plan.

(c) *Alarm system.* The employer shall establish an employee alarm system that provides warning for necessary emergency action or for reaction time for safe escape of employees from the workplace or the immediate work area, or both.

(d) *Evacuation.* The employer shall establish the types of evacuation to be used in emergency circumstances.

(e) *Training.* (1) Before implementing the emergency action plan, the employer shall designate and train a sufficient number of persons to assist in the safe and orderly emergency evacuation of employees.

(2) The employer shall review the plan with each employee covered by the plan at the following times:

(i) Initially when the plan is developed;

(ii) Whenever the employee's responsibilities or designated actions under the plan change; and

(iii) Whenever the plan is changed.

(3) The employer shall review with each employee upon initial assignment those parts of the plan that the employee must know to protect the employee in the event of an emergency. The written plan shall be kept at the workplace and made available for employee review. Employers with 10 or fewer employees may communicate the plan orally to employees and need not maintain a written plan.

Subpart J—Personal Protective Equipment

§ 1918.101 Eye and face protection.

(a) The employer shall ensure that:

(1) Each affected employee uses appropriate eye and/or face protection where there are exposures to eye and/or face hazards. Such equipment shall comply with American National Standards Institute, ANSI Z–87.1–1989, ''Practice for Occupational and Educational Eye and Face Protection.''

(2) For an employee wearing corrective glasses, eye protection equipment required by paragraph (a)(1) of this section shall be of the type that can be worn over glasses. Prescription-ground safety lenses may be substituted if they provide equivalent protection.

(b) Eye protection shall be maintained in good condition.

(c) Used eye protection shall be cleaned and disinfected before issuance to another employee.

§ 1918.102 Respiratory protection.

See § 1918.1(b)(12).

§ 1918.103 Head protection.

(a) 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.

(b) Such equipment shall comply with American National Standards Institute, ANSI Z–89.1–1986, ''Personnel Protection-Protective Headwear for Industrial Workers-Requirements.''

(c) Previously worn protective hats shall be cleaned and disinfected before issuance by the employer to another employee.

[13] The following are recommended topics: Safety responsibility and authority; elements of accidents prevention; attitudes, leadership and motivation; hazards of longshoring, including peculiar local circumstances; hazard identification and elimination; applicable regulations; and accident investigations.

[14] When an employer directs his employees to respond to an emergency that is beyond the scope of the Emergency Action Plan developed in accordance with this section § 1910.120(q) shall apply.

§ 1918.104 Foot protection.

(a) 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) Such equipment shall comply with American National Standards Institute, ANSI Z–41–1991, ''American National Standard for Personal Protection-Protective Footwear.''

§ 1918.105 Other protective measures.

(a) *Protective clothing.* (1) The employer shall provide and shall require the wearing of special protective clothing for each employee engaged in work where protective clothing is necessary.

(2) When necessary, protective clothing shall be cleaned and disinfected before reissuance.

(b) *Personal flotation devices (PFDs).* (1) The employer shall provide and shall require the wearing of PFDs for each employee engaged in work in which the employee might fall into the water.

(2) PFDs (life preservers, life jackets, and work vests) worn by each affected employee shall be any United States Coast Guard (USCG) approved and marked Type I PFD, Type II PFD or Type III PFD; or shall be a USCG approved Type V PFD that is marked for use as a work vest, for commercial use, or for use on vessels. USCG approval is pursuant to 46 CFR part 160, Coast Guard Lifesaving Equipment Specifications.

(3) Personal flotation devices shall be maintained in safe condition and shall be considered unserviceable when damaged in a manner that affects buoyancy or fastening capability.

Appendix I to Part 1918—Cargo Gear Register and Certificates (Non-mandatory)

Note: This Appendix is non-mandatory and provides guidance to part 1918 to assist employers and employees in complying with the requirements of this standard, as well as to provide other helpful information. Nothing in this Appendix adds or detracts from any of the requirements of this standard. The language in this appendix is taken directly from the recommended ILO document.

Form No. 1

Identity of National Authority or Competent Organization

Register of Ships' Lifting Appliances and Cargo Handling Gear

Name of Ship _____

Official Number _____

Call Sign _____

Port of Registry _____

Name of Owner _____

Register Number _____

Date of Issue _____

Issued by _____

Signature and Stamp _____

Note: This register is the standard international form as recommended by the International Labour Office in accordance with the ILO Convention No. 152.

General

The tests, examinations and inspections indicated in this register are based on the requirements of ILO Convention 152 and Recommendation 160. They are intended to ensure that ships having lifting appliances are initially certified by a competent person, and to establish periodically that they continue to be in safe working order to the satisfaction of a competent person acceptable to a competent authority. A Register of lifting appliances and items of loose gear shall be kept in a form prescribed by the competent authority, account being taken of this model recommended by the International Labour Office. This Register and related certificates shall be kept available to any person authorized by the competent authority. The Register and certificates for gear currently aboard the ship shall be preserved for at least five years after the date of the last entry.

Instruction

1. Initial Examination and Certification

1.1. Every lifting appliance shall be certified by a competent person before being taken into use for the first time to ensure that it is of good design and construction and of adequate strength for the purpose for which it is intended.

1.2. Before being taken into use for the first time, a competent person shall supervise and witness testing, and shall thoroughly examine every lifting appliance.

1.3. Every item of loose gear shall, before being taken into use for the first time, shall be tested, thoroughly examined and certified by a competent person, in accordance with national law or regulations.

1.4. Upon satisfactory completion of the procedures indicated above, the competent person shall complete and issue the Register of lifting appliances and attach the appropriate certificates. An entry shall be made in part I of the Register.

1.5. A rigging plan showing the arrangement of lifting appliances shall be provided. In the case of derricks and derrick cranes, the rigging should show at least the following information:

(a) The position of guys;

(b) The resultant force on blocks, guys, wire ropes and booms;

(c) The position of blocks;

(d) The identification mark of individual items; and

(e) Arrangements and working range of union purchase.

2. Periodic Examination and Re-testing

2.1. All lifting appliances and every item of loose gear shall be thoroughly examined by a competent person at least once in every twelve months. The particulars of these thorough examinations shall be entered in part I of the Register.

2.2. Re-testing and thorough examination of all lifting appliances and every item of loose gear is to be carried out:

(a) after any substantial alteration or renewal, or after repair to any stress bearing part, and

(b) in the case of lifting appliances, at least once in every five years.

2.3. The retesting referred to in paragraph 2.2(a) may be omitted provided the part which has been renewed or repaired is subjected by separate test, to the same stress as would be imposed on it if it had been tested in-situ during the testing of the lifting appliance.

2.4. The thorough examinations and tests referred to in paragraph 2.2. are to be entered in part I of the Register.

2.5. No new item of loose gear shall be manufactured of wrought iron. Heat treatment of any existing wrought iron components should be carried out to the satisfaction of the competent person. No heat treatment should be applied to any item of loose gear unless the treatment is in accordance with the manufacturer's instruction; and to the satisfaction of the competent person. Any heat treatment and the associated examination are to be recorded by the competent person in part I of the Register.

3. Inspections

3.1. Regular visual inspections of every item of loose gear shall be carried out by a responsible person before use. A record of these regular inspections is to be entered in part II of the Register, but entries need only be made when the inspection has indicated a defect in the item.

4. Certificates

4.1. The certification forms to be used in conjunction with this Register (Form No. 1) are as follows:

(Form No. 2)—Certificate of test and thorough examination of lifting appliance.

(Form No. 2(U))—Certificate of test and thorough examination of derricks used in union purchase.

(Form No. 3)—Certificate of test and thorough examination of loose gear.

(Form No. 4)—Certificate of test and thorough examination of wire rope.

Definitions

(a) The term ''competent authority'' means a minister, government department, or other authority empowered to issue regulations, orders or other instructions having the force of law.

(b) The term ''competent person'' means a person appointed by the master of the ship or the owner of the gear to be responsible for the performance of inspections and who has sufficient knowledge and experience to undertake such inspections.

(c) The term ''thorough examination'' means a detailed visual examination by a competent person, supplemented if necessary by other suitable means or measures in order to arrive at a reliable conclusion as to the safety of the lifting appliance or item of loose gear examined.

(d) The term ''lifting appliance'' covers all stationary or mobile cargo handling appliances used on board ship for

suspending, raising or lowering loads or moving them from one position to another while suspended or supported.

(e) The term ''loose gear'' covers any gear by means of which a load can be attached to a lifting appliance, but which does not form an integral part of the appliance or load.

THE FOLLOWING ARE SAMPLE FORMS OF CERTIFICATES AS RECOMMENDED BY THE ILO

[Part I—Thorough Examination of Lifting Appliances and Loose Gear]

Situation and description of lifting appliances and loose gear (with distinguishing numbers or marks, if any) which have been thoroughly examined. (See note 1)	Certificate Nos.	Examination performed (see note 2)	I certify that on the date to which I have appended my signature, the gear shown in col. (1) was thoroughly examined and no defects affecting its safe working condition were found other than those shown in col. (5) (date and signature)	Remarks (to be dated and signed)
(1)	(2)	(3)	(4)	(5)
	.....	.....	.....	
	.....	.....	.....	
	.....	.....	.....	

NOTE 1: If all the lifting appliances are thoroughly examined on the same date it will be sufficient to enter in Col. (1) ''All lifting appliances and loose gear''. If not, the parts that have been thoroughly examined on the dates stated must be clearly indicated.

NOTE 2: The thorough examinations to be indicated in Col. (3) include:

(a) Initial.
(b) 12 monthly.
(c) 5 yearly.
(d) Repair/Damage.
(e) Other thorough examinations.

[Part II—Regular Inspections of Loose Gear]

Situation and description of loose gear (with distinguishing numbers or marks, if any) that has been inspected. (See note 1)	Signature and date of the responsible person carrying out the inspection	Remarks (to be dated and signed)

NOTE 1: All loose gear should be inspected before use. However, entries need only be made when the inspection discloses a defect.

Form No. 2

Identity of National Authority or Competent Organization

Certificate of Test and Thorough Examination of Lifting Appliances

Name of Ship _____

Official Number _____
Call Sign _____
Port of Registry _____
Name of Owner _____
Certificate No. _____

Situation and description of lifting appliances (with distinguishing numbers or marks, if any) which have been tested and thoroughly examined	Angle to the horizontal or radius at which test load applied	Test load (tonnes)	Safe working load at angle or radius shown in col. 2 (tonnes)
(1)	(2)	(3)	(4)

Name and address of the firm or competent person who witnessed testing and carried out thorough examination.

I certify that on the date to which I have appended my signature, the gear shown in Col. (1) was tested and thoroughly examined and no defects or permanent deformation was found and that the safe working load is as shown.

Date: _____
Place: _____
Signature: _____

Note: This certificate is the standard international form as recommended by the International Labor Office in accordance with ILO Convention No. 152.

Reverse of Form No. 2

Instructions

1. Every lifting appliance shall be tested with a test load which shall exceed the Safe Working Load (SWL) as follows:

SWL	Test load
Up to 20 tonnes	25 percent in excess.
20 to 50 tonnes	5 tonnes in excess.
Over 50 tonnes	10 percent in excess.

2. In the case of derrick systems, the test load shall be lifted with the ship's normal tackle with the derrick at the minimum angle to the horizontal for which the derrick system was designed (generally 15 degrees), or at such greater angle as may be agreed. The angle at which the test was made should be stated in the certificate.

2.1. The SWL shown is applicable to swinging derrick systems only. When derricks are used in union purchase, the SWL (U) is to be shown on Form 2 (U).

2.2. In the case of heavy derricks, care should be taken to ensure that the appropriate stays are correctly rigged.

3. In the case of cranes, the test load is to be hoisted and luffed at slow speed. Gantry and traveling cranes together with their trolleys, where appropriate, are to be traversed and traveled over the full length of their track.

3.1. In the case of variable load-radius cranes, the tests are generally to be carried out with the appropriate test load at maximum, minimum and intermediate radii.

3.2. In the case of hydraulic cranes where limitations of pressure make it impossible to lift a test load 25 percent in excess of the safe working load, it will be sufficient to lift the greatest possible load, but in general this should not be less than 10 percent in excess of the safe working load.

4. As a general rule, tests should be carried out using test loads, and no exception should be allowed in the case of initial tests. In the case of repairs/replacement or when the periodic examination calls for re-test, consideration may be given to the use of spring or hydraulic balances provided the SWL of the lifting appliance does not exceed 15 tonnes. Where a spring or hydraulic balance is used, it shall be calibrated and accurate to within ±2 percent and the indicator should remain constant for five minutes.

4.1. If the test weights are not used, this is to be indicated in Col. (3).

5. The expression ''tonne'' shall mean a tonne of 1000 kg.

6. The terms ''competent person'', ''thorough examination'', and ''lifting appliance'' are defined in Form No. 1.

Note: For recommendations on test procedures reference may be made to the ILO document ''Safety and Health in Dock Work''.

Form No. 2(U)

Identity of National Authority or Competent Organization

Certificate of Test and Thorough Examination of Derricks Used in Union Purchase

Name of Ship _____

Official Number _____

Call Sign _____

Port of Registry _____

Name of Owner _____

Certificate No. _____

Situation and description of derricks used in Union Purchase (with distinguishing numbers or marks) which have been tested and thoroughly examined	Max. height of triangle plate above hatch coaming (m) or max. angle between runners	Test load (tonnes)	Safe working load, SWL when operating in union purchase (tonnes)
(1)	(2)	(3)	(4)

Position of outboard preventer guy attachments:
(a) forward/aft * of mast—(m) and
(b) from ship's centerline—(m)
Position of inboard preventer guy attachments:
(a) forward/aft * of mast—(m) and
(b) from ship's centerline—(m)

* Delete as appropriate.

Name and address of the firm or competent person who witnessed testing and carried out thorough examination

_____

_____

I certify that on the date to which I have appended my signature, the gear shown in Col. (1) was tested and thoroughly examined and no defects or permanent deformation was found and that the safe working load is as shown.

Date: _____

Signature: _____

Place: _____

Note: This certificate is the standard international form as recommended by the International Labour Office in accordance with ILO Convention No. 152.

Reverse Form No. 2 (U)

Instructions

1. Before being taken into use, the derricks rigged in Union Purchase shall be tested with a test load which shall exceed the Safe Working Load (SWL (U)) as follows:

SWL	Test load
Up to 20 tonnes	25 percent in excess.
20 to 50 tonnes	5 tonnes in excess.
Over 50 tonnes	10 percent in excess.

2. Tests are to be carried out at the approved maximum height of the triangle plate above the hatch coaming or at the angle between the cargo runners and with the derrick booms in their working positions, to prove the strength of deck eye plates and the Union Purchase system. These heights or angles must not exceed the values shown on the rigging plan.

3. Tests should be carried out using test loads.

4. The expression ''tonne'' shall mean a tonne of 1000 kg.

5. The terms ''competent person'', ''thorough examination'' and ''lifting appliance'' are defined in Form No. 1.

Note: For recommendations on test procedures, reference may be made to the ILO document ''Safety and Health in Dock Work''.

Form 3

Identity of National Authority or Competent Organization

Certificate of Test and Thorough Examination of Loose Gear

Name of Ship _____

Official Number _____

Call Sign _____

Port of Registry _____

Name of Owner _____

Certificate No. _____

Distinguishing number or mark	Description of loose gear	Number tested	Date of test	Test load (tonnes)	Safe work load (SWL) (tonnes)

Name and address of makers or suppliers:

Name and address of the firm or competent person who witnessed testing and carried out thorough examination.

I certify that the above items of loose gear were tested and thoroughly examined and no defects affecting their SWL were found.

Date: _____

Place: _____

Signature: _____

Note: This certificate is the standard international form as recommended by the International Labour Office in accordance with ILO Convention No. 152.

Reverse Form No. 3

Instructions

1. Every item of loose gear is to be tested and thoroughly examined before being put into use for the first time and after any substantial alteration or repair to any part liable to affect its safety. The test loads to be applied shall be in accordance with the following table:

Item	Test load (tonnes)
Single sheave blocks (See Note 1)	4 × SWL
Multi sheave blocks (See Note 2):	
SWL < 25 tonnes	2 × SWL
25 tonnes < SWL ≤ 160 tonnes	(0.933 × SWL) + 27
SWL > 160 tonnes	1.1 × SWL
Chains, hooks, rings, shackles, swivels, etc.:	
SWL < 25 tonnes	2 × SWL
SWL > 25 tonnes	(1.22 × SWL) + 20
Lifting beams, spreaders, frames and similar devices:	
SWL ≤ 10 tonnes	2 × SWL
10 tonnes < SWL ≤ 160 tonnes	(1.04 × SWL) + 9.6
SWL > 160 tonnes	1.1 × SWL

Note: 1. The SWL for a single sheave block, including single sheave blocks with beckets, is to be taken as one-half of the resultant load on the head fitting.

2. The SWL of a multi-sheave block is to be taken as the resultant load on the head fitting.

3. This form may also be used for the certification of interchangeable components of lifting appliances.

4. The expression ''ton'' shall mean a ton of 1,000 kg.

5. The terms ''competent person'', ''thorough examination'' and ''loose gear'' are defined in Form No. 1.

Note: For recommendations on test procedures reference may be made to the ILO document ''Safety and Health in Dock Work''.

Form No. 4

Identity of National Authority or Competent Organization

Certificate of Test and Thorough Examination of Wire Rope

Name of Ship _____

Official Number _____

Call Sign _____

Port of Registry _____

Name of Owner _____

Certificate No. _____

Name and address of maker or supplier	
Nominal diameter of rope (mm) Number of strands Number of wires per strand Core Lay Quality of wire (N/mm^2) Date of test of sample Load at which sample broke (tonnes) Safe working load of rope (tonnes) Intended use	

Name and address of the firm or competent person who witnessed testing and carried out thorough examination.

I certify that the above particulars are correct, and that the rope was tested and thoroughly examined and no defects affecting its SWL were found.

Date: _____

Place: _____

Signature: _____

Note: This certificate is the standard international form as recommended by the International Labour Office in accordance with ILO Convention No. 152.

Reverse Form No. 4

Instructions

1. Wire rope shall be tested by sample, a piece being tested to destruction.

2. The test procedure should be in accordance with an International or recognized National standard.

3. The SWL of the rope is to be determined by dividing the load at which the sample broke, by a co-efficient of utilization, determined as follows:

Item	Coefficient
Wire rope forming part of a sling:	
SWL of the sling	5
SWL < 10 tonnes	10[5]
10 tonnes < SWL ≤ 160 tonnes	(8.85 × SWL) + 1910
SWL > 160 tonnes	3
Wire rope as integral part of a lifting appliance:	
SWL of lifting appliance	10[4]
SWL ≤ 160 tonnes	(8.85 × SWL) + 1910
SWL > 160 tonnes	3

These coefficients should be adopted unless other requirements are specified by a National Authority.

4. The expression ''tonne'' shall mean a tonne of 1000 kg.

5. The terms ''competent person'', ''thorough examination'' and ''lifting appliance'' are defined in Form No. 1.

Note: For recommendations on test procedures reference may be made to the ILO document ''Safety and Health in Dock Work''.

Appendix II to Part 1918—Tables for Selected Miscellaneous Auxiliary Gear (Mandatory)

Note: This Appendix is mandatory and is to be used in the appropriate sections of part 1918 when certificates or the manufacturers' use recommendations are not available.

TABLE 1.—WIRE ROPE CLIPS

Improved plow steel, rope	Minimum number of clips		Minimum spacing
Inches (cm)	Drop forged	Other material	Inches (cm)
½ or less (1.3)	3	4	3 (7.6)
⅝ (1.6)	3	4	3¾ (9.5)
¾ (1.9)	4	5	4½ (11.4)
⅞ (2.2)	4	5	5¼ (13.3)
1 (2.5)	5	6	6 (15.2)
1⅛ (2.7)	6	6	6¾ (17.1)
1¼ (3.2)	6	7	7½ (18.1)
1⅜ (3.5)	7	7	8½ (21.0)
1½ (3.8)	7	8	9 (22.9)

TABLE 2

Natural Fiber Rope and Rope Slings

Load Capacity in Pounds (lbs.) Safety Factor=5

Eye and Eye Sling

Basket Hitch

Angle of rope to horizontal
90 deg. 60 deg. 45 deg. 30 deg.

Rope diameter nominal in.	Vertical hitch	Choker hitch	Angle of rope to vertical			
			0 deg.	30 deg.	45 deg.	60 deg.
½	550	250	1,100	900	750	550
9/16	700	350	1,400	1,200	1,000	700
⅝	900	450	1,800	1,500	1,200	900
¾	1,100	550	2,200	1,900	1,500	1,100
13/16	1,300	650	2,600	2,300	1,800	1,300
⅞	1,500	750	3,100	2,700	2,200	1,500
1	1,800	900	3,600	3,100	2,600	1,800
1 1/16	2,100	1,100	4,200	3,600	3,000	2,100
1⅛	2,400	1,200	4,800	4,200	3,400	2,400
1¼	2,700	1,400	5,400	4,700	3,800	2,700
1 5/16	3,000	1,500	6,000	5,200	4,300	3,000
1½	3,700	1,850	7,400	6,400	5,200	3,700
1⅝	4,500	2,300	9,000	7,800	6,400	4,500
1¾	5,300	2,700	10,500	9,200	7,500	5,300

Rope diameter nominal in.	Vertical hitch	Choker hitch	Angle of rope to vertical			
			0 deg.	30 deg.	45 deg.	60 deg.
2	6,200	3,100	12,500	10,500	8,800	6,200
2⅓	7,200	3,600	14,500	12,500	10,000	7,200
2¼	8,200	4,100	16,500	14,000	11,500	8,200
2½	9,300	4,700	18,500	16,000	13,000	9,300
2⅝	10,500	5,200	21,000	18,000	14,500	10,500
Endless Sling						
½	950	500	1,900	1,700	1,400	950
9/16	1,200	600	2,500	2,200	1,800	1,200
⅝	1,600	800	3,200	2,700	2,200	1,600
¾	2,000	950	3,900	3,400	2,800	2,000
13/16	2,300	1,200	4,700	4,100	3,300	2,300
⅞	2,800	1,400	5,600	4,800	3,900	2,800
1	3,200	1,600	6,500	5,600	4,600	3,300
1 1/16	3,800	1,900	7,600	6,600	5,400	3,800
1⅛	4,300	2,200	8,600	8,600	6,100	4,300
1¼	4,900	2,400	9,700	8,400	6,900	4,900
1 5/16	5,400	2,700	11,000	9,400	7,700	5,400
1½	6,700	3,300	13,500	11,500	9,400	6,700
1⅝	8,100	4,100	16,000	14,000	11,500	8,000
1¾	9,500	4,800	19,000	16,500	13,500	9,500
2	11,000	5,600	22,500	19,500	16,000	11,000
2⅓	13,000	6,500	26,000	22,500	18,500	13,000
2¼	15,000	7,400	29,500	25,500	21,000	15,000
2½	16,500	8,400	33,500	29,000	23,500	16,500
2⅝	18,500	9,500	37,000	32,500	26,500	18,500

TABLE 3A

Polypropylene Rope and Rope Slings

Load Capacity in Pounds (lbs.) Safety Factor=6

Eye and Eye Sling

Basket Hitch

Angle of rope to horizontal

Rope diameter nominal in.	Vertical hitch	Choker hitch	Angle of rope to vertical			
			0 deg.	30 deg.	45 deg.	60 deg.
½	650	350	1,300	1,200	950	650
9/16	800	400	1,600	1,400	1,100	800
⅝	1,000	500	2,000	1,700	1,400	1,000
¾	1,300	700	2,700	2,300	1,900	1,300
13/16	1,600	800	2,600	2,300	2,200	1,600
⅞	1,800	900	3,100	2,700	2,600	1,800
1	2,200	1,100	3,600	3,100	3,100	2,200
1 1/16	2,500	1,300	4,200	3,600	3,600	2,500
1⅛	2,900	1,500	4,800	4,200	4,100	2,900
1¼	3,300	1,700	6,700	5,800	4,700	3,300
1 5/16	3,700	1,900	7,400	6,400	5,300	3,700
1½	4,700	2,400	9,400	8,100	6,700	4,700
1⅝	5,700	2,900	11,500	9,900	8,100	5,700
1¾	6,800	3,400	13,500	12,000	9,600	6,800
2	8,200	4,100	16,500	14,500	11,500	8,200
2⅛	9,700	4,800	19,500	16,500	13,500	9,700
2¼	11,000	5,500	22,000	19,000	15,500	11,000
2½	12,500	6,300	25,500	22,000	18,000	12,500
2⅝	14,500	7,100	28,500	24,500	20,000	14,500

TABLE 3B

Polypropylene Rope and Rope Slings

Load Capacity in Pounds (lbs.) Safety Factor = 6

TABLE 3B—Continued

Endless Sling						
Basket Hitch						
Angle of rope to horizontal 90 deg. 60 deg. 45 deg. 30 deg.						
Rope diameter nominal in.	Vertical hitch	Choker hitch	Angle of rope to vertical			
			0 deg.	30 deg.	45 deg.	60 deg.
1/2	1,200	600	2,400	2,100	1,700	1,200
9/16	1,500	750	2,900	2,500	2,100	1,500
5/8	1,800	900	3,500	3,100	2,500	1,800
3/4	2,400	1,200	4,900	4,200	3,400	2,400
13/16	2,800	1,400	5,600	4,900	4,000	2,800
7/8	3,300	1,600	6,600	5,700	4,600	3,300
1	4,000	2,000	8,000	6,900	5,600	4,000
1 1/16	4,600	2,300	9,100	7,900	6,500	4,600
1 1/8	5,200	2,600	10,500	9,000	7,400	5,200
1 1/4	6,000	3,000	12,000	10,500	8,500	6,000
1 5/16	6,700	3,400	13,500	11,500	9,500	6,700
1 1/2	8,500	4,200	17,000	14,500	12,000	8,500
1 5/8	10,500	5,100	20,500	18,000	14,500	10,500
1 3/4	12,500	6,100	24,500	21,000	17,500	12,500
2	15,000	7,400	29,500	25,500	21,000	15,000
2 1/8	17,500	8,700	35,500	30,100	24,500	17,500
2 1/4	19,500	9,900	39,500	34,000	28,000	19,500
2 1/2	23,000	11,500	45,500	39,500	32,500	23,000
2 5/8	25,500	13,000	51,500	44,500	36,500	25,500

TABLE 4 A.—RATED LOAD FOR GRADE 80 ALLOY STEEL CHAIN SLINGS [1] (CHAIN PER NACM)

Chain size nominal		Single leg sling—90 deg. to horizontal loading		Rated load double leg sling horizontal angle (note 2)					
				60 deg.		45 deg.		39 deg.	
in.	mm	lb	kg	Double at 60 deg.		Double at 45 deg.		Double at 30 deg.	
				lb	kg	lb	kg	lb	kg
8/32	7	3,500	1570	6,100	2,700	4,900	2,200	3,500	1,590
2/8	10	7,100	3200	12,300	5,500	10,000	4,500	7,100	3,200
1/2	13	12,000	5400	20,800	9,400	17,000	7,600	1,200	5,400
5/8	16	18,000	8200	31,300	14,200	25,600	11,600	18,100	8,200
3/4	20	28,300	12800	49,000	22,300	40,000	18,200	28,300	12,900
7/8	22	34,200	15500	59,200	27,200	48,400	22,200	34,200	15,700
1	26	47,700	21600	82,600	37,900	67,400	31,000	47,700	21,900
1 1/4	32	72,300	32800	125,200	56,800	102,200	46,400	72,300	32,800

NOTES:
(1) Other grades of proof tested steel chain include Proof Coil (Grade 28), Hi-Test (Grade 43 Chain, and Transport (Grade 70) Chain. These grades are not recommended for overhead lifting and therefore are not covered by this Standard.
(2) Rating of multi-leg slings adjusted for angle of loading between the inclined leg and the horizontal plane of the load.

TABLE 4 B.—MAXIMUM ALLOWABLE WEAR AT ANY POINT OF LINK

Nominal chain or coupling link size		Maximum allowable wear of cross-sectional diameter, in.
in.	mm	
8/32	7	0.037
3/8	10	0.052
1/2	13	0.060
5/8	16	0.084
3/4	20	0.105
7/8	22	0.116
1	26	0.137
1 1/4	32	0.169

NOTE: For other sizes, consult chain or sling manufacturer.

TABLE 5.—SAFE WORKING LOADS FOR SHACKLES

[In tons of 2,000 pounds]

Material size (inches)	Pin diameter (inches)	Safe working load
1/4	5/8	1.4
5/8	3/4	2.2
3/4	7/8	3.2
7/8	1	4.3
1	1 1/8	5.6
1 1/8	1 1/4	6.7
1 1/4	1 3/8	8.2
1 3/8	1 1/2	10.0
1 1/2	1 5/8	11.9
1 1/4	2	16.2
2	2 1/4	21.1

WIRE ROPE TABLE—RATED LOADS FOR SINGLE LEG SLINGS 6 X 19 OR 6 X 37 CLASSIFICATION IMPROVED PLOW STEEL GRADE ROPE WITH FIBER CORE (FC)

Rated loads [note {1}], Tons (2,000 lb)

Vertical				Choker
Rope diameter, in.	HT	MS	S	HT, MS&S
1/4	0.49	0.51	0.55	0.38
8/16	0.78	0.79	0.85	0.6
3/8	1.1	1.1	1.2	0.85
7/16	1.4	1.5	1.7	1.2
1/2	1.8	2.0	2.1	1.5
9/16	2.3	2.5	2.7	1.9
5/11	2.8	3.1	3.3	2.3
3/4	3.9	4.4	4.8	3.3
7/8	5.2	6.0	6.4	4.5
1	6.7	7.7	8.4	5.9
1 3/8	8.4	9.5	11	7.4
1 1/4	10	12	13	9.0
1 3/8	12	14	16	11
1 1/2	15	17	18	13
1 6/8	17	19	21	15
1 3/4	20	22	25	17
2	26	29	32	22

HT=Hand tucked Splice.
For Hidden Tuck Splice (IWRC), use values in HT (FC) columns.
MS=Mechanical Splice.
S=Poured Socket or Swaged Socket.
NOTES:
(1) These values are based on slings being vertical. If they are not vertical, the rated load shall be reduced. If two or more slings are used, the minimum horizontal angle between the slings shall also be considered [see para. 9.2.2.1(d)].
(2) These values only apply when the D/d ratio (see Fig. 11) is 15 or greater.
(3) These values only apply when the D/d ratio is 25 or greater.
D=Diameter or curvature around which the body of the sling is bent.
d=Diameter of rope.

WIRE ROPE TABLE—RATED LOADS FOR SINGLE LEG SLINGS 6×19 OR 6×37 CLASSIFICATION IMPROVED PLOW STEEL GRADE ROPE WITH INDEPENDENT WIRE ROPE CORE (IWRC)

Rated loads [note {1}], tons (2,000 lb)

Vertical				Choker	Vertical basket	
					[Note (2)]	[Note (3)]
Rope diameter, in.	HT	MS	S	HT, MS & S	HT	MS & S
3/4	0.53	0.56	0.59	0.31	1.1	1.1
5/16	0.82	0.87	0.92	0.64	1.6	1.7
3/8	1.2	1.2	1.3	0.92	2.3	2.5
7/10	1.5	1.7	1.8	1.2	3.1	3.4
1/2	2.0	2.2	2.3	1.6	4.0	4.4
9/16	2.5	2.8	2.9	2.0	4.9	5.5
6/8	3.0	3.4	3.6	2.6	6.0	6.8
3/4	4.2	4.9	5.1	3.6	8.4	9.7
7/8	5.5	6.6	6.9	4.8	11	13

WIRE ROPE TABLE—RATED LOADS FOR SINGLE LEG SLINGS 6×19 OR 6×37 CLASSIFICATION IMPROVED PLOW STEEL GRADE ROPE WITH INDEPENDENT WIRE ROPE CORE (IWRC)—Continued

Rated loads [note {1}], tons (2,000 lb)

Vertical				Choker	Vertical basket	
					[Note (2)]	[Note (3)]
Rope diameter, in.	HT	MS	S	HT, MS & S	HT	MS & S
1	7.2	8.5	9.0	6.3	14	17
1⅛	9.0	10	11	7.9	18	20
1¼	11	13	14	9.7	22	26
1⅜	13	15	17	12	27	31
1½	16	18	20	14	32	37
1⅝	18	21	23	16	37	43
1¾	21	25	27	19	43	49
2	28	32	34	24	55	64

HT=Hand Tucked Splice.
For Hidden Tuck Splice (IWRC), use values in HT columns of Table 3.
MS=Mechanical Splice, S=Poured Socket or Swaged Socket.
NOTES:
(1) These values are based on slings being vertical. If they are not vertical, the rated load shall be reduced. If two or more slings are used, the minimum horizontal angle between the slings shall also be considered (see para. 9.2.2.1(d)).
(2) The values only apply when the D/d ratio (see Fig. 11) is 15 or greater.
(3) The values only apply when the D/d ratio is 25 or greater.
D=Diameter or curvature around which the body of the sling is bent.
d=Diameter of rope.

WIRE ROPE TABLE—RATED LOADS FOR SINGLE LEG SLINGS 6 × 19 OR6 × 37 CLASSIFICATION EXTRA IMPROVED PLOW STEEL GRADE ROPE WITH INDEPENDENT WIRE ROPE CORE (IWRC)

Rated loads [note {1}], tons (2,000 lb)

Vertical			Choker	Vertical basket [note (2)]
Rope diameter	MS	S	MS&S	MS&S
¼	0.65	0.68	0.48	1.3
5⁄16	1.0	1.1	0.74	2.0
⅜	1.4	1.5	1.1	2.9
7⁄10	1.9	2.0	1.4	3.9
½	2.5	2.7	1.9	5.1
9⁄16	3.2	3.4	2.4	6.4
⅝	3.9	4.1	2.9	7.8
¾	5.6	5.9	4.1	11
⅞	7.6	8.0	5.6	15
1	9.8	10	7.2	20
1⅛	12	13	9.1	24
1¼	15	16	11	30
1⅜	18	19	13	36
1½	21	23	16	42
1⅝	24	26	18	49
1¾	28	31	21	57
2	37	40	28	73

HT=Hand tucked Splice.
For Hidden Tuck Splice (IWRC), use values in HT columns of Table 3.
MS=Mechanical Splice.
S=Poured Socket or Swaged Socket.
NOTES:
(1) These values are based on slings being vertical. If they are not vertical, the rated load shall be reduced. If two or more slings are used, the minimum horizontal angle between the slings shall also be considered (see para. 9.2.2.1(d)).
(2) These values only apply when the D/d ratio (see Fig. 11) is 25 or greater.

Appendix III to Part 1918—The Mechanics of Conventional Cargo Gear (Non-mandatory)

Note: This Appendix is non-mandatory and provides an explanation of the mechanics in the correct spotting of cargo handling gear.

Although the most prevalent method of cargo handling is accomplished through the use of modern shoreside container gantry cranes, there are occasions when break-bulk cargo is handled with conventional ship's cargo gear. This appendix provides a reference for those unfamiliar with such cargo gear.

Sections 1918.52, 1918.53, and 1918.54 all address the subject of rigging and operating vessel's cargo handling gear. It is important to understand that under the Burton System of cargo handling (conventional gear consisting of two cargo derricks with married falls), the midships or up-and-down boom should be spotted as close to the fore and aft centerline of the hatch as operationally possible. Such spotting of the up-and-down boom will allow the most effective leads for the guy(s) and preventer(s) to safely support

the lateral stresses generated in the boom(s) by the married falls. As the lead of the guy(s) and preventer(s) approaches the vertical, in supporting the boom(s) head, the total stress in the guy(s) increases rapidly due to the increased vertical force that is generated in the guy(s) in order to counteract any particular horizontal or lateral force exerted on the boom(s) head. The appreciable vertical forces that are generated in this process are transmitted, in substantial part, to the boom(s) and topping lift(s), causing proportionate compressive stresses in the boom(s) and tension stresses in the topping lift(s).

In general, guys and preventers must be located so that enough vertical resistance is developed so as to prohibit the boom(s) from jackknifing as cargo passes across the deck. Special care must be exercised in the proper placement of guys and preventers associated with the Burton or yard boom. Preventers, when used, must parallel as closely as possible the guys that they support. Guys and preventers must not be attached to the same fitting.

While under a load, the cargo falls (running rigging) must not be permitted to chafe on any standing or other running gear. Special attention must be paid to ensure that cargo runners work freely through the heel block, without chafing the cheek of the block. Also, bobbing chains and heel block preventers must be attached so as to not interfere with the movement of the cargo runners.

Appendix IV to Part 1918—Special Cargo Gear and Container Spreader Test Requirements (Mandatory) [See § 1918.61 (f), (g), (h); Also Applicable to § 1917.50(c)(5)]

Type gear	Test requirement	Tested by	Proof test	
All Special Cargo Handling Gear Purchased or Manufactured on or After January 21, 1998				
Safe Working Load—> 5 short tons (10,000 lbs./4540 kg.).	Prior to initial use	OSHA Accredited agency only.	Up to 20 short tons	125% SWL.
	Prior to reuse after structural damage repair.	.....	Between 20 and 50 short tons.	5 short tons in excess of SWL.
	Every four years after initial proof load test.	OSHA Accredited agency or designated person..	Over 50 short tons	110% SWL.
Safe Working Load—5 short tons or less	Prior to initial use	OSHA Accredited agency or designated person.	125% SWL.	
	Prior to reuse after structural damage repair.		125% SWL	
Container spreaders not part of vessel's cargo handling gear.	Prior to initial use	OSHA Accredited agency only.		
	Prior to reuse after structural damage repair.			
	Every four years after initial proof load test.	OSHA Accredited agency or designated person.	125% SWL.	
All Special Cargo Handling Gear in Use Prior to January 21, 1998				
Safe Working Load—> 5 short tons (10,000 lbs./4540 kg.).	Every four years from January 21, 1998.	OSHA Accredited agency or designated person.	Up to 20 short tons	125% SWL.
	Prior to reuse after structural damage repair.	.....	Between 20 and 50 short tons.	5 short tons in excess of SWL.
	.....	.....	Over 50 short tons	110% SWL.
Safe Working Load—5 short tons or less	Prior to initial use	OSHA Accredited agency or designated person.	125% SWL	
	Prior to reuse after structural damage repair.		125% SWL	
Container spreaders not part of vessel's cargo handling gear.	Prior to initial use	OSHA Accredited agency or designated person.	125% SWL	
	Prior to reuse after structural damage repair.			

Appendix V to Part 1918—Basic Elements of a First Aid Training Program (Non-mandatory)

Note: This Appendix is non-mandatory and provides guidelines for small businesses, institutions teaching first aid, and the recipients of first aid training.

General Program Elements

A. Teaching Methods

1. Trainees should develop ''hands on'' skills through the use of manikins and trainee partners during their training.

2. Trainees should be exposed to acute injury and illness settings as well as the appropriate response to those settings through the use of visual aids, such as video tape and slides.

3. Training should include a course workbook which discusses first aid principles and responses to settings that require interventions.

4. Training duration should allow enough time for particular emphasis on situations likely to be encountered in particular workplaces.

5. An emphasis on quick response to first aid situations should be incorporated throughout the program.

B. Principles of Responding to a Health Emergency

The training program should include instruction in:

1. Injury and acute illness as a health problem.

2. Interactions with the local emergency medical services system. Trainees have the responsibility for maintaining a current list of emergency telephone numbers (police, fire, ambulance, poison control) easily accessible to all employees.

3. The principles of triage.

4. The legal aspects of providing first aid services.

C. Methods of Surveying the Scene and the Victim(s)

The training program should include instruction in:

1. The assessment of scenes that require first aid services including:

a. general scene safety.

b. likely event sequence.

c. rapid estimate of the number of persons injured.

d. identification of others able to help at the scene.

2. Performing a primary survey of each victim including airway, breathing, and circulation assessments as well as the presence of any bleeding.

3. The techniques and principles of taking a victim's history at the scene of an emergency.

4. Performing a secondary survey of the victim including assessments of vital signs, skin appearance, head and neck, eye, chest, abdomen, back, extremities, and medical alert symbols.

D. Basic Adult Cardiopulmonary Resuscitation (CPR)

Basic adult CPR training should be included in the program. Retesting should occur every year. The training program should include instruction in:

1. Establishing and maintaining adult airway patency.

2. Performing adult breathing resuscitation.

3. Performing adult circulatory resuscitation.

4. Performing choking assessments and appropriate first aid interventions.

5. Resuscitating the drowning victim.

E. Basic First Aid Intervention

Trainees should receive instruction in the principles and performance of:

1. Bandaging of the head, chest, shoulder, arm, leg, wrist, elbow, foot, ankle, fingers, toes, and knee.

2. Splinting of the arm, elbow, clavicle, fingers, hand, forearm, ribs, hip, femur, lower leg, ankle, knee, foot, and toes.

3. Moving and rescuing victims including one and two person lifts, ankle and shoulder pulls, and the blanket pull.

F. Universal Precautions

Trainees should be provided with adequate instruction on the need for and use of universal precautions. This should include:

1. The meaning of universal precautions, which body fluids are considered potentially infectious, and which are regarded as hazardous.

2. The value of universal precautions for infectious diseases such as AIDS and hepatitis B.

3. A copy of OSHA's standard for occupational exposure to bloodborne pathogens or information on how to obtain a copy.

4. The necessity for keeping gloves and other protective equipment readily available and the appropriate use of them.

5. The appropriate tagging and disposal of any sharp item or instrument requiring special disposal measures such as blood soaked material.

6. The appropriate management of blood spills.

G. First Aid Supplies

The first aid provider should be responsible for the type, amount, and maintenance of first aid supplies needed for their particular worksite(s). These supplies need to be stored in a convenient area available for emergency access.

H. Trainee Assessments

Assessment of successful completion of the first aid training program should include instructor observation of acquired skills and written performance assessments. First aid skills and knowledge should be reviewed every three years.

I. Program Update

The training program should be periodically reviewed with current first aid techniques and knowledge. Outdated material should be replaced or removed.

Specific Program Elements

A. Type of Injury Training

1. Shock

Instruction in the principles and first aid intervention in:

a. shock due to injury.

b. shock due to allergic reactions.

c. the appropriate assessment and first aid treatment of a victim who has fainted.

2. Bleeding

a. the types of bleeding including arterial, venous, capillary, external, and internal.

b. the principles and performance of bleeding control interventions including direct pressure, pressure points, elevation, and pressure bandaging.

c. the assessment and approach to wounds including abrasions, incisions, lacerations, punctures, avulsions, amputations, and crush injuries.

d. the principles of wound care including infection precautions, wounds requiring medical attention, and the need for tetanus prophylaxis.

3. Poisoning

Instruction in the principles and first aid intervention of:

a. alkali, acid and systemic poisons. In addition, all trainees should know how and when to contact the local Poison Control Center.

b. inhaled poisons including carbon monoxide, carbon dioxide, smoke, and chemical fumes, vapors and gases as well as the importance of assessing the toxic potential of the environment to the rescuer and the need for respirators.

Trainees should be instructed in the acute effect of chemicals utilized in their plants, the location of chemical inventories, material safety data sheets (MSDS's), chemical emergency information, and antidote supplies.

c. topical poisons including poison ivy, poison sumac, poison oak, and insecticides.

d. drugs of abuse including alcohol, narcotics such as heroin and cocaine, tranquilizers, and amphetamines.

4. Burns

Instruction in the principles and first aid intervention of:

a. assessing the severity of the burn including first degree, second degree, and third degree burns.

b. differentiating between the types of third degree burns (thermal, electrical, and chemical) and their specific interventions. Particular attention should be focused upon chemical burns, and the use of specific chemicals in the workplace which may cause them.

5. Temperature Extremes

Instruction in the principles and first aid intervention of:

a. exposure to cold including frostbite and hypothermia.

b. exposure to heat including heat cramps, heat exhaustion, and heat stroke.

6. Musculoskeletal Injuries

The training program should include instruction in the principles and first aid intervention in:

a. open fractures, closed fractures, and splinting.

b. dislocations, especially the methods of joint dislocations of the upper extremity. The importance of differentiating dislocations from fractures.

c. joint sprains.

d. muscle strains, contusions, and cramps.

e. head, neck, back, and spinal injuries.

7. Bites and Stings

Instruction in the principles and first aid intervention in:

a. human and animal (especially dog and snake) bites.

b. bites and stings from insects (spiders, ticks, scorpions, hornets and wasps). Interventions should include responses to anaphylactic shock; other allergic manifestations; rabies and tetanus prophylaxis.

8. Medical Emergencies

Instruction in the principles and first aid intervention of:

a. heart attacks

b. strokes

c. asthma attacks

d. diabetic emergencies including diabetic coma, insulin shock, hyperglycemia, and hypoglycemia.

e. seizures including tonic-clonic and absence seizures. Importance of *not* putting gags in mouth.

f. pregnancy including the appropriate care of any abdominal injury or vaginal bleeding.

9. Confined Spaces

a. the danger of entering a confined space to administer first aid without having the appropriate respiratory protection.

b. if first aid personnel will be required to assist evacuations from confined spaces, additional training will be needed.

B. Site of Injury Training

Instruction in the principles and first aid intervention of injuries to the following sites:

1. Head and Neck

a. including skull fractures, concussions, and mental status assessments with particular attention to temporary loss of consciousness and the need for referral to a physician.

b. including the appropriate approach to the management of the individual who has suffered a potential neck injury or fracture.

2. Eye

a. foreign bodies, corneal abrasions and lacerations.

b. chemical burns and the importance of flushing out the eye.

c. the importance of not applying antibiotics without physician supervision.

3. Nose

a. nose injuries and nose bleeds.

4. Mouth and Teeth

a. oral injuries, lip and tongue injuries, and broken and removed teeth. The importance of preventing inhalation of blood and teeth.

5. Chest

a. rib fractures, flail chest, and penetrating wounds.

6. Abdomen

a. blunt injuries, penetrating injuries, and protruding organs.

7. Hand, Finger, and Foot Injuries

a. finger/toe nail hematoma, lacerations, splinters, finger nail avulsion, ring removal, and foreign bodies.

b. the importance of identifying amputation care hospitals in the area. When an amputation occurs, appropriate handling of amputated fingers, hands, and feet during the immediate transportation of the victim and body part to the hospital.

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