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29 CFR Parts 1910 and 1915
General Working Conditions in Shipyard Employment; Final Rule

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910 and 1915

[Docket No. OSHA–S049–2006–0675 (formerly Docket No. S–049)]

RIN 1218–AB50

General Working Conditions in Shipyard Employment

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

ACTION: Final rule.

SUMMARY: The Occupational Safety and Health Administration (OSHA) is revising its standards on general working conditions in shipyard employment. These revisions update existing requirements to reflect advances in industry practices and technology, consolidate some general safety and health requirements into a single subpart, and provide protection from hazards not addressed by existing standards, including the control of hazardous energy.

DATES: *Effective date:* This final rule becomes effective and enforceable on August 1, 2011, except for the provisions in § 1915.89, which become effective and enforceable on October 31, 2011.

Information Collections: The collection of information requirements are contained in paragraphs § 1915.83, § 1915.87, § 1915.88, and § 1915.89 (See section *VIII Office of Management and Budget Review Under the Paperwork Reduction Act of 1995*). Notwithstanding the general date of applicability that applies to all other requirements contained in the final rule, affected parties do not have to comply with the collection of information requirements until the Department of Labor publishes a separate notice in the **Federal Register** announcing the Office of Management and Budget has approved them under the Paperwork Reduction Act of 1995.

Incorporation by reference: The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of August 1, 2011.

ADDRESSES: In accordance with 28 U.S.C. 2112(a)(2), OSHA designates Joseph M. Woodward, Associate Solicitor of Labor for Occupational Safety and Health, Office of the Solicitor, U.S. Department of Labor, Room S–4004, 200 Constitution Avenue, NW., Washington, DC 20210, to receive petitions for review of the final rule.

FOR FURTHER INFORMATION CONTACT: *Press inquiries:* Camilla F. McArthur, Office of Communications, OSHA, U.S. Department of Labor, Room N–3647, 200 Constitution Avenue, NW., Washington, DC 20210; telephone: (202) 693–1999.

General information and technical inquiries: Joseph V. Daddura, Director, Office of Maritime, Directorate of Standards and Guidance, OSHA, U.S. Department of Labor, Room N–3621, 200 Constitution Avenue, NW., Washington, DC 20210; telephone: (202) 693–2222.

Additional copies of this Federal Register notice: OSHA, Office of Publications, U.S. Department of Labor, Room N–3101, 200 Constitution Avenue, NW., Washington, DC 20210; telephone (202) 693–1888. Electronic copies of this **Federal Register** notice are also available at *http://www.regulations.gov*, the Federal eRulemaking Portal. This notice, as well as news releases and other relevant documents, also is available at OSHA's Web site at *http://www.osha.gov*.

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I. Background

A. *References and Exhibits.* In this **Federal Register** notice, OSHA references documents in Docket No. OSHA–S049–2006–0675, which was formerly OSHA Docket No. S–049. In addition, OSHA references documents in the following dockets, which the Agency incorporates by reference into this rulemaking:

- The proceedings of the Shipyard Employment Standards Advisory Committee (SESAC)—Docket Nos. SESAC–1988 through SESAC–1993;
- The proceedings of the Maritime Advisory Committee for Occupational Safety and Health—Docket Nos. MACOSH–1995 through MACOSH–2008;
- The General Industry Lockout/Tagout rulemaking record—OSHA Docket Nos. S–012, S–012A, and S–012B;
- The Shipyard Employment Standards rulemaking record—OSHA Docket No. S–024; and
- The Field Sanitation rulemaking record—OSHA Docket No. H–308.

References to documents in Docket No. OSHA–S–049–2006–0675. References to documents in Docket No. OSHA–S049–2006–0675 are given as "Ex." followed by the last sequence of numbers in the Document ID Number and, in the case of the hearing transcripts, the page number. Thus, Ex. 88 is Document Number OSHA–S049–2006–0675–0088, and will appear in this document as (Ex. 88).

The exhibits in this docket (Docket No. OSHA–S049–2006–0675), including public comments, supporting materials, hearing transcripts, and other documents, can be found at *http://www.regulations.gov*, the Federal eRulemaking Portal, by searching the docket number. All exhibits are listed, but some exhibits (for example, copyrighted material) are not available to read or download from that Web page. All exhibits are available for inspection and, if permissible, copying at the OSHA Docket Office, Docket No. OSHA–S049–2006–0675, Room N–2625, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210; telephone (202) 693–2350.

References to other dockets incorporated by reference. In this notice, references to documents in other dockets incorporated by reference are given as the docket number followed by the exhibit number for the document in that docket. For example, a reference to "OSHA Docket H–308 Ex. 1" means Exhibit 1 in the Field Sanitation rulemaking docket. Referenced documents in those dockets are available for inspection and, if permissible, copying at the OSHA Docket Office.

B. Introduction

OSHA is revising and updating standards in subpart F of 29 CFR part 1915 that address hazards in general working conditions in shipyard employment. These revisions update existing requirements to reflect advances in industry practices and technology, consolidate certain safety and health requirements into a single subpart, and provide protection from hazards not previously addressed, including the control of hazardous energy.

This final rule covers diverse working conditions in shipyard employment, including sanitation, medical services and first aid, motor vehicle and pedestrian safety, lighting, housekeeping, and hazardous energy.

OSHA has determined that the rulemaking record supports the need for the revisions and additions to subpart F to protect the safety and health of workers performing shipyard employment operations.

The OSH Act requires OSHA to make certain findings with respect to standards. One of these findings, specified by section 3(8) of the OSH Act, requires an OSHA standard to address a significant risk and to reduce this risk significantly (See Industrial *Union Dep't* v. *American Petroleum Institute,* 448 U.S. 607 (1980)). As discussed in other sections of the preamble, OSHA has determined that the hazards addressed by this rule represent a significant risk, and estimates that the final standard will prevent 1.2 fatalities and 348.4 injuries annually. In accordance with the requirements of Section 6(b) of the OSH Act, OSHA has determined that this standard is both technologically and economically feasible.

The Regulatory Flexibility Act (5 U.S.C. 601, as amended) requires that OSHA determine whether a standard will have a significant economic impact on a substantial number of small firms. As discussed in Section IV of the preamble, OSHA examined the effects of this standard on small firms and certifies that the standard will not have a significant impact on a substantial number of small firms.

In accordance with Executive Orders 13563 and 12866, OSHA has estimated the benefits, costs, and net benefits of this standard. As shown in the table below, the annual benefits of this standard are significantly in excess of the standard's annualized compliance costs. It should be noted that these monetized estimates of net benefits are for informational purposes only. In accordance with the OSH Act, OSHA does not use the magnitude of net benefits as the decision-making criterion in determining what standards to promulgate.

Net Benefits and Cost Effectiveness of the Final General Working Conditions in Shipyards Standard	
Annualized Costs	
Sanitation	$748,709
Medical Services and First Aid	$418,349
Lockout/Tags-plus	$3,004,397
Vehicle Safety	$13,887
Total Annual Costs	$4,185,342
Annual Benefits	
Number of Injuries Prevented	348.4
Number of Fatalities Prevented	1.2
Monetized Benefits (assuming $67,000 per injury $8.7 million per fatality prevented)	$33.8 million
OSHA standards that are updated and consistent with voluntary standards	Unquantified
Net Benefits (benefits minus costs)	$29.6 million
Cost Effectiveness: Compliance with the standard would result in the prevention of 1 fatality and 81 injuries per $2 million spent, or alternatively, $7.06 in benefits per dollar of cost.	

C. Events Leading to the Final Rule

OSHA adopted the existing standards in subpart F in 1972 (37 FR 22458, Oct. 19, 1972) pursuant to section 6(a) of the Occupational Safety and Health Act of 1970 (OSH Act) (29 U.S.C. 651, 655). Section 6(a) permitted OSHA, during the first two years following passage of the OSH Act, to adopt as occupational safety and health standards any established Federal standards and national consensus standards. OSHA adopted the existing provisions in subpart F from Federal regulations promulgated under section 41 of the Longshore and Harbor Workers' Compensation Act (LHWCA) (33 U.S.C. 941), as well as national consensus standards (for example, ANSI sanitation standards).

In 1982, the Shipbuilders Council of America and the American Waterways Shipyard Conference requested that OSHA: (1) Revise and update the existing shipyard standards, including subpart F; and (2) consolidate into a single set of shipyard standards those general industry standards that apply to shipyards, particularly landside operations.

In response to these recommendations, OSHA established the Shipyard Employment Standards Advisory Committee (SESAC) in November 1988. The purpose of SESAC, which included representatives from industry, labor, and professionals in the maritime community, was to provide guidance and technical expertise to OSHA about revising the shipyard employment standards. SESAC met from 1988 until 1993 to develop recommendations and provide technical expertise in developing draft regulatory language for revising the shipyard safety standards. On April 29, 1993, SESAC unanimously approved and submitted to OSHA final draft recommendations for revising subpart F (Docket SESAC 1993–2, Ex. 102X, p. 257; detailed discussion on SESAC comments and specific recommendations are presented in Section III, the Summary and Explanation section below).

In 1995, OSHA established the Maritime Advisory Committee for

Occupational Safety and Health (MACOSH) under section 7 of the OSH Act (29 U.S.C. 656) to advise the Agency on issues relating to occupational safety and health standards in the shipyard and marine cargo-handling (longshoring) industries. On September 8, 1995, MACOSH discussed and approved the recommendations and draft regulatory language that SESAC developed and made additional recommendations, including that OSHA do a separate rulemaking on the control of hazardous energy (Docket MACOSH 1995–1, Exs. 2; 102X, pp. 25, 26).

OSHA published the proposed rule on December 20, 2007 (72 FR 72452). The Agency requested public comment by March 19, 2008, on the proposed rule, the preliminary economic analysis, and the issues the Agency raised in the proposal. The Agency received comments on the proposed rule from employees, employers, trade associations, consultants, and government agencies (Exs. 88 through 132.1). In addition, a number of stakeholders requested an informal public hearing and an extension of the 60-day comment period (Exs. 93 through 99). OSHA granted the requests to hold a hearing in two locations (73 FR 54340, Sept. 19, 2008; 73 FR 36823, June 30, 2008), and denied the request to extend the comment period.

After publishing notice of an informal public hearing (73 FR 36823, June 30, 2008; 73 FR 54340, Sept. 19, 2008), OSHA convened the hearing on September 9, 2008, in Washington, DC, with Administrative Law Judge Stephen Purcell presiding (Ex. 168). The hearing continued October 21 and 22, 2008, in Seattle, WA, where Administrative Law Judge Jennifer Gee presided (Exs. 198; 199). Thirty-five stakeholders presented oral testimony at the public hearing.

Pursuant to OSHA's recommendation, on September 9, 2008, Judge Purcell ordered that after the close of the hearing on October 22, 2008, the hearing record would remain open for an additional 60 days, until December 22, 2008, for the submission of new factual information and data relevant to the hearings (Ex. 169). Judge Purcell also ordered that the record would remain open until February 20, 2009, for the submission of final written comments, arguments, summations, and briefs (Exs. 197 and 200 through 206.1). OSHA's recommendation for a 120-day post-hearing comment period was in response to comments from some stakeholders who said the 60-day pre-hearing comment period had not provided stakeholders with sufficient time to submit comments (for example, Ex. 119.1).

On August 25, 2009, Judge Purcell issued an order closing the record of the public hearing on the Proposed Rule to Update OSHA's Standards on General Working Conditions in Shipyard Employment and certifying the record to the Assistant Secretary of Labor for Occupational Safety and Health.

As required by the OSH Act, this final rule is based on careful analysis and consideration of the rulemaking record as a whole, including materials discussed or relied upon in the proposed rule, written comments and exhibits received, and the record of the public hearing.

D. Hazards

Shipyard employment is a risky occupation that exposes workers to a number of different hazards. Shipyard-employment workers are at risk due to the nature of their work, which includes a variety of industrial operations such as steel fabrication, welding, abrasive blasting, electrical work, pipefitting, rigging, stripping, and coating applications. Shipyard-employment workers also operate and service complex machinery and equipment such as powered industrial trucks, cranes, and vessel systems. Several stakeholders said that vessel systems, in particular, present "unique complexity" (Ex. 132.2).

The hazards associated with these operations and equipment are heightened because they are often performed outdoors in all kinds of weather. Gerry Merrigan, of Prowler LLC and Ocean Prowler LLC, commented on the risks of working outdoors and on vessels: "The predictability of shoreside operations is not often found at sea (for example, ice accumulation on vessels)," and that "Almost everyday so far this fishing season in the Bering Sea had freezing spray warning" (Ex. 100). A number of other stakeholders also said that working in rain, ice, and snow is common in shipyard employment (Exs. 101.1; 105.1; 121.1; 124; 128).

Yaniv Zagagi, of Atlantic Marine Florida, also addressed the range of environmental conditions that shipyard workers face:

> With outdoor work a common practice on vessels under construction and repair, maintaining dry work surfaces at all times in all area[s], since work areas cannot be delineated, is not possible. In this region, rainfall averages 6 inches per month, with an inch or more common for a single rain event (Ex. 115.1).

The nature of work spaces in shipyard employment also poses risks for employees. Shipyard employment activities are performed aboard vessels, in confined or enclosed spaces below deck, on scaffolds, and on busy, crowded docks. James Thornton, of Northrop Grumman—Newport News, commented: "Shipbuilding and repair, by nature, requires employees to access numerous small, awkward spaces, such as catapult wing voids on aircraft carriers and vertical launch silos on submarines; therefore, working space is inherently limited" (Ex. 116.2).

The safe coordination of shipyard employment activities also is complicated by the fact that most shipyards are multi-employer worksites where shipyard workers, ship's crew, contractors, and subcontractors work side-by-side and often on the same vessel system at the same time.

The combination of these hazards puts workers at risk of injury, regardless of whether they are working on vessels or at landside operations.

The proposed rule examined in detail the fatalities and injuries associated with the hazards this rule addresses (72 FR 72453–55, Dec. 20, 2007). Since OSHA did not receive any objections on its fatality and injury analysis, the Agency does not see a need to repeat the analysis here. In addition, section IV of this preamble discusses the fatalities and injuries the final rule is estimated to prevent.

II. Pertinent Legal Authority

The purpose of the OSH 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 issue and to 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 OSH Act's effective date); 655(b) (authorizing promulgation of standards pursuant to notice and comment); and 654(a)(2) (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 3(8) of the OSH Act if it materially reduces a significant risk to workers; is economically feasible; is technologically feasible; is cost effective; is consistent with prior

Agency action or is a justified departure; adequately responds to any contrary evidence and argument in the rulemaking record; and effectuates the Act's purposes at least as well as any national consensus standard it supersedes. See 29 U.S.C. 652; 58 FR 16612, 16616, Mar. 30, 1993.

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. See *Pub. Citizen Health Research Group* v. *U.S. Dep't of Labor*, 557 F.3d 165, 170–71 (3rd Cir. 2009); *Am. Iron and Steel Inst.* v. *OSHA*, 939 F.2d 975, 980 (D.C. Cir. 1991) ("*AISI*"); *United Steelworkers of Am., AFL–CIO–CLC* v. *Marshall*, 647 F.2d 1189, 1272 (D.C. Cir. 1980).

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 *Am. Textile Mfrs. Inst.* v. *Donovan*, 452 U.S. 490, 530 n.55 (1981) ("*ATMI*"); *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. *Int'l Union, United Auto., Aerospace & Agric. Implement Workers of Am., UAW* v. *OSHA*, 37 F.3d 665, 668 (D.C. Cir 1994) ("*LOTO III*"). See also *ATMI*, 452 U.S. at 514 n.32 (suggesting that the "reasonably necessary or appropriate" language of Section 3(8) of the Act (29 U.S.C. 652(8)) might require OSHA to select the less expensive of two equally effective measures).

Section 6(b)(7) of the OSH 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).

All safety standards must be highly protective. See 58 FR 16614–16615, Mar. 30, 1993; *LOTO III*, 37 F.3d at 668. Finally, whenever practicable, standards shall "be expressed in terms of objective criteria and of the performance desired." 29 U.S.C. 655(b)(5).

III. Summary and Explanation of the Final Rule

This section of the preamble discusses the requirements of the final standard and explains the purpose of the requirements and the reasons supporting them. This section also discusses and resolves issues raised during the comment period, significant comments received as part of the rulemaking record, and any substantive changes from the proposed rule.

As mentioned, OSHA adopted many of the provisions in subpart F in 1972 from existing Federal occupational safety and health standards and national consensus standards (for example, sanitation, medical services and first aid, housekeeping). Since then, those national consensus standards have been updated and revised. OSHA carefully reviewed the updated standards and, when they encompassed new technology and requirements to provide greater workplace safety and health, has incorporated those changes in the final rule.

SESAC recommended many of the provisions in the final rule as representing industry best practices. To the extent that such practices and technology have changed since SESAC made its recommendations, OSHA has updated those recommendations accordingly.

In the final rule, OSHA has consolidated a number of provisions to more clearly indicate that they apply to shipyard employment. For example, both existing general industry (part 1910) and shipyard employment (part 1915) standards address housekeeping, sanitation, and medical services and first aid. General industry standards apply to shipyard employment when part 1915 standards do not address a particular hazard or working condition. To make the applicable requirements easier to understand and follow, the final rule consolidated the sets of standards into one section. To illustrate, § 1910.141 and § 1915.97 contain requirements on sanitation that are applicable to shipyard employment. The final rule has combined all of the sanitation requirements in both standards that are applicable to shipyard employment in § 1915.88.

The consolidation of some standards, and the addition of new sections, has resulted in a renumbering of the sections in subpart F. Table 1 lists the section numbers of the final rule and the existing section(s), if any, from which they were derived.

TABLE 1—PROPOSED PROVISIONS AND CORRESPONDING EXISTING PROVISIONS

Title of provision	Final rule	Existing rule applicable to shipyard employment
Scope, application, and definitions	§ 1915.80	Each section of subpart F has a scope and application provision. No existing section for definitions.
Housekeeping	§ 1915.81	§ 1915.91 and § 1910.141.
Lighting	§ 1915.82	§ 1915.92.
Utilities	§ 1915.83	§ 1915.93.
Working alone	§ 1915.84	§ 1915.94.
Vessel radar and communication systems	§ 1915.85	§ 1915.95.
Lifeboats	§ 1915.86	§ 1915.96.
Medical services and first aid	§ 1915.87	§ 1915.98 and § 1910.151.
Sanitation	§ 1915.88	§ 1915.97 and § 1910.141.
Control of hazardous energy (lockout/tagout)	§ 1915.89	No existing rule.
Safety color code for marking physical hazards	§ 1915.90	§ 1910.144.
Accident prevention signs and tags	§ 1915.91	§ 1910.145.
Retention of DOT markings, placards and labels	§ 1915.92	§ 1915.100.
Motor vehicle safety equipment, maintenance, and operation	§ 1915.93	No existing rule.
Servicing multi-piece and single-piece rim wheels	§ 1915.94	No existing rule.

To the extent possible, OSHA has expressed the final rule in performance language; that is, the requirements are "expressed in terms of objective criteria and of the performance desired." 29 U.S.C. 655(b)(5). Some stakeholders, particularly larger establishments, supported this approach and urged OSHA to adopt a flexible approach in the final rule (Exs. 116.1; 120.1). Other stakeholders, particularly smaller businesses, urged OSHA to provide more specific language in the final rule (Exs. 104.1; 107; 121.1; 125; 198, p. 56). For example, Philip Dovinh, of Sound Testing, Inc., said that vague or "open-ended" language "leaves ample room for

erroneous misinterpretations" (Ex. 121.1).

OSHA believes that the performance-based approach in the final rule provides employers with maximum flexibility in determining the most effective strategies for controlling hazards and protecting their workers. At the same time, OSHA believes that the objective criteria the final rule incorporates will assist employers, particularly small businesses, with complying with the final rule. In addition, as stakeholders requested, OSHA has defined a number of additional terms used in the final rule (Exs. 121.1; 129.1). OSHA believes this approach also will help employers understand and comply with the final rule while providing flexibility for the range of employers the final rule covers.

Section 1915.80—Scope, Application, and Definitions

Paragraph (a)—Scope and Application

Paragraph (a) specifies that the provisions in subpart F apply to general working conditions:

- In shipyard employment;
- At landside operations and on vessels and vessel sections; and
- Regardless of geographic location.

Final paragraph (a) consolidates the individual scope provisions contained in each section of existing subpart F into one section. Paragraph (a) also applies subpart F to all operations constituting shipyard employment. Some of the existing scope provisions, which were part of the LHWCA standards that OSHA adopted in 1972, applied only to certain sectors of shipyard employment. However, OSHA's intention always has been that part 1915 standards apply to all of shipyard employment, which § 1915.4(i) defines as "ship repairing, shipbuilding, shipbreaking and related employments." As OSHA stated in the proposed rule, this consolidation eliminates duplication. Finally, the consolidation also makes the scope and application section consistent with other subparts of 29 CFR part 1915 that OSHA has revised (for example, subpart B—Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment (59 FR 37816, Jul. 25, 1994); subpart I—Personal Protective Equipment in Shipyard Employment (61 FR 26322, May 24, 1966); and subpart P—Fire Protection in Shipyard Employment (69 FR 55702, Oct. 15, 2004). OSHA did not receive any comments on the proposed consolidation.

Paragraph (a) of the final rule adopts the proposed language that subpart F applies to shipyard-employment work on vessels and vessel sections and at landside operations. With regard to vessels, this means that the requirements of subpart F apply to the extent that OSHA has authority over the vessel. OSHA's instruction titled, "OSHA Authority over Vessels and Facilities on or Adjacent to U.S. Navigable Waters and the Outer Continental Shelf (OCS)," provides current Agency policy, information, and guidance on OSHA's authority to regulate working conditions on certain vessels (inspected vessels, commercial uninspected fishing vessels, and other uninspected vessels) (CPL–02–01–047, Feb. 22, 2010). The instruction is available to read and download on OSHA's Web site at *http://www.osha.gov.*

Paragraph (a) also adopts language from the proposed rule clarifying OSHA's longstanding position that subpart F applies to shipyard employment "regardless of geographic location" of the shipyard activity. OSHA included the phrase "regardless of geographic location" in the scope so that protection is afforded to employees whenever they engage in shipyard employment: On vessels, on vessel sections, at landside facilities, or at any other location where they perform shipyard employment. This has been the Agency's longstanding policy on shipyard employment, and is included in the scope of subpart B—Confined and Enclosed Spaces and Other Dangerous Atmospheres, subpart I—Personal Protective Equipment, and subpart P—Fire Protection.

Shipyard employment also occurs on vessels and vessel sections within the navigable waters of the United States, and includes work on a vessel or part of a vessel that is being constructed, or repaired, whether it is in the shipyard or dockside, at anchor, or underway for testing. The requirements in this subpart will apply to all vessels within OSHA's jurisdictional boundaries.

Several commenters requested that OSHA define "navigable waters" in the final rule (Exs. 101.1; 124; 126; 128; 132.2). Since the final rule does not use the term "navigable waters," OSHA does not believe there is a need to include a definition in the rule. In any event, the U.S. Coast Guard, not OSHA, is the Federal agency responsible for making determinations about whether a body of water is considered "U.S. navigable waters." The Coast Guard definition of navigable waters and other associated terms are contained at 33 CFR part 2, which is available at *http://www.gpoaccess.gov/cfr/index.html.*

One stakeholder urged OSHA to exempt from the rule vessels under 200 gross weight tons or vessels that do not process seafood (Ex. 197.1). Karen Conrad of the North Pacific Fishing Vessel Owners' Association commented:

> [T]hese regulations would apply to all uninspected vessels and that would include "tens of thousands" of vessels of all kinds. OSHA needs to consider that these vessels do ongoing maintenance work, not just at the dock, but while they move to other locations. We suggest that OSHA communicate with the Coast Guard and industry to identify which vessels need this regulation and best to scale down this regulation to cover the sector of vessels that should be covered (Ex. 197.1).

OSHA does not agree with the stakeholder's position and has not exempted small vessels from the final rule. OSHA regulates hazardous working conditions where they are found. To the extent that the hazardous working conditions addressed in subpart F are present, OSHA believes employees are at risk of injury and death and need protection. Of course, OSHA has authority only to the extent that the hazard, employer, and vessel are within the Agency's geographical authority.

Paragraph (b)—Definitions

Paragraph (b) of the final rule sets forth definitions that are applicable to subpart F. As mentioned, OSHA believes that defining key terms makes the final rule easier to understand and, therefore, will increase compliance.

OSHA has moved the definitions to the beginning of subpart F from the final section of the proposed rule (§ 1915.95). Two stakeholders urged OSHA to move the definitions forward (Exs. 119.1; 121.1). Philip Dovinh of Sound Testing, Inc. commented:

> Definitions are an extremely important part of any successful regulation. OSHA may have misled the reader that their set of definitions is just an incomplete afterthought as represented in the current Proposed Rule. Section 1915.95 Definitions, is awkwardly buried in the last section of Subpart F–General Working Conditions. Why not be consistent and place it immediately following § 1915.80 Scope and application—as in the rest of the other OSHA regulations? By having the definitions located immediately at the front of the Proposed Rule, they will grab the attention of the reader and become much more beneficial (Ex. 121.1).

OSHA agrees with the commenter that prominently placing the definitions for this subpart immediately after the Scope and Application section will assist the employer and employees in understanding the provisions in subpart F.

Many of the proposed definitions have been carried forward unchanged, or with editorial changes, to better clarify the term. Some of the clarification, additions, and modifications have been made in response to stakeholder comments, which provided helpful and useful language to improve the clarity of terms used in the final rule. OSHA also has added new definitions to the final rule, many of which help to explain and clarify OSHA's revised approach to the control of hazardous energy. Definitions that have been added to the final rule, or substantially clarified or modified from the proposal, are described below.

Additional safety measure. A definition for "additional safety measure" was added to the final rule to more fully explain and clarify the tags-plus system described in § 1915.89, Control of hazardous energy. "Additional safety measure" is defined as a component of the tags-plus system that provides an impediment (in addition to the energy-isolating device) to the release of hazardous energy or the energization or startup of the machinery, equipment, or system being serviced. Examples include, but are not limited, to removing an isolating circuit element; blocking a control switch; blocking, blanking, or bleeding lines; removing a valve handle or wiring it in place; or opening an extra disconnecting device.

Authorized employee. Paragraph (b)(3) of § 1915.80 specifies that an "authorized employee" is an employee who performs one or more of the following lockout/tagout responsibilities:

- Executes the lockout/tagout procedures;
- Installs a lock or tagout system on any machinery, equipment, or system that is to be serviced; or
- Services any machinery, equipment, or system that is under a lockout/tagout application.

The final definition specifies clearly and more directly than the proposed definition the role of authorized employees in lockout/tagout situations. In addition, the final definition retains the sentence clarifying that affected employees become authorized employees if their duties include servicing machinery, equipment, or systems under a lockout/tagout application.

Contract employer. OSHA has added a new definition for "contract employer." OSHA determined that this definition was needed to clarify the requirements in § 1915.89(l), Multi-employer worksites. The definition is currently included in subpart P, Fire Protection for Shipyard Employment, and has been carried over into subpart F in this final rule. A "contract employer" is an employer who performs shipyard employment-related services or work under contract to the host employer or to another employer who is under contract to the host employer when the work or services takes place at the host employer's worksite. Services a contract employer may provide include painting, joinery, carpentry, or scaffolding. The definition excludes any employer who provides services that are not directly related to shipyard employment, such as mail delivery, office-supply, or food vending services.

Dummy load. In § 1915.85, Vessel radar and communication systems, paragraph (b)(2) was revised at the suggestion of Northrop Grumman Shipbuilding—Newport News (Ex. 116.2) to require protection for employees working on a system with a dummy load. OSHA defines "dummy load" as a device used in place of an antenna to aid in the testing of a radio transmitter that converts transmitted energy into heat to minimize energy radiating outward or reflecting back to its source during testing.

Hazardous energy. "Hazardous energy" was defined to ensure that employers understand that § 1915.89, Control of hazardous energy, applies to any source or type of energy, including mechanical (for example, power transmission apparatus, counterbalances, springs, pressure, and gravity), pneumatic, hydraulic, electrical, chemical, and thermal (for example, high or low temperature), that could cause injury to employees. These energy sources may be active, residual, or stored. Because this definition encompasses the various types of energy, it was not necessary to define separately the phrase "energy source," so OSHA deleted the phrase as its own defined term.

Hazardous substances. In the proposal, OSHA defined "hazardous and toxic substances" broadly as used in § 1915.87, Medical services and first aid. Several commenters stated that this definition was not appropriate, was economically infeasible, or was too broad (Exs. 104.1; 107.1; 105.2; 106.1; 112.1). OSHA has replaced "hazardous and toxic substances" with "hazardous substances" in the final standard, which are defined as substances that may cause injury, illness, or disease, or otherwise harm an employee by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful. OSHA has concluded that this definition adequately sets forth the hazards that have the potential to occur in shipyard employment. This definition will assist employers to address the hazards in their particular workplaces by providing, for example, quick-drench facilities and other first aid or emergency medical equipment.

Host employer. OSHA added a new definition for "host employer" in the final rule. OSHA determined that this definition was needed to clarify the requirements in § 1915.89(l), Procedures for multi-employer worksites. The definition is currently included in subpart P, Fire Protection for Shipyard Employment, and has been carried over into subpart F in this final rule. "Host employer" is an employer who is in charge of coordinating the shipyard-employment work of other employers, or who hires other employers to perform shipyard-employment work or to provide shipyard employment-related services at a multi-employer worksite.

Isolated location. For purposes of § 1915.84, Working alone, OSHA has added a new definition for "isolated location," as requested by many commenters (Exs. 101.1; 104.1; 105.1; 114.1; 115.1; 118.1; 124; 125; 126; 128; 130.1; 198, p. 73). "Isolated location" is defined as an area where employees are working alone or with little assistance from others due to the type, time, or location of their work. Isolated locations include remote locations or other work areas where employees are not in close proximity to each other. Examples of isolated locations include an employee working alone on a job task at the far end of a vessel, vessel section, or shipyard; an employee working alone in a hold, sonar space, or tank; or an employee working in a confined space. OSHA intends to include situations where co-workers may be near an employee working alone but are not participating in the work of the lone worker. For example, an isolated location exists when two employees are working on either side of a metal partition, or when one employee performs hot work and a firewatch is on the other side of the bulkhead.

Lock. OSHA has shortened the phrase "lockout device" from proposed § 1915.89, Control of hazardous energy, by removing the word "device," since "device" is not needed to explain what a lock is. A lock is self explanatory, although OSHA retained the definition of the term in this final rule. Throughout the standard, when the proposal required the employer to affix a "lockout device," OSHA has simplified the term to "lock." The term is defined as a device that utilizes a positive

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

Lockout/tags-plus coordinator. OSHA has added a new requirement in § 1915.89, Control of hazardous energy, to designate a lockout/tagout coordinator in certain situations to verify each lockout/tagout system. Thus, OSHA has added the term "lockout/tags-plus coordinator" to the definition section. The lockout/tags-plus coordinator is an employee designated by the employer to coordinate all lockout and tags-plus applications on vessels or vessel sections and at landside facilities when employees are performing multiple servicing operations on the same equipment at the same time, or on vessels and vessel sections when employees are servicing multiple machines, equipment, or systems at the same time. As explained in the summary and explanation of § 1915.89, the employer may have more than one lockout/tags-plus coordinator, depending on the size of the shipyard and the scope of work being performed at any given time. The coordinator will also be responsible for maintaining a lockout/tagout log for each worksite.

Lockout/tags-plus materials and hardware. A new definition for "lockout/tags-plus materials and hardware" was added to clarify the requirements for controlling hazardous energy in § 1915.89. This hardware includes locks, chains, wedges, blanks, key blocks, adapter pins, self-locking fasteners, or other hardware used to isolate, block, or secure machinery, equipment, or systems to prevent the release of energy or the startup or energization of the machinery, equipment, or system.

Navy ship's force. A new term for "Navy ship's force" was added to clarify situations when naval vessels are in shipyards and the ship's force will maintain control of the lockout/tagout applications under § 1915.89. "Navy ship's force" is the crew of a vessel, owned and operated by the U.S. Navy, other than a time- or voyage-chartered vessel, that is under the control of a Commanding Officer or Master.

Normal production operations. The term "normal production operations" was modified from proposed § 1915.89 to include several examples of machinery or equipment that OSHA intends this phrase to encompass. These machines or types of equipment may include, but are not limited to, punch presses, bending presses, shears, lathes, keel press rollers, or automated burning machines.

Readily accessible/available. In § 1915.82, Lighting, § 1915.83, Utilities, § 1915.87, Medical services and first aid, and § 1915.88, Sanitation, OSHA uses the term "readily accessible." Several commenters requested that OSHA clarify the term "readily accessible" for this final rule (Exs. 105.1; 121.1). OSHA agrees, and has defined "readily accessible/available" to mean capable of being reached quickly enough by an employee to ensure, for example, that medical services and first aid can be rendered effectively, or that employees can reach sanitation facilities in time to meet their health and personal needs.

Servicing. The proposed term "servicing and/or maintenance" in § 1915.89, Control of hazardous energy, has been shortened in the final rule to "servicing" because "maintenance" has been incorporated into the definition as one of the workplace activities that the term "servicing" encompasses. The definition now clarifies that servicing covers workplace activities that involve constructing, installing, adjusting, inspecting, modifying, testing, and repairing machinery, equipment or systems. Servicing also includes maintaining machines, equipment, or systems when performing these services would expose the employee to harm from the start-up or energization of the system being serviced or the release of hazardous energy. Servicing would not include the inspection of a space since that is not an inspection of a machine, piece of equipment or a system.

Shield. As used in § 1915.83, Utilities, "shield" means to install a covering, protective layer, or other effective measure on or around a steam hose or temporary steam-piping system, including metal fittings and couplings, to protect employees from coming into contact with hot surfaces or elements. This action would protect the employee, as well as the piping or hose. OSHA received comments requesting that this definition be added to the final rule (Exs. 106.1; 117.1).

Short bight. In § 1915.83 of the final rule, Utilities, OSHA added the new term "short bight." NIOSH commented: "[I]t would be useful to define the term 'short bights'" (Ex. 129.1). OSHA agrees with this comment. "Short bight" is the loop that is created in a line or rope that is used to tie back or fasten hoses, wiring, or fittings. A short bight is not the rope, or the act of fastening the hose, but the loop in the rope that is being used.

Tag. OSHA has shortened the phrase "tagout device" from proposed § 1915.89, Control of hazardous energy, by removing the word "device," since "device" is not needed to explain what a tag is. The term "tag" is self explanatory, although OSHA retained the definition of this term in this final rule. Throughout the standard, when the proposal required the employer to affix a "tagout device," OSHA has simplified the term to "tag" for the final rule. The term is defined as a prominent warning device that includes a means of attachment that can be securely fastened to an energy-isolating device in accordance with an established procedure to indicate that the energy-isolating device and the equipment being controlled must not be operated until the tag is removed by an authorized employee.

Tags-plus system. A definition for "tags-plus system" was added to clarify the requirements of § 1915.89, Control of hazardous energy. Although similar to the proposed "tagout" definition, it needed to be revised to be consistent with requirements in the final standard. Tags-plus is a system for controlling hazardous energy that is comprised of: An energy-isolating device with a tag affixed to it and an additional safety measure. It is imperative that employers and employees understand that the system is made up of two parts; without both components, employers will not meet the tags-plus requirements, and employees will not be fully protected.

Verification of isolation. In § 1915.89 of the final rule, a new term, "verification of isolation," was added for clarification. The term refers to the means necessary to detect the presence of hazardous energy, which may involve the use of a test instrument, such as a voltmeter, a visual inspection, or a deliberate attempt to start-up the machinery, equipment, or system. For electric shock protection, employers may not use a visual inspection or a deliberate attempt to start-up the machinery, equipment or system.

Walkway. In § 1915.81, Housekeeping OSHA included a single definition for "walking and working surfaces" in the proposal. Based on comments, that section was amended for clarity. As explained in the summary and explanation of § 1915.81, OSHA split the requirements for walkways and working surfaces into separate provisions and added definitions for both of these terms in this final rule. A "walkway" is any surface where employees walk or pass through to perform their job tasks. This may be a vertical, slanted, or horizontal surface, and may include access ways, designated walkways, aisles, exits, gangways, ladders, ramps, stairs, and passageways. In addition, if an

employer has instructed employees to use an area such as a scaffold to gain access to other locations, the scaffold will also be considered a walkway.

Work area. OSHA has defined two new terms—"work area" and "worksite"—that are used throughout this subpart. These terms were added in response to the number of commenters asking for such definitions (Exs. 101.1; 104.1; 107.1; 124; 126; 128; 130). Richard Webster from Marine Industries Northwest testified: "Work area is also an awkward definition. You've got work location and work area, but you really don't define what it is. * * * So it would be helpful to have work area * * * much better defined than it is right now" (Ex. 198, p. 195). The Agency agrees that defining terms will assist employers to better understand the intent of the provisions where the terms occur. Thus, a "work area" is defined as a specific area, such as a fabrication area, machine shop, tank, space, or hold, where one or more employees are working.

Working surface. A "working surface," as used in § 1915.81, Housekeeping, encompasses any surface where work is occurring or any area where tools, materials, and equipment are being staged for performing work. This definition does not include storage areas where tools, materials, and equipment have been stored out of walkways, but it may include a walkway that is now being used to stage tools, materials, and equipment for a job in progress.

Worksite. As discussed previously, this term was added in response to the number of commenters asking for a definition (Exs. 101.1; 104.1; 107.1; 124; 126; 128; 130). A "worksite" is a general work location where employees are performing work, such as a shipyard, pier, vessel, vessel section, or barge.

Terms Not Defined and Definitions Deleted by OSHA

The Agency has decided not to define "adequate" or "adequate number," as used primarily in § 1915.87, Medical services and first aid. Richard Webster of Marine Industries Northwest stated, "You use the terminology over and over again, adequate, adequate. Adequate number of first aid kits, adequate number of—adequate supplies. * * * The term is just begging for [a] definition" (Ex. 198, p. 194). Other commenters stressed the need to define "adequate" (Exs. 101.1; 124; 126; 128; 130.1). OSHA believes that the employer, by considering the factors required in § 1915.87(c)(3), will be able to determine the number of first aid providers they will need at their facility. These factors include the size and location of each shipyard worksite, the number of employees at each worksite, and the nature of the hazards present at each worksite. To determine first aid and CPR needs, employers must also consider the distance of each worksite from on-site infirmaries or clinics, or off-site hospitals. For sanitation facilities, employers must take into account the distance of each worksite from the sanitation facilities.

OSHA has also deleted the following proposed definitions from the final rule: "Energized," "energy source," "hot tap," and "ship's systems." While no comments were received on these definitions, Electric Boat Corp. noted that proposed § 1915.89(a)(2)(iii)(B) referred to "hot-tapping" even though 29 CFR 1915.14 "requires a Marine Chemist certificate for hot work on pipelines that contain or have contained flammable or combustible liquids" (Ex. 108.1). Furthermore, Electric Boat Corp. noted:

> NFPA Standard 306 (Control of Gas Hazards on Marine Vessels) does not permit the Marine Chemist to authorize hot tapping except in emergency situations where the vessel is in peril. If this work cannot be authorized in the marine environment why include it in the proposed standard. The practice of hot tapping in a shipyard should be removed to eliminate any confusion (Ex. 108.2).

OSHA agrees with the commenter and understands that hot tapping is an uncommon practice in shipyard employment. Therefore, the definition and related provisions have been removed from this final rule.

The terms "energized," "energy source," and "ship's systems" are no longer used in the regulatory text of § 1915.89 of this final rule and, therefore, need not be defined.

Definitions Included Without Change or With Minor Editorial Changes

OSHA did not receive comments on the remaining definitions, and believes that all of the terms used in this subpart are "terms of art" in the industry and are universally recognized by shipyard employees and employers. In addition, some terms were carried forward into the final standard with only minor editorial changes. These terms include "affected employee," "capable of being locked out," "energy-isolating device," "healthcare provider," "lockout," "motor vehicle," "portable toilet," "potable water," "sanitation facility," "serviceable condition," "sewered toilet," "tagout," "vehicle safety equipment," and "vermin."

Section 1915.81—Housekeeping

This section of the final rule covers housekeeping issues that are found throughout shipyard employment that, unless adequately addressed, can add to an already hazardous environment. The final rule, like the proposed rule, consolidates, revises, and reorganizes the housekeeping requirements applicable to shipyards (§ 1910.141(a)(3) and § 1915.91). However, in the final rule OSHA has changed the approach to, and the organization of, the housekeeping requirements.

In the proposed rule, OSHA applied the housekeeping requirements uniformly to all "walking and working surfaces" rather than treating walking surfaces and working surfaces as two distinct areas having unique characteristics and warranting separate safety considerations and requirements. As mentioned in the discussion of § 1915.80(b), the proposed rule defined walking and working surfaces as "any surface on or through which employees gain access to or perform their job duties or upon or through which employees are required or allowed to walk or work in their workplace." The proposed definition also specified that the term included work areas, accessways, aisles, exits, gangways, ladders, ramps, stairs, steps, and walkways. OSHA applied this umbrella term to all of the housekeeping requirements in an attempt to make this section easier to understand.

However, many commenters expressed concern that combining walking and working surfaces created a term that was too broad (Exs. 106.1; 108.2; 117.1). For example, Electric Boat stated: "Every location in a shipyard and on a vessel has the potential to be a working surface" (Ex. 108.2). Bath Iron Works added that the term walking and working surfaces is so broad that it "will include every square foot of a shipyard" (Ex. 106.1).

Stakeholders also said combining walking and working surfaces as one term could result in confusion since walking surfaces sometimes became working surfaces and vice versa (Exs. 121.1; 199, p. 102). Manitowoc Marine Group commented: "During the construction and repair of a vessel, many operations take place simultaneously, and it could be easily very difficult to discriminate what is and what is not considered, quote, a 'work area'" (Ex. 168, p. 68). Commenters from the American Shipbuilding Association and the North Pacific Fishing Vessel Owners' Association requested that OSHA establish separate definitions for walkways and working surfaces to eliminate potential confusion (Exs. 117.1; 197).

Northrop Grumman—Newport News pointed to the uniqueness of working surfaces in shipyard employment to support dividing walking and working surfaces into separate terms:

> Shipbuilding and repair, by nature, requires employees to access numerous small, awkward spaces, such as the catapult wing voids on aircraft carriers and vertical launch silos on submarines; therefore, working space is inherently limited even under the very best housekeeping practices (Exs. 116.2; 120.1).

Based on the comments received and testimony heard, OSHA has decided to separate "walking and working surfaces" into two terms: "walkways" and "working surfaces." Section 1915.80(b)(35) of the final rule defines a "walkway" as any surface on which employees walk, including areas that employees pass through, to perform their job tasks. Walkways include, but are not limited to, accessways, designated walkways, aisles, exits, gangways, ladders, ramps, stairs, steps, passageways, and scaffolding. If an area is used or is intended to be used, to gain access to other locations, it is a walkway within the meaning of the final rule.

The final rule defines "working surface" as any surface where work is occurring or any area where tools, material, and equipment are being staged for performing work (§ 1915.80(b)(37)).

To make the distinction between walkways and working surfaces, OSHA has reorganized § 1915.81 of the final standard into three paragraphs. Paragraph (a) covers general requirements that apply to both walkways and working surfaces; paragraph (b) includes specific requirements for walkways; and paragraph (c) includes specific requirements for working surfaces.

Paragraph (a)—General Requirements

Paragraph (a)(1) requires the employer to establish and maintain good housekeeping practices to eliminate hazards to employees to the extent practicable. Proposed § 1915.81(a) required that the employer maintain good housekeeping conditions "at all times" to ensure that walking and working surfaces "do not create a hazard for employees." American Seafoods Company commented that this requirement was "vague and impractical in that maintenance and cleaning operations at times necessitate that the walking and working surfaces be lifted from their frames" (Ex. 105.1). In addition, the U.S. Navy stated that the term "'[g]ood housekeeping' adds an ambiguity without apparent benefit" (Ex. 132.2). Other stakeholders said that in shipyard employment it is not always possible to maintain good housekeeping conditions at all times (Exs. 99; 104.1; 107). For example, Steven Labreque of Electric Boat Corp. said: "Maintaining a clean and dry condition in all these locations is simply not feasible" (Ex. 108.2).

After considering stakeholder comments and other information in the record, OSHA has modified the language in § 1915.81(a) of the final rule in two ways. First, the final rule requires that employers establish good housekeeping practices. OSHA's intention in including a general housekeeping requirement has always been to ensure that shipyard employers develop and implement procedures for regular and systematic housekeeping to minimize hazards and protect employees from harm. In particular, OSHA believes that requiring employers to establish regular housekeeping practices will be effective in helping to reduce the large number of slip, trip, and fall injuries that occur in shipyard employment. As stated in the preamble to the proposed rule (72 FR 72458, December 20, 2007), according to the BLS data for 2002, slips, trips, and falls accounted for 19 percent of all injuries and illnesses involving days away from work in ship and boat building and repairing (Ex. 69).

Second, OSHA has revised the language in paragraph (a)(1) to require that employer housekeeping practices eliminate hazards to employees "to the extent practicable." The proposed rule would have required that employers ensure that they maintain good housekeeping conditions at all times in their workplaces so no hazard is created for employees. The revised language recognizes that, due to unique conditions inherent in shipyard employment, it may not be possible to maintain good housekeeping conditions in shipyard-employment workplaces at all times or ensure that workplace conditions never present a hazard. However, the rule requires employers to implement and maintain rigorous housekeeping conditions unless it is impracticable.

Paragraph (a)(2) specifies that employers must eliminate slippery conditions on walkways and working surfaces "as necessary." This provision, proposed as paragraph (g), would have required that slippery conditions, including snow and ice, be eliminated "as they occur."

Northrop Grumman Shipbuilding—Newport News supported the proposal: "[E]liminating slippery conditions, including those associated with snow and ice, are important to minimizing the risk of an employee slipping and being injured" (Exs. 116.2; 120.1). However, a number of other commenters were opposed to the proposed requirement. Trident Seafoods Corporation, the U.S. Navy, Bath Iron Works, the Shipbuilders Council of America, American Shipbuilding Association, and Sound Testing, Inc., said it is extremely difficult in shipyard-employment worksites to ensure that snow and ice are immediately eliminated (Exs. 104.1; 106.1; 107.1; 114.1; 115.1; 117.1; 118.1; 119.1; 121.1; 125; 132.2; 168, p. 68; 199, pp. 55, 80–83). For instance, Atlantic Marine said: "It is not practical to eliminate snow and ice as they occur" (Exs. 115.1; 118.1). Roy Martin testified that the proposed requirement "represents an unrealistic expectation. Removing snow and ice as they occur is not practical, considering, as I well know [from] firsthand experience on the Great Lakes, conditions such as this may last several days, making constant attention a major burden, if not infeasible" (Ex. 168, p. 57). Dale Myer of Arctic Storm Management Group testified that requiring employers to clean slippery conditions as they occur would be impossible because such conditions were "almost impossible to define. When is a surface slippery? * * * So is one flake going to be snow occurred? Is one inch going to be snow occurred? Is a trace of snow going to be as it occurs?" (Ex. 199, p. 82).

Stakeholders suggested alternative approaches. Atlantic Marine suggested that OSHA allow "a practical amount of time" to remove snow and ice (Exs. 115.1; 118.1). Dale Myer recommended:

> I believe that the phrases that you have in subsection D [proposed paragraph (d)], which talks about the dry conditions, as it reads it says, maintain so far as practical in dry conditions. I think that phrase, 'so far as practical,' should actually be incorporated into G [proposed paragraph (g)] (Ex. 199, p. 83).

To address stakeholders' concerns, OSHA has revised the language of the final rule to require that employers eliminate slippery conditions "as necessary." OSHA intends "as necessary" to mean that conditions are such that they can pose a hazard to employees. The revised language gives employers flexibility in determining whether the particular conditions may pose a hazard to employees or have deteriorated such that action is necessary. In addition, the performance-based approach gives employers flexibility in determining what method of eliminating slippery conditions will work most effectively for them.

During the hearings, participants described some of the methods and

procedures they use at their shipyard facilities. For instance, Roy Martin described how Manitowoc Marine Group deals with ice and snow:

> We will have someone come in the moment we do have an event, and they will start the cleanup process, as much as feasible. They will clean the main thoroughfares, and they will sand-salt as they are cleaning as well. We do have areas around the vessels which we train our employees to help utilize the salt-sand buckets, for lack of [a] better phrase, at these areas as well. We utilize a lot of employee assistance in that, because, as you well know, there are instances where we have days of extensive weather (Ex. 168, p. 93).

Some stakeholders stated that, in certain severe weather conditions, it was not always possible to eliminate slippery conditions (Exs. 115.1; 116.1; 118.1). The final rule recognizes that, in some circumstances, weather conditions may make it impracticable for employers to eliminate slippery conditions. In such cases, employers must take alternative action to ensure that employees are not injured. Accordingly, the final rule specifies that when it is impracticable for employers to eliminate slippery conditions, they must either (1) restrict employees to designated walkways and working surfaces where the employer has been able to eliminate slippery conditions, or (2) provide employees with slip-resistant footwear. This footwear must be provided in accordance with 29 CFR part 1915, subpart I. In particular, § 1915.152(f) specifies whether the employer must provide personal protective equipment (PPE) at no cost to employees.

OSHA does not think that employers will have difficulty in complying with the alternative methods. For example, Dale Myer stated that their company already has incorporated slip-resistant footwear in their housekeeping program:

> Another thing that we do is we have bought our crew slip-on, you know, we call them toggles. What they are is they're just, they slip right over the rubber boots and stuff like that. They're like grippers. And when we have been working on the dock and the dock is slippery, we provide those to our crew members (Ex. 199, pp. 87–88).

Paragraph (a)(3) requires that employers store materials in a manner that does not create a hazard for employees. Proposed § 1915.91(h) would have required that "construction materials" be stacked in a manner that does not create a hazard to employees. Information in the record, including site visits to shipyards and on fishing vessels (Ex. 207), support expanding the final rule to cover more than construction materials and address additional storage methods. Shipyard employment activities involve large amounts of materials, including construction materials, drums filled with hydraulic fluid, pallets (empty and full), and equipment such as welding machinery. If any of these materials are not properly stored or stacked, they could create a hazard for employees. For instance, if hydraulic drums are not properly stacked, they could topple over and injure workers. Scaffolding material could cause trips and falls if they are not stored properly when not in use. Therefore, the final rule expands the scope of this provision to cover all materials used in shipyard employment, including materials for constructing or repairing vessels and vessel sections, as well as any materials used in daily shipyard operations.

In addition, the final rule specifies that the employer must "store" materials safely, which is more comprehensive than the proposed requirement to "stack" materials safely. OSHA believes that requiring materials to be stored safely will protect employees from injury no matter whether the employer chooses to stack them or use another storage method.

Paragraph (a)(4) requires that employers maintain easy and open access to fire alarm boxes, fire call stations, all fire-fighting equipment, and exits, including ladders, staircases, scaffolds, and gangways. Proposed § 1915.81(f) contained a similar requirement, but the provision referred generally to maintaining easy access to "exits." In shipyard-employment workplaces, there are many types of exits and methods of egress, including gangways, ladders, staircases, and scaffolds. OSHA believes that employees must have immediate access to all means of egress in the event of an emergency. Therefore, the final rule clarifies additional types of exits in shipyard-employment workplaces to which the employer must maintain easy and open access.

Paragraph (a)(5) requires that all flammable and combustible substances, such as paint thinners, solvents, rags, scrap, and waste, be disposed of or stored in covered fire-resistant containers. The final rule combines proposed paragraphs (j) and (k) into one provision. Proposed § 1915.81(j) would have required that all oils, paint thinners, solvents, waste, soaked rags, or other flammable substances be kept in fire-resistant covered containers when not in use. Similarly, proposed § 1915.81(k) would have required that combustible scrap be removed from work areas as soon as possible.

Several commenters, including Bath Iron Works, the Shipbuilders Council of America, and Atlantic Marine, recommended that OSHA delete both proposed paragraphs (j) and (k), saying 29 CFR part 1915, subpart P, Fire Protection in Shipyard Employment, covers these issues (Exs. 106.1; 108.2; 114.1; 115.1; 117.1; 118.1). To the extent that subpart P covers the hazards of flammable and combustible substances, the requirements only apply to work areas where hot work is performed. Section 1915.81(a)(5), on the other hand, addresses flammable and combustible substances wherever they are used, located, or stored in shipyard-employment worksites. Therefore, OSHA believes it is necessary to retain the proposed requirements in the final rule. The Agency believes that the removal or proper storage of flammable and combustible substances is important to ensure that employees have safe working conditions.

Paragraph (a)(5) also requires that flammable and combustible substances be disposed of or stored at the completion of a job or end of a workshift, whichever occurs first. Proposed § 1915.81(j) would have required that flammable substances be stored "when not in use," while proposed § 1915.81(j) would have required that combustible scrap be removed from work areas "as soon as possible."

Trident Seafoods Corporation raised concerns about when employers must store or dispose of substances (Exs. 104.1; 107.1; 199, pp. 136–137):

> Does 'when not in use' mean that closed paint thinner cans must be placed in covered fire resistant containers during short breaks? It would be better if this requirement read along the lines of 'at the end of the shift, when no longer needed for [on] the particular portion of the job being performed or end of the work day whichever comes first' (Exs. 104.1; 107.1).

OSHA agrees with the commenter's recommendation. OSHA did not intend to require that employers store flammable substances while employees are at lunch or on break. OSHA used performance-based language in proposed paragraphs (j) and (k) to give employers flexibility in how to best comply with the requirements. OSHA believes the commenter's recommendation provides clearer direction to employers, while ensuring adequate protection for employees. Accordingly, the final rule requires that employers dispose of or store flammable and combustible substances at the end of each workshift or when the job is completed, whichever occurs first.

Paragraph (b)—Walkways

Paragraph (b) sets forth requirements to protect employees from hazards when they are using walkways. OSHA has included in paragraph (b) those requirements from the proposed rule that were intended to apply primarily to walkways, as well as requirements that address issues that are unique to walkways.

Paragraph (b)(1)(i) requires that all walkways provide adequate passage. The proposed rule contained a similar requirement (proposed § 1915.81(b)). This requirement is intended to be read in conjunction with paragraphs (b)(1)(ii)–(iv), which address keeping walkways clear of debris, materials, hoses, and cords. Taken together, these provisions provide employers with directions for ensuring that walkways provide safe and adequate passage.

Paragraph (b)(1)(ii) requires that walkways be clear of debris, including solid and liquid wastes, that may create a hazard for employees. The proposal included a similar provision (§ 1915.81(e)). Sound Testing, Inc., requested that OSHA define "solid and liquid waste" (Ex. 121.1). OSHA believes that employers understand that "solid and liquid waste" includes any materials unused and rejected as unwanted, such as trash, used materials, scraps, studs, welding rod tips, nuts or bolts, broken equipment, empty containers, or other items that will be thrown away. OSHA intends that the term have only the normal definition of "waste"; therefore, the Agency does not believe it is necessary to add a definition to the regulatory text.

Paragraph (b)(1)(iii) specifies that employers ensure walkways are free from tools, materials, equipment, and other objects that may cause a hazard to employees. Proposed § 1915.81(c) would have required that only tools, materials, and equipment necessary to perform the job in progress may be kept on walking and working surfaces, and that all other tools, materials, and equipment be stored or located in an area that does not interfere with walking and working surfaces.

General Dynamics Electric Boat and Sound Testing, Inc., recommended that the provision be applied only to walkways, not working surfaces (Exs. 108.2; 121.1). For example, Phil Dovinh, of Sound Testing, Inc., stated:

> Walking surfaces should be kept clear of all tools and equipment at all times—portable welding machines, generators, blowers and ventilation equipment, gas cylinders and fire extinguishers, welding leads, cables and hoses, pressure washers, pumps, etc * * * all are necessary during hot work, repair or maintenance operations, and could easily block a walkway—hence potentially hindering an emergency escape. A walking surface can become a working surface when the repair is required—only then tools and equipment may be placed on the walking surfaces as needed to successfully complete the job (Ex. 121.1).

OSHA believes that walkways must be clear from tools, materials, and equipment at all times. If materials and equipment are placed in walkways, employees passing through the area are at risk of injury. OSHA recognizes that workers need to have the necessary tools, materials, and equipment at hand to perform their jobs. However, if employees place materials or equipment in a walkway, that walkway becomes a working surface and the employer must prevent the area from being used as a walkway (see discussion of paragraph (b)(2)).

Paragraph (b)(1)(iv) requires that walkways be clear of hoses and electrical service cords, and identifies acceptable means to meet that requirement. The purpose of the proposed and final provisions is to prevent injury to employees and damage to the hoses and cords.

The proposed rule (proposed § 1915.81(i)) contained a similar requirement, but it did not include a general provision allowing employers to use other suitable means to keep hoses and cords out of walkways. Stakeholders suggested that OSHA allow employers to use additional methods to prevent employee contact with hoses and cords. For example, Trident Seafood Corporation recommended "the option of ensuring that hoses and electrical cords are kept to the side of a walkway or working surface provided they are not trip hazards or in danger of being damaged" (Exs. 104.1; 107.1). General Dynamics NASSCO recommended that:

> Hoses, cords and leads shall be routed in a manner that prevents employee exposure to trip hazards and damage to the hoses, cords, and leads. Walkways shall be kept free of trip hazards by routing hoses, cords and leads overhead, through crossovers or by other suitable means (Ex. 119.1).

OSHA agrees with the commenters' statements that there are additional safe ways to protect employees from contact with hoses and cords in walkways. Accordingly, OSHA has modified paragraph (b)(1)(iv) to provide employers alternatives to comply with this provision. Employers may either place hoses and cords above walkways, underneath walkways, or on walkways, provided they are covered by crossovers or other means. In addition, OSHA has added a performance-based alternative that allows the employer to protect each hose and cord by another suitable means, provided that the "suitable means" provides equivalent protection for employees and prevents damage to the hoses and cords. OSHA believes that this revision gives employers greater flexibility in complying with the requirement of paragraph (b)(1)(iv).

Several commenters raised an issue about applying this provision to both walking and working surfaces. Northrop Grumman Shipbuilding—Newport News argued that the provision was not feasible for working surfaces: "Employees may perform job tasks in tight, confined or otherwise awkward areas on ships where there is limited overhead to hang a line or room to cover the line" (Exs. 116.2; 120.1). Based on these comments, the Agency has changed the final rule so it applies only to walkways.

In paragraph (b)(2) of the final rule, OSHA is adding a new requirement that specifies what action employers must take if they use a walkway as a working surface. Paragraph (b)(2) requires that employers cordon off any portion of a walkway they are using as a working surface to prevent the area from being used as a walkway.

As mentioned, many stakeholders said using walkways as working surfaces is a common occurrence in shipyard employment (Exs. 108.2; 121.1; 199, p. 122). Philip Dovinh, from Sound Testing, Inc., commented: "A walking surface can become a working surface when repair is required—only then tools and equipment may be placed on the walking surfaces as needed to successfully complete the job" (Ex. 121.1).

The new requirement ensures that this common occurrence in shipyard employment does not injure or endanger workers. If workers are allowed to walk through a walkway that is also being used as a working surface, they could bump into employees working in the area or disturb equipment or materials that are being used to perform the job in that area. OSHA believes that this new requirement protects not only workers who otherwise would use the walkway as a thoroughfare, but also employees who are working in the cordoned-off section.

OSHA notes that even if the employer uses a portion of a walkway as a working surface, the employer is still required to ensure that each walkway provides adequate passage (§ 1915.81(b)(1)(i)). If the remaining portion of the walkway does not provide adequate passage, the employer must provide other means of access.

Paragraph (c)—Working Surfaces

Paragraph (c) specifies the requirements that employers must follow, in addition to those in paragraph (a), to protect employees on working surfaces. Paragraph (c)(1) requires that employers ensure that each working surface is cleared of tools, materials, and equipment that are not necessary to perform the job in progress. The proposed rule contained a similar requirement (proposed § 1915.81(c)). OSHA understands that some jobs may require a large amount of tools, materials, or equipment, and that workers should be able to access these items as they are needed. However, excess tools, materials, and equipment pose a risk of slips, trips, falls, or other injuries. In addition, excess materials take up precious space in what stakeholders say are small, tight working areas in shipyard employment (Ex. 116.2; 120.1). OSHA did not receive any comments opposing this requirement as it applies to working surfaces.

Paragraph (c)(2) requires employers to ensure that each working surface is cleared of debris, including solid and liquid waste, at the end of each workshift or job, whichever occurs first. Proposed § 1915.81(e) would have required that both walking and working surfaces be kept clear of debris at all times. OSHA has modified that requirement as it applies to working surfaces in this final rule. In active work areas, OSHA recognizes that the job may produce debris. OSHA did not intend to require employers to stop the job to clear the area every time debris is produced. Rather, OSHA intended that at the end of each workshift, the employer shall clean up and remove debris from the work area. If a job is completed before a workshift ends, the final rule requires that the employer clear debris from the work area at that time. The Agency believes that the revised language in paragraph (c)(2) provides greater clarity than the proposal.

Paragraph (c)(3) specifies that each working surface be maintained, so far as practicable, in a dry condition. When wet processes are used, the final rule requires that the employer implement measures so workers have dry standing places. If that is not practicable, the final rule requires that the employer provide footgear that protects the employee from the wet process. Proposed § 1915.81(d) contained a similar requirement.

A number of commenters said the language in the proposed rule implied that employers would be required to provide waterproof footgear to all workers any time the floor or deck of a work area became wet. Atlantic Marine stated that:

> The way this paragraph reads, employers would have to provide waterproof foot gear every time it rains because the surface may not dry immediately. Atlantic Marine assumes that OSHA did not intend rain gear to be required PPE since it is specifically excluded in the recent payment for PPE final rule; however, the way that this section is worded, it becomes required PPE. Please remove or reword this section (Exs. 115.1; 118.1).

American Shipbuilding Association added:

> Paragraph (d) is problematic due to the breadth of its scope[;] however[,] the proposal retains the existing requirement that employers must provide waterproof boots to workers in every work area where wet processes take place if keeping the floor or deck of that work area dry is not practicable. Because every location in a shipyard and on a vessel is a potential working area and many of those areas are located outdoors, the proposal should be more specific in defining work areas and should explicitly exclude walking areas. Otherwise, it could be interpreted to mean that employers must provide waterproof boots to all employees in the event of rain at the facility. Among wet processes, the proposal explicitly includes painting and cleaning. Those two processes should be removed as examples because waterproof footgear does not necessarily provide the best protection when painting and cleaning. Many waterproof rubbers will dissolve in solvents used in the painting process. Cleaning a tank containing acid, for example, requires more than waterproof footgear for adequate protection (Ex. 117.1).

Other commenters raised the same concerns (Exs. 104.1; 106.1; 107.1; 199, pp. 80–81, 106).

OSHA believes it is important for employers to maintain working surfaces in dry condition when possible to protect employees from injury. Keeping working surfaces dry will help to prevent slips, trips, and falls, which constitute a significant portion of injuries in shipyard employment (Ex. 69). Therefore, OSHA is retaining this general provision in the final rule.

Paragraph (c)(3) also requires that employers take additional actions if they cannot keep working surfaces in a dry condition. However, these additional actions only apply in work areas where employers are using wet processes. Shipyard employment involves various wet processes, including hydroblasting, gas-freeing, and cleaning. Employers do not have to implement the additional actions in non-wet processes or operations or where working surfaces are wet because of weather conditions. OSHA has revised the language in paragraph (c)(3) to clarify that the additional actions only apply in work areas where wet processes are used.

If employers cannot keep working surfaces in a dry condition when using wet processes, they will need to maintain drainage and implement measures, such as false floors, platforms, mats, or other types of dry standing places, to prevent employees from being exposed to contaminated water or from standing for prolonged periods of time in water, both of which may result in adverse health effects.

When the employer demonstrates that this procedures is not practicable to implement measures in wet processes that will provide dry standing places for workers, paragraph (c)(3) requires that employers provide footgear that protects employees from exposure to contaminants (for example, standing in water to perform job tasks). Paragraph (c)(3) also requires employers to provide protective footgear in accordance with the requirements of subpart I. Among other requirements in subpart I, § 1915.152(f) establishes requirements for when employers must provide personal protective equipment at no cost to the employee.

In addition, OSHA has revised the language in paragraph (c)(3) specifying what type of footgear employers must provide when it is not practicable for the employer to keep the working surface dry. The final rule requires employers to provide "protective footgear" in such cases. The proposed rule, on the other hand, would have required that employers provide "waterproof footgear, such as rubber overboots." As noted earlier, one stakeholder pointed out a problem with the proposed requirement to provide waterproof or rubber boots in certain wet processes:

> Among wet processes, the proposal explicitly includes painting and cleaning. Those two processes should be removed as examples because waterproof footgear does not necessarily provide the best protection when painting and cleaning. Many waterproof rubbers will dissolve in solvents used in the painting process. Cleaning a tank containing acid, for example, requires more than waterproof footgear for adequate protection (Ex. 117.1).

OSHA believes that the revised language in the final rule addresses the commenters' issue and ensures that employers provide the type of footgear that will protect employees in the particular wet process they are using or working.

Section 1915.82—Lighting

This section sets forth lighting requirements in shipyard-employment

workplaces. OSHA reorganized this section into four paragraphs: (1) General requirements; (2) temporary lights; (3) portable lights; and (4) explosion-proof, self-contained lights.

Paragraph (a)—General Requirements

Paragraph (a) establishes general lighting requirements that apply in all areas of shipyard employment, regardless of whether permanent or temporary lights are used. Adequately lit workplaces are essential in preventing employees from being injured or killed because they can't see and avoid hazards that might be present. As discussed in the preamble to the proposed rule, there have been fatalities in shipyard employment that may have been prevented if the employer had provided adequate lighting (72 FR 72452, 72459–60, Dec. 20, 2007). In one case, an employee was electrocuted while performing repair work in a poorly lighted area. In another case, an employee was killed when he stepped into a dark cargo deck and fell through an opening in the floor to the bottom of the cargo hold. These types of worker fatalities clearly indicate that employers need to provide lighting that is sufficient for employees to see where they are, where they are going, and what job tasks they are performing.

Paragraph (a)(1) requires that employers adequately illuminate each work area and walkway whenever a worker is present. This requirement is the same general requirement as the existing rule and the proposed rule. OSHA received no comments opposing this requirement and, therefore, is retaining the requirement in the final rule.

In paragraph (a)(2), OSHA carries over from the proposal the table of lighting intensity levels (Table F–1) for landside areas. For vessels and vessel sections, paragraph (a)(3) allows employers either to provide lighting that achieves the levels in Table F–1 or to meet the requirements of ANSI/IESNA RP–7–01, "Recommended Practice for Lighting Industrial Facilities" (incorporated by reference as set forth in § 1915.5). The proposed rule would have required employers to provide lighting on vessels and vessel sections that meets the levels in Table F–1.

Table F–1 sets forth the minimum illumination requirements for designated areas in shipyard employment. For instance, Table F–1 specifies that general landside areas, such as corridors and walkways that employees pass through, must have an illumination intensity of at least five lumens (foot candles). Higher illumination levels (for example, 10 lumens) are required for landside areas such as machine and carpentry shops where employees use hazardous tools and equipment and perform precision work. Likewise, higher illumination levels are required in warehouses, where employees read signs and warning labels and operate forklift trucks and other heavy equipment where controls or instructions must be seen and understood. OSHA developed the illumination levels in Table F–1 from the requirements in its Construction Illumination (§ 1926.56) and Hazardous Waste Operations (§ 1910.120) standards, and from the American National Standards Institute (ANSI) standard, Recommended Practice for Lighting Industrial Facilities (ANSI/IESNA RP–7–01) (Ex. 38). The Agency believes illumination requirements at these levels will help to ensure that workers have sufficient lighting to safely move about and perform work tasks.

Table F–1 of the final rule includes a note indicating that the required illumination levels in the table do not apply to emergency or portable lighting. The final rule carries over the note in proposed Table F–1 with minor revisions. OSHA did not receive any comments on the note.

OSHA developed proposed Table F–1, in large part, because SESAC recommended that OSHA revise the lighting standards to include specific illumination levels (Docket SESAC–1992–1, Ex. 100X, 1992, p. 113). Some stakeholders, such as General Dynamics NASSCO, generally agreed with requiring employers to meet the illumination levels in Table F–1 (Ex. 119.1). However, OSHA also received mixed reaction to the proposed Table F–1. During the hearing John Killingsworth, representing the Puget Sound Shipbuilders Association, testified:

> [T]he numbers in this table on lumens for specific work areas are somewhat reasonable and they're achievable. But in my 43 years of work experience, I've never had to carry a light meter into any work area I've been in. In order to comply with this section, however, I guess I'll have to. Will it reduce risk? I don't think so (Ex. 198, p. 86).

OSHA also received several comments opposing the application of proposed Table F–1 on vessels (Exs. 105.1; 112.1; 131.1; 132.2; 168, pp. 286–287; 198, pp. 20–22). For instance, Northrop Grumman Shipbuilding—Newport News stated:

> We agree that adequate lighting is important to ensure employees can access and perform work safely. However, we have conducted numerous lighting measurements on ships and do not believe that a prescriptive table of lighting intensities is practical. Our findings indicate that it is extremely difficult to obtain uniform lighting due to interferences associated with ship's components and materials. Our results indicate that passageways and decks, in general, are visible at lighting levels below those listed in the table. We recommend that Table [F–1] be removed and that performance-oriented language be provided along with a non-mandatory reference to ANSI/IESNA [RP–7–01–2001]. We recommend the following or similar language, 'The employer shall ensure that areas where employees will work or must pass through to access their work are adequately illuminated.' ANSI/IESNA [RP–7–01–2001] should be used as a non-mandatory reference to assist in determining the adequacy of lighting (Exs. 116.2; 120.1).

The American Shipbuilding Association (ASA) stated:

> Our findings indicate that it is extremely difficult to obtain uniform lighting [on vessels] due to the variety of shipboard configurations encountered. Equipment and smaller internal compartments obstruct lighting and cause shadows even in the best-lit work environments. Unlike in buildings, where lighting is usually level with the ceiling or only slightly recessed, on ships, lighting is often not the lowest fixture in the overhead. It is therefore often subject to obstruction by other ship's structures (Ex. 204.1).

In sum, many commenters found the illumination levels in proposed Table F–1 problematic for vessels and vessel sections.

Although OSHA believes that the minimum levels specified in Table F–1 provide useful and clear assistance for employers, the Agency also is persuaded by stakeholders who expressed that it may be difficult for them to maintain uniform lighting levels on vessels and vessel sections using permanent lighting, particularly when the vessel is old or when the employer does not own the vessel. Therefore, in final paragraph (a)(3), OSHA is allowing employers to either follow the illumination levels set forth in Table F–1 for lighting vessels and vessel sections or comply with the appropriate values specified in ANSI/IESNA RP–7–01 (2001). For example, an employer could follow Table F–1 or ANSI/IESNA RP–7–01 (2001) for a fabrication area in a shipyard. By following Table F–1, the employer would be required to ensure that the area was illuminated to 10 fc. Figure A2–2, Recommended Illuminance Values for Industrial Areas/Activities—Outdoor, in ANSI/IESNA RP–7–01 requires 30 fc for the same area. Additionally, for changing rooms (locker rooms) Table F–1 would require the employer to ensure that the area was illuminated to 10 fc, while Figure A2–1, Recommended Illuminance Values

for Industrial Areas/Activities—Interior, in ANSI/IESNA RP–7–01 requires 7 fc for the same area.

OSHA believes that paragraph (a)(3) gives employers greater flexibility in providing lighting that is adequate for workers to safely move and work on vessels and vessel sections. OSHA also believes that allowing employers the option of complying with Table F–1 or the values specified in the ANSI standard will help alleviate stakeholder concerns that the proposed rule would require them to obtain costly personnel and equipment to verify lighting levels (Exs. 116.2; 120.1). In particular, stakeholders were concerned about the costs associated with verifying lighting levels, particularly on vessels undergoing constant change during construction and repair (Ex. 204.1). (See Section IV, Final Economic Analysis, for further discussion.)

Based on the record and site visits, OSHA recognizes that permanent lighting on vessels and vessel sections may be limited. In some circumstances and areas, it may not be possible for employers to install permanent lighting that meets the required illumination levels. This may be particularly true for older vessels. To address this issue, OSHA added a new requirement (paragraph (a)(4)) specifying that, when it is impracticable for employers to provide permanent lighting on vessels or vessel sections that meets the requirements in paragraphs (a)(2) and (a)(3), employers must supplement the permanent lighting with temporary lights. OSHA believes this additional requirement is necessary to ensure that employees have adequate lighting to move about and work safely, while giving employers additional flexibility in meeting the lighting requirements.

In paragraph (a)(5), OSHA carries over from the proposed and existing rules the provision prohibiting the use of matches and open-flame devices for lighting, including during emergencies. OSHA believes that matches and open flames can never be a safe method to light a dark area. This rule requires that employers provide employees with portable lights to ensure safe movement when there is no lighting, or when lights are not working (1915.82(c)(1)).

Paragraph (b)—Temporary Lights

Paragraph (b) sets forth the requirements for temporary lighting, including light guards, grounding, insulation, and splicing. For the most part, the final rule carries forward the requirements in proposed § 1915.82(b).

Several commenters suggested that the provisions in paragraph (b) more properly belong in 29 CFR part 1910 subpart S, Electrical (Exs. 106.1; 108.2; 114.1; 168, p. 75). However, others requested that OSHA have one standard on temporary lighting dedicated to the maritime industry (Ex. 105.1). Although some of the requirements in paragraph (b) address electrical issues, they only address electrical issues to the extent they are associated with temporary lighting. The electrical standards in part 1910, on the other hand, are much more comprehensive and focus primarily on more complex electrical issues. As such, OSHA believes that including the requirements in § 1915.82(b) ensures that the provisions receive appropriate focus.

Paragraph (b)(1) requires that temporary lights be guarded if they do not have "completely" recessed bulbs to prevent employees from accidentally coming into contact with the hot bulb. The final rule is identical to the proposed provision. As noted in the preamble to the proposed standard, unless a temporary light is completely recessed, there is a risk that the light could be damaged or broken, thus creating a hazard for employees (for example, electrical shock, laceration, burn) (72 FR 72460). The requirement to have guards or completely recessed lights will prevent employees from accidentally contacting the hot bulb. These safeguards also will help to prevent combustible materials from igniting.

Northrop Grumman Shipbuilding—Newport News supported the proposed provision (Exs. 116.2; 120.1). One stakeholder suggested that OSHA more clearly define what is meant by "completely recessed" and recommended that OSHA replace the term with the following language: "extend beyond the plane of the lighting fixture opening" (Ex. 132.2). OSHA believes that the term "completely recessed" is clear and self-explanatory, and that the recommended language would add unnecessary complexity without providing significant additional benefit or clarity.

Paragraph (b)(2), like the proposed rule, requires that employers equip temporary lights with electric cords "designed with sufficient capacity to carry the electric load." The final rule updates the existing standard requiring employers to use "heavy duty" electrical cords. OSHA believes that the language in the final rule more clearly and accurately identifies the type of cord employers must provide to ensure that employees are protected from electrical, fire, and other hazards. OSHA recognizes that heavy-duty, hard, and extra-hard cords have accepted meanings in industry standards; however, the use of a heavy-duty cord does not ensure that it has sufficient capacity to carry the particular electric load. OSHA believes the final rule provides clearer direction while giving employers flexibility in choosing what type of cord to use so long as it can safely carry the electric load.

Paragraph (b)(3), like the proposed rule, specifies that connections and insulation for electric cords for temporary lights must be "maintained in a safe condition." To ensure that connections and insulation are "maintained in a safe condition," employers must check insulation and connections to determine whether they continue to be in proper working order and replace those that are broken, cracked, or damaged. If insulation and connections are damaged, workers can be exposed to electrical, fire, and other hazards. OSHA remains convinced that this maintenance requirement is necessary for employee safety. OSHA did not receive comments opposing the requirement.

Paragraph (b)(4) prohibits temporary lights and light stringers from being suspended solely by their cords unless the manufacturer has designed them to be hung that way. Improper suspension of lights by their electric cords places the cords under tension that they were not designed to withstand. Such tension could cause the cords to fray, break, or become damaged and expose employees to electrical and other hazards. The only change the final rule makes in the existing rule is to clarify that lights may only be suspended by the cord if the manufacturer designs the cord to be used that way. OSHA did not receive any comments opposing the proposed change.

Paragraph (b)(5) specifies that lighting stringers must not overload branch circuits, while paragraph (b)(6) requires that branch circuits be equipped with over-current protection with a capacity that does not exceed the rated current-carrying capacity of the cord used. Both provisions were contained in the proposed and existing rules. OSHA believes that both measures are necessary to provide an adequate measure of safety from electrical and fire hazards associated with circuit overloading. Stakeholders did not oppose the proposed requirements.

Paragraph (b)(7) specifies that splices must have insulation that "exceeds" that of the original insulation of the cord. When a splice is necessary on an electrical cord, the current may create a surplus of energy or "hot spot" at the splice junction that is greater than the current for which the cord was designed. Requiring that the rated

capacity of the new insulation exceed the capacity of the cord's insulation ensures that employees will be protected if they touch or come into contact with the cord at the splice. The additional insulation capacity also ensures that hot spots do not start burning or ignite combustible materials in the area.

In the proposal, OSHA requested comment on paragraph (b)(7), including whether the Agency should require a more specific requirement. In particular, OSHA requested comment on whether OSHA should require splices to have insulation that is 1½ times greater than that of the cord. NIOSH expressed a preference for such language, saying such a requirement "could be objectively evaluated and may facilitate compliance and enforcement" (Ex. 129.1). Trident Seafoods Corporation made two recommendations. First, they recommended that OSHA provide guidance on determining when splice insulation "exceeds" the original insulation. They also said that OSHA should reference a "recognized standard for determining appropriate splices insulation such as NFPA [National Fire Protection Association] NC70" standard (Ex. 198, p. 72). On the other hand, the U.S. Navy said that the existing rule requiring that splices have insulation "equal" to that of the cord was adequate, and that it complies with the requirements on splices in the NFPA NC70 national consensus standard (Ex. 132.2).

OSHA decided to adopt the proposed requirement for two reasons. First, OSHA believes that requiring splice insulation to exceed the capacity rating of the insulation on the original cord ensures that employees are fully protected from electrical and other hazards. OSHA notes that employers who use splices with insulation that is 1½ times greater than the original will be in compliance with the final rule.

Second, OSHA believes that the performance-based language in the final rule will give employers greater flexibility. OSHA believes that providing employers with such flexibility will be beneficial, especially since different capacities of splice insulation may be needed depending on the use and location of each temporary light cord.

Paragraph (b)(8) requires that exposed, non-current-carrying metal parts of temporary lights be grounded. It also requires that grounding be provided either through a third wire in the cord that contains the circuit conductors, or through a separate wire that is grounded at the source of the current. In addition, it requires that grounding be done in accordance with the electrical standards in 29 CFR part 1910, subpart S. The proposed rule would have required that grounding be done in accordance with the requirements of § 1915.132(b) (subpart H, Tools and Related Equipment). Since publication of the proposal, OSHA promulgated 29 CFR 1910, subpart S, which supersedes § 1915.132(b). Therefore, OSHA updated the reference in the final rule. No comments were received that opposed paragraph (b)(8).

Paragraph (c)—Portable Lights

Paragraph (c) sets forth requirements for providing and using portable lights, including emergency lights. The proposed rule referred to "handheld" portable lights. A number of stakeholders urged OSHA either to define the term "handheld portable lights" used in proposed paragraph (c), or replace it with either "portable light" or the common term "flashlight" (Exs. 101.1; 121.1; 124; 126; 128; 130.1; 168, pp. 72, 353; 198, pp. 86–87). Several stakeholders pointed out that there are various types of portable lights available and used in the industry, not all of which are handheld. For example, some employers provide portable lights affixed to head protection; one stakeholder strings emergency lighting through the vessel in case of a power outage; and another has a generator linked with permanent lighting systems that transfers power in the event that a power outage occurs (Ex. 168, p. 242).

OSHA's intention in the proposed rule was to ensure that workers do not enter unlighted areas or do not have to move about in dark spaces if lights stop working. OSHA believes stakeholder recommendations that employers be permitted to supply employees with other types of portable lights, as well as handheld ones, will provide greater flexibility while ensuring that workers are protected. Accordingly, the final rule allows employers to use handheld lights as well as other types of portable lights.

Paragraph (c)(1) requires that employers provide, and ensure that employees use, portable lights before they enter a dark area if that area does not have permanent or temporary lights, if the lights do not work, or if permanent or temporary lights are not readily accessible. OSHA believes that workers are at great risk of harm when they enter dark areas, especially on vessels. The IMIS database reports several fatalities in shipyard employment in which workers fell to their deaths in dark areas on vessels (72 FR 72452, 72459–60, Dec. 20, 2007).

For purposes of paragraph (c)(1), the term "not readily accessible" means that fixtures for turning on permanent or temporary lights are not located at, or in close proximity to, the entrance to the dark area. For example, when an employee would have to walk across a dark work area or climb steps in the dark to turn on the lights, OSHA would not consider such lights to be readily accessible. In such cases, the employer would have to provide, and ensure that the employee uses, a portable light to enter the area.

OSHA does not believe that employers will have difficulty complying with this requirement. Some stakeholders said it was "common practice" to provide flashlights to workers (Ex. 114.1). Other stakeholders commented that they already require that workers have portable lights when they go below deck on vessels or enter any area where they cannot see the walking surface (Exs. 116.2; 120.1).

Paragraph (c)(2) requires employers to provide portable or emergency lights for the safe movement of employees on a vessel or vessel section when the only means of illumination comes from off-vessel light sources. The proposed rule contained a similar requirement. Like paragraph (c)(1), this provision is needed because off-vessel lighting could fail, making it hazardous for employees to move around or exit a dark area on the vessel or vessel section. If off-vessel lights stop working when employees are working below deck on a vessel, the workers could be injured or killed if they try to move around or exit the space.

Final paragraph (c)(2) changes the proposed rule in two respects. First, the final rule allows employers to provide either emergency or portable lights. The proposed rule would have required employers to provide portable lights. OSHA is expanding the final rule because some stakeholders said they use back-up generators that activate if off-vessel lights go out (Ex. 168, p. 243).

Second, the final rule deletes the proposed language requiring that employers ensure that portable lights are available in "the immediate work area." Some stakeholders questioned what the immediate work area is when lights go out and asked OSHA to define the term in the final rule (Ex. 168, p. 297). After reviewing the record, OSHA finds that what constitutes an immediate work area on a vessel varies based on factors such as the size of the vessel and its work areas, the number of employees working on the vessel and in specific work areas, and the type of portable or emergency lights being provided. OSHA believes employers

need to examine those factors to determine where portable and emergency lights need to be located to ensure each employee is able to move safely.

Also implicit in paragraph (c)(2) is the requirement that employers provide an adequate number of portable or emergency lights to ensure that each employee is able to move about and exit the dark areas safely. The factors employers use to determine where portable lights need to be located are the same factors for determining the number of portable or emergency lights necessary to ensure that each worker can safely move about if the lights go out.

A number of commenters, including Puget Sound Shipbuilders Association, American Seafoods Company, Trident Seafoods Corporation, and Bath Iron Works, also questioned whether OSHA was requiring each worker to carry a flashlight or portable light at all times (Exs. 104.1; 105.1; 106.1; 107.1; 124). OSHA is not requiring that every worker have a portable light when working on a vessel. For instance, if a number of employees work in the same area on a vessel, one portable light may be sufficient to allow them to move around safely and exit the vessel. However, when an employee is working alone, especially in an isolated area or confined space, the employer must ensure that the worker has a portable or emergency light.

OSHA does not believe that employers will have difficulty complying with this provision. A number of stakeholders commented that they already provide portable or emergency lights to employees working on vessels so they can move safely if the lights go out (Exs. 99; 104.1; 107.1; 114.1; 116.2; 120.1).

Some stakeholders said that they have other procedures they follow when power outages occur on vessels, including having workers stay in place in the dark area until lights are reenergized or someone comes with portable or emergency lights (Exs. 119.1; 125; 168, pp. 242–43). These stakeholders said their "stand fast" policies were safe and adequate, and they should be allowed to continue those practices instead of following paragraph (c)(2) (Exs. 119.1; 125). OSHA does not consider such a practice, by itself, to be sufficient to ensure the safety of workers. For example, it could take hours for lights to be restored, making it difficult for workers to stand fast in dark areas. In addition, if lights have gone off because a situation requires workers to evacuate the vessel immediately, a stand-fast policy could endanger not only the workers waiting in dark areas on the vessel, but also any worker who comes with a light to help them exit the vessel.

The American Shipbuilding Association requested an exception to paragraph (c)(2) when natural sunlight provides sufficient illumination (Ex. 117.1). OSHA's intention was to require that employers provide portable or emergency lights to help workers exit dark areas if off-vessel lights go out. If natural sunlight is sufficient to allow a worker to move safely or exit the vessel, employers do not have to provide portable or emergency lights. The Agency has included language in paragraph (c)(2) clarifying this point.

Paragraph (d)—Explosion-Proof, Self-Contained Lights

Paragraph (d) specifies what type of portable lights employers must provide for use in areas that are not gas-free. The final rule, like proposed paragraph (c)(3), requires employers to ensure that only "explosion-proof, self-contained" portable lights or other electrical equipment approved by a nationally recognized testing laboratory (NRTL) are used. Existing provision § 1915.92(e) also sets forth the same requirements for lights in non-gas-free areas, but does so by referencing § 1915.13(b)(9). Both the proposal and the final rule added the pertinent language from § 1915.13(b)(9) to paragraph (d) thus eliminating the need for employers to reference another standard.

Several stakeholders requested OSHA to clarify that the provision applies to areas with the potential for a flammable atmosphere (Exs. 112.1; 116.2; 120.1; 121.1; 198, pp. 87, 162). OSHA agrees that it is important that employers clearly understand the types of atmospheres in which explosion-proof, self-contained portable and temporary lights are needed. Therefore, OSHA added language to paragraph (d) stating that explosion-proof, self-contained lights are required in any area where the atmosphere is determined to contain a concentration of flammable vapors that are at or above 10 percent of the lower explosive limit, as specified in part 1915, subparts B and C.

Section 1915.83—Utilities

Section 1915.83 of the final rule addresses requirements to protect workers from hazards associated with the unchecked release of steam or electricity, excessive wear and tear of steam hoses that could compromise their integrity, and burns and fires from unguarded heat lamps.

Paragraph (a)—Steam Supply System

Paragraph (a)(1) requires that employers ensure that the vessel's steam piping system, including hoses, is designed to safely handle the working pressure prior to supplying steam from an outside source to the vessel. Paragraph (a)(1) revises the term "responsible vessel's representative" in the existing provision (§ 1915.93(a)(1)) to "responsible vessel's representative, contractor, or any other person who is qualified by training, knowledge, or experience," and requires this individual to determine whether the working pressure is safe.

The proposed rule would have required employers to ensure that the steam supply system has a safe working pressure, but did not carry forward the existing requirement to ascertain that information from a vessel's representative. Instead, the proposed rule would have given employers flexibility in determining the most effective way to ensure that the steam system's working pressure is safe before supplying steam from an outside source.

In the preamble to the proposal, OSHA explained that its intention in proposing to revise the requirement for a vessel's representative was to give employers greater flexibility in determining who they could use to ascertain whether the working pressure was safe—for example, a vessel's representative, contractor, or any other person qualified to make such a determination (72 FR 72452, 72462, Dec. 20, 2007). Trident Seafoods Corporation requested that OSHA make this point clear by adding the preamble language to the final regulatory text (Exs. 104.1; 107.1; 198, p. 73). OSHA agrees with the commenter that including the preamble language in the regulatory text will provide employers with clear and useful information about the various qualified persons whom they can use to comply with the requirement to ensure that the working pressure of the steam system is safe. OSHA also believes that requiring employers to ascertain from a qualified person whether the working pressure is safe will enhance worker safety because it builds regular safety checks into the process.

Atlantic Marine expressed concerns that paragraph (a)(1) would require employers to have written documentation that steam supply systems have safe working pressure and that other requirements in paragraph (a) have been met (Exs. 115.1; 118.1). OSHA does not intend to require employers to document in writing that a qualified person has determined that

the working pressure of the steam supply system is safe. Hence, the Agency has revised the language in paragraphs (a)(1) and (c)(3) to clarify that employers do not have to maintain written documentation.

Paragraph (a)(2) sets forth several requirements regarding relief valves and pressure gauges for a steam supply connected to the vessel's steam system. Several commenters asked OSHA to clarify in paragraph (a)(2) whether "each steam supply system" is limited to those systems connected to a vessel's steam piping system (Exs. 106.1; 115.1; 117.1; 118.1). OSHA intended that the requirements in paragraph (a)(2) apply only to outside steam supply systems connected to the vessel's steam piping system, and has added language to the final rule to clarify that intention.

Paragraph (a)(2) carries over a number of the requirements from the existing rule. Paragraph (a)(2)(i) requires that both the pressure gauge and relief valve be installed at the point where the steam pipe or hose from an outside steam source joins a vessel's steam piping system. Paragraph (a)(2)(ii) requires that the relief valves of outside steam systems be set to relieve excess steam, and be capable of relieving steam, at a pressure that does not exceed the safe working pressure of the vessel's steam piping system in its present condition. Paragraph (a)(2)(iii) requires that there be no means of inadvertently disconnecting the relief valve from the system that it protects. OSHA did not receive any comments on these provisions.

Paragraph (a)(2)(iv) specifies that pressure gauges and relief valves of steam supply systems be legible and located so that they are visible and readily accessible. This additional language will address SESAC's concerns that workers cannot read gauges and valves because they are too dirty or the print is too small (Docket SESAC 1992–2, Ex. 102X, pp. 94–96). OSHA believes that illegible pressure gauges can be hazardous. Employees working in or walking through the area need to be able to readily identify whether pressure is increasing to a hazardous level or continues to be at a safe level. Therefore, OSHA has retained the proposed requirement that pressure gauges be visible, accessible, and legible to allow employers and employees to determine accurately whether the working pressure of the steam supply system is safe.

Paragraph (a)(2)(v) requires that relief valves be positioned so they will not be likely to cause injury if steam is released. The proposed rule (paragraph (a)(5)) would have required that relief valves be "located or positioned" where workers would not be injured if steam were released.

One commenter suggested that the provision in proposed paragraph (a)(5) (paragraph (a)(2)(i) of the final rule), requiring pressure gauges and relief valves to be installed at the connection point between the outside steam hose and the vessel's steam piping system, would not work. Sound Testing, Inc., stated:

> The requirement of having a relief valve installed right next to the pressure gauge might endanger the worker each time he or she approaches to check the pressure. If the pressure were too high, and the pressure relief valve ruptured just as the worker was reading the gauge, the superheated steam would burn his or her face instantly. The pressure gauge and the relief valve should be located at least 15 to 20 feet apart (Ex. 121.1).

OSHA believes it is the positioning of the relief valve that protects workers against injury if steam is released. For example, the relief valve should not be positioned so that, if an employee is walking by and the steam is released, the employee would be injured. Therefore, in the final rule OSHA requires the employer to position the relief valve so that it is not likely to cause injury if steam is released, regardless of where the valve is located.

Paragraph (b)—Steam Hoses

Paragraph (b)(1) requires that employers ensure that steam hoses and their fittings are used in accordance with manufacturers' specifications. The proposed rule (proposed paragraph (b)(1)), similar to the existing standard (§ 1915.93(a)(2)), would have required that the employer ensure that all steam hoses and fittings have a safety factor of at least five.

Northrop Grumman Shipbuilding—Newport News and Alaska Ship and Drydock opposed the proposed requirement and recommended that OSHA specify that steam hoses and their fittings be used in accordance with manufacturers' specifications (Exs. 116.1; 120.1). They pointed out that manufacturers use a safety factor of 4, not the 5 as OSHA proposed. Northrop Grumman added that there are issues in addition to safety factors that are important in ensuring that steam hoses and fittings are safe. For example, manufacturers also specify the temperatures, in addition to pressure ratings, that must not be exceeded (Exs. 116.1; 120.1).

Kim Hodne, of Alaska Ship and Drydock, testified that his company contacted vendors and found that steam hoses for feed lines with a safety factor of 5 do not exist, and that all of the hoses his facility uses are rated at 250 psi (Ex. 198, pp. 111–112).

In light of these comments, OSHA has modified final paragraph (b)(1) to require that steam hoses and their fittings be used in accordance with manufacturers' specifications. The change gives employers flexibility, and ensures that steam hoses meet all critical specifications necessary to protect employees from injury.

Paragraph (b)(2) requires that employers hang steam hoses tightly with short bights to prevent chafing and to reduce tension on the hose and its fittings. The proposed rule contained an identical requirement.

Commenters requested that OSHA define the term "short bight" (Exs. 129.1; 132.2). For example, the U.S. Navy recommended defining the term to mean "when a steam hose is hung in a bight or bights, the weight shall be received by appropriate lines that are spaced not to exceed eight feet maximum along the entire run" (Ex. 132.2). In response, OSHA defined "short bight" in the final rule (§ 1915.80(b)) as a loop made in a line or rope that is used to tie back or fasten hoses, piping, wiring, or fittings. OSHA did not adopt the Navy's recommendation that bights not be spaced further than eight feet apart along the entire run (Ex. 132.2). In this regard, OSHA believes that the performance-based requirement in paragraph (b) adequately ensures that bights will be placed so they "prevent chafing and reduce tension," while giving employers flexibility in determining how best to space the bights so they prevent damage to hoses. Moreover, the Navy did not provide any information or explanation demonstrating that a maximum distance of eight feet between bights was appropriate and would adequately protect hoses on vessels.

Paragraph (b)(3) requires that steam hoses be protected from damage. The proposed rule contained an identical provision. OSHA believes that preventing damage to steam hoses is necessary to protect employees working or walking near steam hoses. In walking and work areas, steam hoses can be damaged when equipment and materials are moved or operated nearby. Employees could be seriously injured if a damaged hose suddenly releases steam. Stakeholders did not submit comments on the proposed provision.

Paragraph (b)(4) requires that employers shield steam hoses and temporary steam piping, including metal fittings and couplings (hereafter collectively referred to as "hoses"), if they pass through walkways or work

areas. OSHA believes that shielding hoses is necessary to protect workers from accidentally contacting hot elements and getting burned. The proposed rule (proposed § 1915.83(a)(4)) contained a similar requirement that would have updated the existing rule, which only required that hoses be shielded if they passed through "normal work areas," but did not require shielding for hoses passing through other work areas or walkways.

Several commenters opposed the shielding provision and suggested various revisions (Exs. 106.1; 116.1; 117.1; 120.1). For instance, Bath Iron Works opposed the requirement because vessels contain thousands of feet of steam hoses and "installing shielding the entire run isn't practical" (Ex. 106.1). They also said shielding was "not a good practice" because it would compromise the physical integrity of the hoses, which "tend to become brittle when they are not allowed to breathe" (Ex. 106.1).

OSHA does not find that either of these arguments supports deleting or revising paragraph (b)(4) (proposed § 1915.83(a)(2)(iv)). First, although OSHA agrees that vessels contain thousands of feet of steam hoses, not all of them pass through walkways or work areas. In fact, Bath Iron Works said they try to re-route hoses so they will not be in walkways or work areas (Ex. 106.1). As such, only a portion of the hose, not the entire run, will need to be shielded. Second, the final rule gives employers flexibility in determining what types of shielding to use or install. The only requirement is that the shielding protects workers from contacting hot steam hoses. Employers are free to select shielding that protects against contact while still allowing the hoses to "breathe."

American Shipbuilding Association (ASA) said OSHA should revise paragraph (b)(4) to allow shipyards to re-route hoses as an alternative to shielding them (Ex. 117.1). Paragraph (b)(4) does not prohibit employers from protecting workers from contact with hoses by re-routing the hoses and piping so they do not pass through walkways or work areas. The intention of paragraph (b)(4) is to prevent workers from getting burned by accidentally contacting hot steam hoses. Paragraph (b)(4) gives employers flexibility in determining how best to meet the requirement. If employers elect to re-route hoses so they do not pass through walkways or working areas, the requirement will be met, and workers will not come into contact with hot steam hoses. In this instance, the hoses will not pass through walkways or working areas, and employers will not be required to shield them. Accordingly, since ASA's recommended method of preventing contact with steam hoses is permitted under paragraph (b)(4), there is no need to revise the provision.

Paragraph (b)(4) also would allow employers to comply by re-routing walkways and work areas away from the hoses. Once again, if workers do not pass through or work in areas where steam hoses are present, paragraph (b)(4) would not require employers to shield those hoses. To ensure that employees are fully protected from accidental contact with hot steam hoses, employers could block or cordon off areas where unshielded steam hoses are present, post appropriate warning signs, or instruct workers that they are prohibited from entering the blocked-off areas.

Some commenters recommended that OSHA limit the requirement for shielding hoses to those areas where "contact is likely" (Exs. 106.1; 117.1; 168, pp. 299–300). The commenters do not contend, or explain why this recommendation would increase protection of workers. OSHA believes, to the contrary, that this recommendation may increase the risk of injury to workers from contact with hot elements. Limiting shielding to areas where contact with hoses is likely may leave workers unprotected if the employer does not shield hoses when changes in work or the workplace occur. For example, if a walkway needs to be used as a temporary work space and the walkway must be reconfigured or re-routed, workers could be at risk of injury if the hoses and piping in the temporary walkway are not shielded. In addition, determining whether and when "contact is likely" adds complexity and ambiguity to the provision. By contrast, the requirement to shield hoses that pass through walkways or work areas is clear and unambiguous. In conclusion, OSHA believes the requirement in paragraph (b)(4) is necessary because the potential for worker injury from contact with hot steam hoses is great, especially in light of the number of tight and confined areas on vessels (Ex. 116.1).

Finally, some stakeholders recommended that OSHA also require "metal fittings and couplings" on steam hoses to be shielded (Exs. 106.1; 117.1; 168, pp. 300–301). ASA said that metal couplings are "a much more serious burn hazard" than steam hoses or piping (Ex. 117.1). Bath Iron Works added that "the temperature on a coupling is somewhere between 210 to 230 degrees, which is very, very hot versus the outer shielding [of hoses], which * * * is roughly 120 to 150 degrees" (Ex. 168, p. 300). As mentioned, Bath Iron Works tries to re-route steam hoses to prevent workers from getting burned by metal parts (Ex. 106.1). OSHA intended that paragraph (b)(4) carry over the existing shielding requirement for steam hoses and piping systems, which OSHA has interpreted to include the fittings and coupling for those systems. However, to clarify paragraph (b)(4), OSHA added "metal fittings and couplings" to those items that employers must shield if they pass through walking or working areas.

Paragraph (c)—Electric Shore Power

Paragraph (c) addresses precautions employers must take prior to energizing a vessel's circuits when electricity is supplied from a landside power source. The required actions will protect employees from the hazards of remote power carried by electric cables or wires onto a vessel, which differ from other electrical hazards such as the hazards associated with hand-held powered tools.

Paragraph (c)(1) requires employers to ensure that vessels are grounded prior to energizing any of the vessel's circuits. The proposed and existing rules would have required that vessels be grounded only when in dry dock, which is a standard practice in shipyards. However, OSHA believes that a vessel should be grounded whether or not it is in dry dock, such as when the vessel is on a marine railway or pierside. OSHA did not receive any comments on the proposed rule. The language in the final rule simply clarifies that a vessel should always be grounded prior to energizing its circuits.

Paragraph (c)(2) requires that, prior to energizing any vessel circuit, employers equip the circuit to be energized with over-current protection that does not exceed the rated current-carrying capacity of the conductors. Proposed § 1915.83(c)(3) and existing § 1915.93(b)(1)(iii) contain the same requirement, which also is standard practice in shipyards. OSHA notes that the existing rule requires that the over-current protection not exceed the rated current-carrying capacity of the "cord." In the proposed and final rules, OSHA changed "cord" to "conductors" to make the provision more inclusive and protective. Conductors include connections in addition to cords. OSHA did not receive any comments on the proposed provision.

Paragraph (c)(3) requires employers to ensure that vessel circuits are in a safe condition prior to energizing any circuit with landside power. Employers must obtain a determination that vessel circuits are in a safe condition from a

responsible vessel's representative, a contractor, or any other person qualified by training, knowledge, or experience to make that determination. Paragraph (c)(3) expands the flexibility of the existing rule, which requires that employers ascertain that circuits are in safe condition from "responsible vessel's representatives" (existing § 1915.93(b)(1)(ii)).

To make the requirement more flexible, OSHA proposed to eliminate the existing requirement in § 1915.93(b)(1)(ii) that employers consult with a person qualified to determine that vessel circuits are in safe condition (proposed § 1915.83(c)(3)). In the preamble to the proposed rule, OSHA explained that eliminating the existing requirement to ascertain the information from vessel's representatives would allow employers to obtain the information from other persons who were qualified to make a determination about the condition of vessel circuits (72 FR 72452, 72462, Dec. 20, 2007). Commenters requested that OSHA make its purpose clear in the text of the final rule (Exs. 104.1; 107.1); therefore, OSHA included the preamble language in the final rule.

Several commenters, including Lake Union Drydock Company, Puget Sound Shipbuilders Association, and Dakota Creek Industries, said that the proposed requirement was too vague and appeared to require that all junction boxes and panels on each vessel be covered before providing shore power (Exs. 101.1; 124; 126; 128; 130.1). OSHA believes that the proposed and final requirement is clear—only circuits "to be energized" need to be checked to determine whether they are in a safe condition. Therefore, if shore power will be supplied to only a portion of the vessel, the final rule requires employers to ascertain that only the circuits affected by the energization are in a safe condition. A good safety practice would be to check the wires and connectors on the vessel to ensure that they are not damaged before providing landside power to the vessel. Since landside power has high amperage, energizing wires and connectors that are damaged could cause an explosion or electric arc that could electrocute or burn workers on the vessel.

Paragraph (d)—Heat lamps

Paragraph (d), as did the proposed rule, requires that employers ensure that heat lamps, including the face, be equipped with surround-type guards to prevent contact with the lamp and bulb. Heat lamps present risks of burns and fire if employees or combustible materials come into contact with the hot elements and surfaces. Fires are a hazard in shipyard employment, especially onboard vessels. Accordingly, paragraph (d), as did the proposed rule, expanded the existing rule in two ways. First, paragraph (d) applies to all heat lamps used in shipyard employment. The existing rule only applied to "infrared electrical heat lamps" (§ 1915.93(c)) even though other types of heat lamps also are used in shipyard employment. The revision ensures that these contact hazards are addressed so employees are fully protected from being burned by accidental contact, and the risk of igniting combustible materials is reduced.

Second, paragraph (d) requires that the entire heat lamp, including the face, be guarded to prevent contact with hot surfaces of the heat lamp. The existing rule did not require that the face be guarded. The face of heat lamps, as with other parts of heat lamps, can become extremely hot. Contacting the lamp face can burn workers and ignite combustible materials. Guarding the face of the lamp will control these hazards. OSHA did not receive any comments on the proposed requirement, including the language expanding the existing provision to make it more protective.

Section 1915.84—Working Alone

Section § 1915.84 addresses the hazards associated with working alone, such as in isolated or confined spaces. As discussed in the preamble of the proposed rule, between 1987–2002 there were 13 fatalities reported in the OSHA IMIS system involving employees working alone and not discovered until after they had died from their injuries (72 FR 72452, 72463, Dec. 20, 2007). The purpose of § 1915.84 is to ensure that employers account for employees working alone, thereby enhancing the safety of these employees. However, if an injury occurs, OSHA believes the requirements in § 1915.84 will reduce the severity of the injury and increase survivability because the requirements will ensure rapid detection and treatment of the injury.

OSHA revised the scope of the final rule to focus on the hazards associated with an employee working alone in an area where others cannot see or hear if the employee is safe or needs assistance. The proposed and existing rules (existing § 1915.94) cover: (1) Employees working in confined spaces, and (2) employees working alone in isolated spaces.

A number of commenters said the rule should only cover employees working alone, while others said the rule should not apply to confined spaces (Exs. 106.1; 115.1; 117.1; 118.1; 132.2; 198, p. 73). With regard to confined spaces, some commenters said the rule was not necessary because they rarely assigned employees to work alone in confined spaces (Exs. 115.1; 118.1; p. 168, pp. 81–84). Other commenters said they use a "buddy system" to ensure that workers are constantly monitored and provided with immediate assistance if an injury or other problem occurs. The U.S. Navy also said the confined space requirements in § 1915.84 were not needed because 29 CFR 1915, subpart B, Confined and Enclosed Spaces and Other Dangerous Atmospheres, adequately addresses the same hazards (Ex. 132.2).

Electric Boat Corporation added that the requirements in § 1915.84 pertaining to confined spaces should be moved to subpart B (Ex. 108.2). They stated, "This confined space requirement [in § 1915.84] is often overlooked in its current location and moving it to subpart B would consolidate the maritime confined space regulations in one area" (Ex. 108.2). On the other hand, Bath Iron Works said that the requirements in § 1915.84 "have been known to reside in the General Working Conditions section," and, therefore, there was no need to address them in subpart B (Ex. 106.1).

Subpart B addresses work conducted in dangerous atmospheres and in spaces that are confined and enclosed, regardless of the number of employees entering and conducting work in those areas (§ 1915.11(a)). Its primary purpose is to protect workers from atmospheric hazards associated with confined spaces and dangerous atmospheres, including exposure to atmospheric hazards such as toxic or oxygen-deficient atmospheres. Subpart B is narrower in scope and more specific regarding the hazards it addresses than § 1915.84. By contrast, the confined space hazards that § 1915.84 addressed in the proposal, and now in this final, are broader than the hazards addressed by subpart B. Section 1915.84 covers the hazards of employees working alone in confined spaces, regardless of whether atmospheric hazards are present. To ensure that an employee working alone is protected against all of the hazards associated with confined spaces, OSHA believes it is necessary to retain coverage of the confined spaces provisions in § 1915.84.

That said, OSHA agrees with stakeholders that the primary focus of § 1915.84 is to address the hazards of employees becoming injured or ill working alone in areas where others cannot see or hear them, such as in a confined space or isolated location.

Because of this danger, some stakeholders said they use a "buddy system" for work in confined spaces, which involves assigning two workers for the confined space task—one employee who works in the confined space and the another worker who remains outside the confined space and maintains constant communication with the employee inside the space. Using buddy systems, which some stakeholders refer to as "tank watchers" or "hole watchers," serves to emphasize the need to monitor an employee who is in a confined or isolated space and is working alone as specified by § 1915.84 (Exs. 108.1; 202.1). Accordingly, OSHA notes that the buddy system described above is an effective and reliable method employers can use to meet the requirements of § 1915.84. OSHA does not believe employers in shipyard employment should have trouble complying with this requirement because many already use this method to monitor employees working alone in confined or isolated spaces (Exs. 108.1; 202.1).

Northrop Grumman Shipbuilding—Newport News said the focus of § 1915.84 should be on work in isolated or confined spaces on vessels and should not apply to landside facilities and office areas. They added that working in isolated and confined spaces at landside locations "do[es] not present the same risk as shipboard work" (Ex. 116.1). OSHA's existing rule at § 1915.94, which has been in place since 1972, applies to isolated and confined spaces both on vessels and landside. OSHA believes it is necessary for the final rule to apply wherever the hazards of working alone in isolated or confined spaces may occur. OSHA's IMIS data includes reports of many fatalities involving employees working alone in isolated landside locations (Ex. 69). Employees working alone in isolated work locations, whether they are on the end of a distant pier or working in the hold of a vessel, may not be able to summon help if they are injured. In both cases, these workers are at risk of harm if they are not accounted for during, and at the end of the workshift or job. Therefore, the final rule continues to apply to employees working alone, including working in isolated or confined spaces landside or on vessels.

A number of commenters said the rule was not clear about what constitutes an "isolated location," and asked OSHA to define and give examples of the term in the final rule (Exs. 101.1; 105.2; 114.1; 115.1; 118.1; 124; 126; 128; 130.1; 198, p. 73). To address stakeholders' concerns, in § 1915.80(b) OSHA defined "isolated location" as "an area in which employees are working alone or with little assistance from others due to the type, time, or location of their work. Such locations include remote locations or other work areas where employees are not in close proximity to others." The following examples describe work that OSHA considers to be in isolated locations: A lone oiler checking a forward bilge on a vessel; an employee working alone "below deck" or "in the bowels of the ship"; and an employee working alone in a side or ballast tank (Exs. 168, pp. 102–103).

Section § 1915.84 retains the language in the existing rule specifying that the provision does not apply to § 1915.51(c)(3). Section 1915.51(c)(3), which addresses welding, cutting, or heating in a confined space when sufficient ventilation cannot be maintained without blocking its means of access, requires that an employee be stationed outside the confined space to maintain communication with the employee inside the confined space to provide aid in an emergency. OSHA believes that the serious hazards that such working conditions present warrant the specific requirements in § 1915.51(c)(3). OSHA did not receive any comments on the exception.

Paragraph (a)

Paragraph (a) requires that employers account for each employee working alone (1) at regular intervals throughout the workshift, and (2) at the end of the job assignment or at the end of the workshift, whichever occurs first. The proposed rule would have required that employees be "checked frequently." In the final rule, OSHA replaced this term with the term "account for" because OSHA believes that employers may misinterpret checking employees frequently as limiting them only to a visual check. In this regard, OSHA added new language to the final rule that allows employers to account for each employee working alone either by a visual check or through verbal communication. Therefore, OSHA used the term "account for" in this provision of the final rule, which it believes will avoid misinterpretation by more accurately describing the additional means available to employers for monitoring these employees than the term "checked frequently" does.

Paragraph (a)(1) requires that employers account for employees working alone, such as in a confined space or at an isolated location, throughout the workshift at "regular intervals appropriate to the job assignment" to ensure the employees' safety and health. Proposed paragraph (a) would have required that employers check on employees "frequently during each workshift."

A number of stakeholders stressed the importance of checking throughout the workshift on employees working alone (Exs. 114.1; 115.1; 118.1; 125). Other commenters said the requirement to "frequently" monitor employees was too subjective (Exs. 101.1; 124; 126; 128; 198, pp. 73, 99–100; 199, pp. 137–38). Sound Testing, Inc., commented:

> How often is 'frequently'? How often should we check during each work shift? Is the inspection of the confined or isolated spaces performed each work shift or each day by the Shipyard Competent Person 'frequently' enough? (Ex. 121.1).

Some stakeholders said the requirement to frequently check employees posed foreseeable enforcement difficulties stating: "[H]ow do we convince an enforcement officer that we are conducting checks frequently enough?" (Ex. 101.1; 124; 126; 128; 130.1), and "We'll be required to convince an OSHA field inspector that our frequently is as good as or better than his or her concept of frequently?" (Ex. 199, pp. 137–38).

Stakeholders also said the frequency with which they check on employees working alone depends on various factors, including whether the employee is working in a confined space or isolated location, the type of isolated or confined space in which the employee is working, and the type of work the employee is performing (Exs. 168, pp. 97–103, 303–306; 198, pp. 19–20). For example, Roy Martin, of the Shipbuilders Council of America and Manitowoc Marine Group, testified:

> [I]f we are talking about general cargo holds and things of that nature, they are checking on it at least on an hourly basis. If they are in an area which is isolated, such as some of these older vessels, in their side tanks and what have you, they will check on them more frequently, within a 30-minute time frame (Ex. 168, pp. 97–98).

When employees work alone in confined spaces, Bath Iron Works said they may check on the employee as often as every 15 minutes (Ex. 168, p. 305). John Killingworth of Dakota Creek Industries added, "In our case we can pretty much check on employees four times a day, but in confined spaces * * * the need is to be very diligent and perhaps more frequently would be adequate" (Ex. 198, p. 100).

Stakeholders' comments indicate that the proposed rule's approach to the frequency of accounting for employees that are working alone may not be the most protective approach. The stakeholders' comments and discussion of their practices convince OSHA that

requiring employers to account for employees at intervals that are appropriate for the job being performed provides better protection for employees. It ensures that employers will consider all relevant factors in determining what frequency is appropriate for specific jobs requiring employees to work alone, such as in isolated or confined spaces. Accordingly, OSHA revised the final rule so it requires employers to make an individualized, job-specific determination as to what intervals or frequency of monitoring will be adequate to ensure the safety and health of the employee working alone. The factors discussed above will assist employers in making this determination.

OSHA believes that employers will not have difficulty complying with the final rule. The existing rule already requires employers to conduct frequent checks on employees working in confined spaces and alone in isolated locations. Moreover, the record indicates that a number of employers in shipyard employment already are performing job-specific assessments for determining monitoring frequency (Exs. 114.1; 115.1; 118.1; 125; 168, pp. 97–98, 305; 198, p. 100).

Paragraph (a)(2) requires that employers account for each employee working alone at the end of a job assignment or at the end of the workshift, whichever comes first. The proposed rule would have required that employers account for each employee at the end of the workshift (proposed § 1915.84(b)).

Several stakeholders commented that OSHA should revise § 1915.84 to require employers to account for employees at the end of an assignment (Exs. 114.1; 115.1; 118.1; 125; 168, p. 74). For example, Shipbuilders Council of America said:

> Given the nature of this work, accounting for employees is an extremely important procedure. * * * [W]ork in confined space sometimes does not last the span of an entire workshift. * * * Workers should be accounted for when they leave a confined space, which may occur well before the end of a designated shift (Ex. 114.1).

Atlantic Marine Florida said, "[I]f employees are working alone, they are assigned a supervisor, even if he/she is from another craft, to report to when they complete their task and are no longer working alone" (Ex. 115.1).

Stakeholders' comments clearly demonstrate the safety and health benefit of requiring employers to account for employees at the end of any job assignment that involves working alone. This requirement provides employers with timely information that employees working alone are safe, as well as timely warning that they may be injured and need assistance. Because end-of-assignment checks are common practice in shipyard employment, OSHA believes that employers will comply readily with this requirement.

When job tasks extend beyond a workshift, paragraph (a)(2) requires employers to check on employees who are working alone at the end of such a workshift. In the preamble to the proposed rule, OSHA explained that this provision would ensure that employers ascertain that each employee working alone has returned safely. If this is not the case the employer must take immediate action to locate the missing employee (72 FR 72452, 72463, Dec. 20, 2007). Review of shipyard employment fatality data indicates that some employees working alone were not discovered until long after their shifts ended and the time for effective medical intervention had passed. *Id.* Requiring an end-of-workshift check if the job assignment has not been completed will ensure that employees who are assigned to work alone will not be unintentionally deserted at the end of their workshift if they are injured and need help.

Paragraph (b)

Final paragraph (b) adds the requirement that the employer account for each employee by sight or verbal communication. Neither the proposal nor the existing rule has such a requirement. Through comments submitted and testimony heard, the Agency received information that stressed the importance of communication methods used in accounting for employees that are working alone, such as in a confined space or an isolated location. Electric Boat stated that "a verbal response from a worker inside a confined space to a person checking on them should be an acceptable method to verify an employee's safety" (Ex. 108.2).

In proposed § 1915.84, OSHA requested information pertaining to specific methods for checking on employees who are working alone. The regulated community responded with many examples (Exs. 106.1; 108.2; 114.1; 115.1; 116.2; 117.1; 118.1; 119.1; 120.1; 129.1; 168, pp. 101–103, 234–235, 304–305; 198, pp. 19–20, 50–51, 101–102, 114–115; 202.1). Similar to other commenters, Electric Boat explained that at one of their facilities, "tank monitors in combination with a radio type system is used to monitor tank entrants" (Ex. 108.2). Both the tank monitor and the entrant are issued hand-held radios, which the entrant uses to not only notify the monitor that they entered the space, but to respond to frequent checks at twenty-minute intervals. Similar to Electric Boat, Atlantic Marine uses verbal radio communication to verify the safety of its employees, or has employees physically climb into the space to observe employees who are working alone (Exs. 115.1; 118.1). Manitowoc Marine Group explained that they use a combination of verbal checks through radio communication, as well as visual checks during muster held at the end of each job assignment or workshift (Ex. 168, pp. 98–100).

Alternative methods of communication that have low reliability, such as noise from power tools, whistles, or tapping on tank walls, bulkheads, or decks, would not comply with paragraph (b). To illustrate, if a supervisor accounting for an employee in a confined space hears power-tool noise coming from the confined space, that noise cannot be relied on to verify that the employee is safe. The tool noise may indicate that the employee is safe or it might mean that the employee is unconscious or injured, and the power tool is still running. Hence, OSHA has determined that, when employers use verbal communication to check on employees working alone, communication must include both parties speaking.

In the proposed rule, OSHA requested comment on whether the Agency should add a provision to § 1915.84 requiring employees to establish a system of leaving a picture identification or other signal (for example, a flag) outside the entrance of a confined space, to indicate when an employee enters a confined space alone to perform work (72 FR 72463–72464, Dec. 20, 2007). A few stakeholders have such a system or support having one (Exs. 118.1; 129.1; 198, pp. 100–101). However, the majority of stakeholders who commented on this issue did not support adding that requirement to the final rule (Exs. 106.1; 114.1; 115.1; 116.1; 117.1; 120.1; 125; 132.2; 198, p. 101).

Some stakeholders said a photo identification or signal system would not be effective (Exs. 106.1; 108.1; 132.2). Electric Boat said that "badges or picture identification left at the entrance [of a confined space] may not be the best method due to their small size" (Ex. 108.1). American Shipbuilding Association agreed, saying that when "a single employee has to enter an isolated or confined space, there is usually no one else there to notice a flag, picture, or signal anyway, thus negating the

purpose of such a requirement" (Ex. 117.1). The Navy added that it believed frequent checks and proper supervision are an adequate and a more practical solution than a picture identification system (Ex. 132.2). John Killingsworth, of Dakota Creek Industries, raised a similar objection stating: "Personally, as [a Shipyard Competent Person], I'm going to tanks alone. It may be 20 [confined] spaces on a vessel that I visit every single day. I'm not going to hang a tag at every hatch as I go in and come out. That would be impractical" (Ex. 196, pp. 100–101).

Northrop Grumman Shipbuilding—Newport News said it evaluated whether to implement such a system but determined it was not desirable, noting:

> Many spaces have multiple means of access and it is not feasible or desirable to require an employee to use the same opening for access and egress. In particular, in the event of an emergency, employees are taught to use the closest means of safe egress. If this is not the same access as their "identifiable flag", an emergency responder may falsely believe someone is in the space and be placed in danger looking for the individual. We have found the combination of frequent checks and end of shift checks to be adequate (Exs. 116.1; 120.1).

After reviewing the record as a whole, OSHA decided not to require employers to establish a picture or signal identification system at entrances of confined and isolated spaces where employees are working alone. Rather, the Agency concluded that employers must account for each employee by either sight or verbal communication to ensure their safety.

Finally, OSHA reminds employers to ensure that, when employees discover a non-responsive employee in a confined space or isolated location, no one enters the area without taking appropriate precautions in accordance with 29 CFR part 1915, subpart B and other applicable existing OSHA standards. Paragraph (b) of the final rule requires that employers must account for each employee by sight or verbal communication, but safe entry practices set forth in other OSHA standards, such as 29 CFR 1915, subpart B, still apply when employers face an emergency rescue situation.

Section 1915.85—Vessel Radar and Communication Systems

Section 1915.85 specifies requirements to protect employees working on or near vessel radar and communication systems. If precautions are not taken, these workers may be exposed to radiation (for example, radio frequency radiation). They also may be electrocuted or struck by the antennas or other components if the system activates, energizes, or releases hazardous energy.

The final rule, like the proposed provisions, expands the scope of the existing rule, which solely addressed radiation hazards, to cover both radiation and other energy hazards. OSHA believes this change is necessary to ensure that employees are protected from other serious hazards associated with operating and servicing radar and communication systems. For example, employees working aloft on a system's antenna could be injured or killed if the system activates and the antenna moves, striking an employee and causing the employee to fall.

The proposed rule referred to radars and radio transmitters. For example, proposed paragraph (a) requires the employer to "secure each radar and radio transmitter so it is incapable of energizing or emitting radiation before any employee begins to work on it." Some stakeholders commented that the terms "radar" and "radio transmitter" were not clearly explained (Exs. 101.1; 121.1; 124; 126; 128; 130.1). For example, Philip Dovinh of Sound Testing, Inc. said:

> Are the little two-way handheld radios, CB radios, or heavy duty radars and sonar equipment capable of transmitting and receiving communication signals, such as those installed on large [fish processing vessels], container vessels, Navy and [U.S. Coast Guard] vessels all applicable under the requirements of this section? (Ex. 121.1).

American Seafoods Company and Northrop Grumman—Newport News were unclear whether proposed § 1915.85 also applied to hazards associated with sonar (Exs. 105.1; 116.2). Northrop Grumman recommended that § 1915.85 should not apply to sonar because sonar and radar are different technologies: "Sonar does not pose a radiation hazard. Sonar repair and testing may involve electrical or acoustical hazards" (Ex. 116.2; 120.1).

In response to stakeholder comments, OSHA has revised the language of § 1915.85 to more clearly indicate that this section addresses the radiation, electrical, and struck-by hazards associated with operating and servicing radar and communication systems. It is these system components, particularly antennas and transmitters, that emit radiation, may electrocute employees, or may move and strike employees working on or near them. However, if these components cannot emit radiation at levels that could injure workers in the vicinity, or cannot electrocute or strike workers if the system suddenly activates, the requirements of § 1915.85 would not apply. In addition, this section does not apply to sonar. OSHA agrees that the hazards associated with sonar are not the same as hazards associated with radar and communication systems.

Although the scope of § 1915.85 covers shipbreaking operations, OSHA notes that it is unlikely that radar and communication systems would be operational when workers perform shipbreaking operations. If the hazards associated with radar and communication systems are not present in these operations, then § 1915.85 does not apply. However, to the extent that radiation hazards or hazardous energy are present in shipbreaking operations, the employer must protect workers from the risk of injury.

Paragraph (a)

Paragraph (a) requires that employers service vessel radar and communication systems in accordance with the requirements of 29 CFR 1915.89, the lockout/tags-plus standard for shipyard employment. Under final § 1915.89, employers must implement a lockout/tags-plus program for all servicing operations when machinery, equipment, or systems could activate. Such a program requires the use of lockout/tagout applications; implementation of procedures for the safe servicing of machinery, equipment, and systems; and employer training of employees. In addition, final § 1915.89(a)(3) specifies that, when other standards in part 1915, and applicable standards in part 1910, require the use of a lock or tag to protect workers from the risk of equipment activation or energization, employers are required to supplement such protections with the procedural and training requirements in final § 1915.89.

The proposed rule contained the same requirement (proposed § 1915.85(b)). The existing rule, on the other hand, only required that employers put tags on radar and communication-system components prior to starting work. OSHA believes that requiring compliance with the procedural and training requirements of final § 1915.89 will provide greater protection for workers than the existing rule. It will require employers to use energy-isolating measures that provide a physical barrier to the hazards of equipment activation and also will ensure that all employees involved in the servicing operations follow consistent and uniform procedures in all servicing operations. As OSHA said in the preamble to the proposed rule:

> [M]ore detailed [control of hazardous energy] procedures are needed to ensure that employees are fully protected from the movement or start up of equipment and the

release of hazardous energy. Tagging the equipment without complying with the rest of the proposed [control of hazardous energy] program and procedures does not ensure that employees will be fully protected, especially those working in multi-employer worksites or in situations where ship's crew are present (72 FR 72452, 72464, Dec. 20, 2007).

OSHA simplified the language in paragraph (a) by using the term "servicing" in place of the proposed language (for example, "servicing, repairing, or testing"). OSHA made the same revision in final § 1915.89(a). As discussed in the summary and explanation of final § 1915.80(b), OSHA defines "servicing" to include a variety of activities including testing and repairing machinery, equipment, or systems, that may expose employees to the risk of injury from the startup, energization, or the release of hazardous energy. OSHA believes that using consistent language in § 1915.85 and § 1915.89 will make the provisions easier for employers to understand and facilitate compliance.

Paragraph (b)

Paragraph (b) requires employers to secure each radar and communication system so it is incapable of energizing or emitting radiation before an employee begins work:

- On or in the vicinity of the system (paragraph (b)(1));
- On or in the vicinity of a system equipped with a dummy load (paragraph(b)(2)); or
- Aloft, such as on a mast or king post (paragraph (b)(3)).

The proposed rule (paragraph (a)) contained a similar requirement. The existing rule is similar but only pertains to radiation hazards.

Northrop Grumman Shipbuilding—Newport News recommended that OSHA revise paragraph (b) to require that employers secure a system that is equipped with a "dummy load" prior to beginning work on or near the vicinity of the system's antenna (Exs. 116.2; 120.1). A dummy load is a device used in place of an antenna to aid in testing radio transmitters. It is substituted for the antenna that is being tested so that the transmitter does not interfere with other radio transmitters during the adjustments. The dummy load converts transmitted energy into heat so that little to no energy radiates outward or reflects back to its source during testing. Northrop Grumman explained:

> Certain radar systems are designed to redirect energy into a dummy load in order to make adjustments to the system without emitting to free space. This is a necessary step in the maintenance of radar systems and this safety feature is built into the system to allow it to be performed safely (Exs. 116.2; 120.1).

Although dummy loads are designed to minimize radiation emissions, they still may emit some radiation. Therefore, OSHA agrees with Northrop Grumman that employers also need to secure systems equipped with dummy loads before employees begin work on or in the vicinity of these systems.

Paragraph (c)

Paragraph (c) requires that, when a vessel's radar or communication system is operated, serviced, repaired, or tested, employers must ensure that (1) no other work is in progress aloft, and (2) no employee is closer to the system's antenna or transmitter than the manufacturer's "minimum safe distance" for the type, model, and power of the equipment. The proposed and existing rules both require that employers schedule testing of radar and communication systems when no work is in progress aloft or when personnel are cleared to a minimum safe distance from the danger area, with employers following the minimum safe distances established for the type, model, and power of the equipment by the manufacturers of the equipment.

One stakeholder implied that the term "minimum safe distance" is vague and subject to misinterpretation. Philip Dovinh of Sound Testing, Inc., said:

> Which safety parameters should be used in making the determination of minimum safe distance? "Minimum safe distance" in one operation may not be sufficient in another. Not only that, applying "minimum safe distance" alone does not guarantee complete worker safety (Ex. 121.1).

Many stakeholders recommended that OSHA revise paragraph (c) to require employers to follow the minimum safe distance established by the manufacturer for the particular type, model, and power of the vessel radar or radio-frequency-emitting system being operated or serviced (Exs. 101.1; 104.1; 105.1; 107.1; 124; 126; 128; 130.1; 199, p. 138). The Agency is persuaded that requiring employers to follow manufacturer's specifications on safe distances will provide greater protection for workers. The requirement will ensure that the safe distance that must be maintained will be specific and designed for the equipment installed. It also will guarantee that safe distances represent current manufacturing practices. In addition, the requirement establishes objective criteria, which should be easier for employers to understand and follow.

Paragraph (d)

OSHA is adding a new provision to § 1915.85 that requires employers to ensure that no worker enters an area designated hazardous by the manufacturer's specifications while a radar or communication system is capable of emitting radiation. OSHA added this provision in response to stakeholder comments that language in proposed § 1915.85 was unclear, ambiguous, and open-ended (Exs. 104.1; 105.1; 107.1; 121.1; 199, p. 138). For example, American Seafoods Company commented: " 'Near' is a subjective term; it would be better to specify that we follow the minimum safe working distance established by the manufacturer for the particular type, model and power of the equipment being worked on as is done in paragraph (c)" (Ex. 105.1).

Other stakeholders made a similar recommendation (Exs. 101.1; 104.1; 120.1; 124; 126; 128; 130.1). For the reasons specified above in the discussion of paragraph (c) of this section, OSHA believes that requiring employers to keep all employees outside the area designated as hazardous by the manufacturer's specifications until the systems are rendered incapable of emitting radiation will enhance worker protection.

Paragraph (e)

OSHA added a new paragraph (e) to the final rule to clarify that the requirements of this section do not apply when a radar or communication system is incapable of emitting radiation at levels that could injure workers in the vicinity of the system, or when the radar or communication system is incapable of energizing in a manner that could injure employees working on or in the vicinity of the system. This paragraph responds to comments noting that some small communication systems, such as two-way handheld radios or CB radios, may not expose employees to the hazards this section addresses (Ex. 121.1). This provision also makes clear that employers need not comply with this section when radar systems are inoperative, such as radar systems aboard vessels being dismantled, as discussed above.

Section 1915.86—Lifeboats

Paragraph (a)

Paragraph (a) requires the employer to ensure that, before employees work in or on a stowed or suspended lifeboat, the lifeboat is secured independently of the releasing gear to prevent it from falling or capsizing. Securing the lifeboat in such a manner will prevent

it from falling if the releasing gear is accidentally tripped or the davits move. It also prevents lifeboats that are stowed on chocks from capsizing. The proposed and existing rules contained the same requirement, and OSHA did not receive any comments on the proposal.

Paragraph (b)

Paragraph (b) requires that employers prohibit employees from being inside a lifeboat while it is hoisted or lowered. The final rule also adds two exceptions to the prohibition. Employees may be in a lifeboat that is being hoisted or lowered (1) when the employer demonstrates that it is necessary to conduct operational tests or drills over water, or (2) in the event of an emergency. Proposed paragraph (b) did not include any exceptions to the prohibition against employees being in a lifeboat while it is being hoisted. The existing rule at § 1915.96(b) only prohibits employees from being in lifeboats when they are hoisted into the "final stowed position," which allows employees to be in lifeboats while they conduct sea trials and drills over water.

Many commenters, including Trident Seafoods Corporation, American Seafoods Company, Northrop Grumman—Newport News, Lake Union Drydock Company, and Sound Testing, Inc., said that the complete prohibition in proposed paragraph (b) was impractical because there may be times when workers need to perform tasks in a lifeboat while it is being hoisted or lowered. For example, stakeholders said employees may need to be in lifeboats during sea trials and drills over water, particularly when the hoisting and lowering mechanism is inside the lifeboat, and during emergencies (Exs. 101.1; 104.1; 105.1; 107.1; 116.2; 120.1; 121.1; 124; 126; 128; 130.1; 199, pp. 274–275).

OSHA believes that there is an inherent danger in allowing employees to be in lifeboats when they are hoisted or lowered, and not just when they are hoisted into the final stowed position. As noted in the preamble to the proposal, several fatalities and serious injuries occurred when employees were working in lifeboats (72 FR 72452, 72464, Dec. 20, 2007). That said, the Agency recognizes that there may be some limited situations when employees need to be inside lifeboats as they are raised or lowered. However, OSHA believes that any exceptions to the prohibition must be specific and narrow. Therefore, the final rule provides an exception, but only for the limited situations of conducting operational tests or drills over water or in the event of an emergency.

Paragraph (c)

Paragraph (c) requires that employers prohibit employees from working on the outboard side of any lifeboat that is stowed on its chocks unless the lifeboat is secured to prevent it from swinging. As noted in the preamble to the proposed standard, if the lifeboat is not secured prior to employees working on its outboard side, the lifeboat could swing out and strike an employee, causing the employee to fall (72 FR 72452, 72464, Dec. 20, 2007). The proposed and existing rule contained the same requirement, and OSHA did not receive any comments on the proposal.

Section 1915.87—Medical Services and First Aid

This section sets out requirements for medical services, first aid, and lifesaving equipment. Shipyard employment involves many workplace activities that are inherently dangerous, some of which take place on moving vessels or outdoors during harsh weather conditions. The potential for severe or even fatal injuries is supported by data of actual injuries and fatalities, described in the preamble to the proposal (72 FR 72452, 72453, Dec. 20, 2007). The provisions in this section will ensure that workplace accidents are responded to in a manner that mitigates the severity and increases survival from life-threatening injuries/illnesses.

The final rule combines, as necessary, the existing standards on medical services and first aid that are applicable to shipyards (§ 1910.151 and current § 1915.98). OSHA adopted both standards in 1971, pursuant to section 6(a) of the OSH Act, from the established Federal occupational safety and health standards in effect at the time. Medical services, first aid practices, and related supplies and equipment have changed over the last four decades. Therefore, a revision of the current standards was necessary. The provisions in § 1910.151 apply to shipyards to the extent that those provisions address hazards and working conditions that this final rule does not (see Ex. 81, OSHA's "Shipyard Employment 'Tool Bag' Directive").

Paragraph (a)—General Requirement

Paragraph (a) requires employers to ensure that emergency medical services and first aid for employees are readily accessible. The purpose of this provision is twofold. First, it establishes uniform criteria applicable to all of the first aid and medical services specified in the section, ensuring that these services are available and close enough to the injured/ill employee so that appropriate intervention can be provided. Second, in the case of a serious or life-threatening injury/illness, it requires employers to have steps in place to ensure that additional emergency medical intervention is readily accessible. The provision also addresses SESAC's concerns that first aid providers be able to reach injured employees quickly enough to render effective assistance.

For this final rule, OSHA has included requirements for employers to deliver first aid or medical services in the event of illnesses as well as injuries. OSHA recognizes that first aid and medical services may be required at a worksite to treat not just work-related injuries but also acute illnesses that are often work-related, such as asthma attacks, heart attacks, heat-related illnesses, or severe reactions to contaminants or fumes.

Uniform criteria for all first aid and medical services are necessary because their components, primarily first aid providers and first aid supplies, are interrelated. They both must be readily accessible for intervention to be effective. It is not effective to require that first aid kits be situated at every worksite without a parallel requirement to have trained employees at the worksite who are capable of using those supplies. Conversely, on-site trained first aid providers cannot provide effective assistance if first aid supplies are too far away to be accessed quickly. Thus, establishing uniform criteria ensures that the components of first aid and medical services are in place to provide effective intervention when needed. Uniform provisions simplify the section and make understanding and compliance easier for employers.

With regard to the second purpose, the provision requires employers to ensure that additional emergency medical services such as rescue squads and ambulances are readily accessible. OSHA notes that some shipyards, primarily larger ones such as Northrop Grumman Shipbuilding—Newport News, Manitowoc Marine Group, and Bath Iron Works, already have taken these steps by establishing their own on-site medical clinics and ambulance or rescue squads (Exs. 116.2; 120.1; 168, pp. 87–89, 258–261). This provision does not require shipyard employers to have on-site clinics, ambulances or rescue squads, but it does require employers to implement a system to ensure that emergency medical services such as local rescue squads or ambulance services are readily accessible when needed. The employer, in determining how to meet the

requirements of § 1915.87, needs to factor in reasonably foreseeable delays, such as railroad tracks that could be blocked when rescue squads need to access injured/ill employees in the shipyard.

Comments were received on proposed paragraph (a) requesting a definition for "readily accessible" (Exs. 105.1; 115.1; 118.1; 121.1; 199, pp. 138, 263, 272). In response to those comments, and for purposes of this section, "readily accessible" is defined in final § 1915.80(b)(23) as capable of being reached quickly enough to ensure that medical services and first aid interventions are effective. Whether originating in the shipyard or provided by an outside service, medical services and first aid must be provided in a timeframe that will ensure their effectiveness in treating an injured or ill employee. Medical services that can be delivered quickly enough to the employee to be effective would be considered readily accessible.

Paragraph (b)—Advice and Consultation

Paragraph (b), which carries over the same language from the proposal, requires employers to ensure that healthcare professionals are readily available for advice and consultation to the employer on matters of workplace health. Implicit in this provision is the necessity for employers to fully understand what hazards are present in their workplace. For example, employers must understand that some materials that their employees work with may contain hazardous components. Although material safety data sheets (MSDSs) provide the employer with an abundance of health-related information on various materials that employees may be working with, this provision ensures that if the employer has any questions that cannot be answered by MSDSs or similar resources, they will have a healthcare professional at their disposal with whom to discuss specific workplace health issues. OSHA received limited comments on this provision and is carrying the provision forward in this final standard as proposed.

American Seafoods Company requested a clear definition for "healthcare professional" (Ex. 105.2). The Agency believes that the definition of "healthcare professional" provided in the "Scope, application, and definitions" section of this subpart (§ 1915.80(b)) clarifies whom employers should consult. As defined, "healthcare professional" means a physician or other licensed healthcare provider whose legally permitted scope of practice allows the provider to independently provide, or be delegated the responsibility to provide, some or all of the advice or consultation this subpart requires. This definition includes doctors, nurses, nurse practitioners, osteopaths, EMTs, or other health care providers whose license, registration, or certification authorizes them to provide such assistance and advice. A safety professional, unless he or she was also a licensed healthcare provider, would not meet the criteria set forth in this definition. The key to meeting this requirement is that the healthcare professional must be readily available to provide advice and consultation when needed.

American Seafoods Company also questioned what kind of consultative availability OSHA expects of the healthcare professional (Ex. 105.2). Rather than impose prescriptive requirements on employers, this provision allows employers to seek the information from the appropriate source in a timely manner, given the circumstances. For instance, if an employee complained about headaches and dizziness at the workplace while working with a chemical compound, and the MSDS sheet for that compound did not address the particular symptoms, the provision ensures that the employer would have a readily available healthcare professional to consult for additional advice.

The employer should not wait until the need arises before beginning the search for a healthcare professional. A facility that has an on-site medical service staffed by a healthcare professional could consult with that individual. Facilities that do not have on-site healthcare providers may consult with local physicians who have knowledge of workplace health issues, contact their insurance companies, or request assistance from organizations such as medical schools or state departments of health to locate a healthcare professional who is familiar with workplace health hazards. The employer should acquaint the healthcare professional with the particular conditions of the workplace, including the size of the facility, the types of materials employees are using, and potential health hazards that are present.

Paragraph (c)—First Aid Providers

Paragraph (c) sets forth the requirements for the number and availability of first aid providers; training; and certification.

Paragraph (c)(1) requires an adequate number of employees trained in first aid at each worksite on each workshift unless the employer either (a) has an on-site clinic or infirmary that is staffed with first aid providers during each shift, or (b) can demonstrate that outside first aid providers can reach the worksite within five minutes of a reported injury or illness.

The final rule uses the word "worksite" rather than the proposed term "work location." The Agency received many comments that the term "work location" was vague and/or undefined (Exs. 101.1; 105.2; 114.1; 115.1; 118.1; 121.1; 124; 125; 126; 128; 130.1). In response to these concerns, and to clarify the terms used in the final rule, OSHA has adopted the term "worksite" and defined it to mean a general location where one or more employees are performing work, such as a shipyard, pier, barge, vessel or vessel section (§ 1915.80(b)(38)). The term does not mean a single "work area," which is also defined in the final rule and means a specific area such as a machine shop, engineering space, or fabrication area where one or more employees are performing job tasks. A shipyard may have hundreds of work areas, with only one or a few employees working in any one of those areas. In this final rule, a shipyard "worksite" refers to a group of work areas that are in near proximity to each other. For instance, all of the work areas in a small, concentrated shipyard may constitute a single worksite, even though some areas may be located on a vessel and others landside. By contrast, a large shipyard that has multiple piers, docks, large vessels, and landside facilities that are spread across a wide area would be considered to have multiple worksites. In these shipyards, it is unlikely that a first aid provider located in one worksite would be able to reach all worksites within the shipyard quickly enough to provide effective intervention. Accordingly, OSHA believes that each worksite must have an adequate number of first aid providers to ensure that timely intervention is provided to injured/ill employees working at a work area within that worksite. By comparison, a single work area distantly located from other work areas may, of necessity, be considered a worksite because first aid providers in other work areas would not be able to reach the area quickly enough to effectively aid an injured/ill employee.

Several commenters questioned the meaning of "adequate number" (Exs. 104.1; 105.1; 107.1; 115.1; 118.1; 125). As Trident Seafoods stated, "The term 'adequate number' is subjective. What is adequate to one group may not be to another" (Exs. 104.1; 107.1). In contrast, another commenter, speaking about the word "adequate," stated: "I do like the

word adequate. It gives us a leeway of making some determination of what we feel is right for our particular situation" (Ex. 198, p. 228).

This final rule provides employers with guidance on how to make that determination rather than prescriptively require them to follow a formula. To that end, paragraph (c)(3), which was carried over unchanged from proposed paragraph (c)(1), sets forth several objective factors for employers to consider that should assist them in making a determination of how many trained first aid providers would be needed at their worksite. These factors are:

- The size and location of each shipyard worksite;
- The number of employees at each worksite;
- The hazards present at each worksite; and
- The distance of each worksite from hospitals, clinics, and rescue squads.

Employers applying these factors should bear in mind that accidents involving electrical shock resulting in heart or breath stoppage must be treated within a short time (optimally within three to five minutes) to increase the chances of a positive outcome. To the extent that these types of accident risks are present in shipyards, such as when servicing electrical systems where there is a risk of electrical shock, it is necessary to have first aid providers located at the worksite so cardiopulmonary resuscitation (CPR) can be started quickly. Similarly, when work tasks involve a risk of injury that could result in severe bleeding, first aid must be quickly administered to maximize the injured employee's survivability. OSHA believes that while the list of factors provided in this provision of the regulatory text is not an exhaustive one, it should assist employers in determining an adequate number of first aid providers.

The Agency received several comments from employers regarding the number of employees trained in first aid. Roy Martin testified that approximately 35 of 600 employees at the Manitowoc Marine Group are trained in first aid (Ex. 168, p. 150). James Thornton testified that, at the Northrop Grumman Shipbuilding—Newport News facility, approximately 1,000 of 20,000 employees are trained to provide first aid (Ex. 168, pp. 356–357). Kim Hodne from Alaska Ship and Drydock testified that "probably 15 to 20 percent of our workforce is first aid/CPR trained" (Ex. 198, p. 103). Doug Dixon of Pacific Fishermen Shipyard and Electric, LLC, noted that his shipyard, which employs 50 to 70 union and 17 non-union workers, has 15 first aid providers (Exs. 168, pp. 162–163; 198, p. 232). OSHA does not mean for these numbers to represent a preferred percentage of employees who should be trained in first aid. Rather, these examples illustrate that, even under the current § 1915.98(a) rule requiring a single first aid provider, shipyards have assessed their needs for first aid providers, and have trained multiple employees accordingly.

The final rule adds flexibility to proposed paragraph (c)(1), which required employers simply to ensure that each work location and each shift have an adequate number of employees qualified to render first aid, including cardiopulmonary resuscitation (CPR). Paragraph (c)(1)(i) permits the employer to have an on-site clinic or infirmary with first aid providers during each workshift as an alternative to the requirement to have an adequate number of employees trained in first aid.

Several large shipyards described their on-site medical facilities and their capacity to deliver first aid and other medical services. Bath Iron Works testified:

> We have an on-site physician that is there 40 hours a week along with six nurses. We also have a physical therapy ward along with two physical therapists on site. We have five emergency medical technicians that are trained on site in the facility, and I have got two on night shift and three on day shift. We have an ambulance on site. We also have a fire department, we have 35 fire brigades, employees that provide support if need be (Ex. 168, pp. 258–259).

Northrop Grumman Shipbuilding—Newport News stated that, in addition to having first aid-trained employees:

> We operate an onsite medical clinic with licensed medical practitioners, as well as a 24/7 emergency medical and fire response organization equipped with ambulances and Advanced Cardiac Lifesaving equipment (Ex. 116.2; 120.1).

OSHA recognizes that this alternative to having an adequate number of first aid-trained employees is, for the most part, practical only for larger shipyards that have the physical space and budget to provide an on-site clinic or infirmary. For smaller shipyards, or any shipyard that does not have an on-site clinic or infirmary staffed by individuals able to provide first aid, paragraph (c)(1)(ii) permits employers to demonstrate that outside first aid providers can reach the worksite within five minutes of a report of injury/illness. The employer is also required to take appropriate steps to ascertain that emergency medical services will be readily available if an injury/illness occurs. These conditions are a shipyard employer's second alternative to ensuring an adequate number of first aid-trained employees.

Several employers commented that they either rely solely on outside emergency medical services or use a combination of first aid-trained employees and outside emergency medical services. Fishing Vessel Owners Marine Ways, Inc. testified:

> Yes, when we rely on 911, we have dock 1 [and] 2 and 3 is the cement dock on the left, dock 4 is the one next to it on the left. At the end of that dock is a fire department, and that's the proximity of medical services for us, emergency medical services (Ex. 198, p. 212).

Petersburg Shipwrights, Inc., stated: "At least half of our staff are trained in first aid [and] CPR" (Ex. 198, p. 212). This employer also described an accident where they called in the local fire department: "They were at the site within three minutes. A person with a cell phone on the dock called immediately. * * * He's fine. He's pretty well stitched up * * * He's got a nice little slice on his neck from a grinder" (Ex. 198, p. 213).

The proposed rule did not require arrival of first aid services within a set timeframe. However, the proposal discussed the types of severe injuries, such as electrical shock resulting in heart or breath stoppage, that require near-immediate treatment. Thus, the Agency solicited comments regarding the sufficiency or appropriateness of a maximum response time, such as three to five minutes, after discovery or report of an injury (72 FR 72452, 72465, Dec. 20, 2007).

Several commenters described their experiences with the response time of off-site services. Bath Iron Works reported that, while they rely on an on-site ambulance staffed with EMTs to provide emergency treatment during the first and second shift, "During the 3rd shift, BIW relies on a city ambulance that responds to emergencies within 3 to 5 minutes" (Ex. 106.1). Kim Hodne of Alaska Ship and Drydock testified that it takes less than three minutes for the closest EMT facility to respond to calls from the shipyard (Ex. 198, p. 128). John Killingsworth of Dakota Creek Industries stated that it takes five or six minutes for the EMT responders to reach a victim located on the bottom deck of the largest vessel (Ex. 198, p. 129). Dick Webster from Petersburg Shipwrights noted that it could take up to 10 minutes for a responder just to reach an injured employee if, for example, the employee was in the bottom of a 400-foot barge that required crossing 18-inch beams every six feet (Ex. 198, pp. 235–236).

To allow for the occasional difficulty of reaching an injured/ill employee below deck or in a confined space, the final rule sets a five-minute limit for off-site responders to reach the worksite, not the victim. This provision acknowledges that, even under the best of circumstances with an EMT service located within a few blocks of the shipyard, there are times when it would be impossible for the off-site service to reach an injured/ill employee within five minutes. Dakota Creek Industries described a system of working with off-site responders when an employee is injured in a confined space on a vessel:

> We've come to an agreement [with off-site responders] that the shipyard will, through its, you might say its confined space rescue team, handle the victim, as it were, from the vessel to the ground, and then we would rely on the paramedics to provide the victim care during that period. When the victim hits the ground, however, the paramedics take over using their own equipment and provide whatever is necessary from there (Ex. 198, p. 105).

Notwithstanding the leeway that OSHA gives employers by requiring off-site first aid providers to reach the worksite, rather than the victim, within five minutes, paragraph (c)(2) states that employers must ensure that a first aid provider is able to reach an injured employee within five minutes of a report of serious injury/illness, such as one involving cardiac arrest, acute breathing problems, uncontrolled bleeding, suffocation, electrocution, or amputation. Prompt, properly administered first aid may mean the difference between rapid or prolonged recovery, temporary or permanent disability, and even life or death. For example, the American Heart Association found that when resuscitation and automatic external defibrillation are delivered within three to five minutes, reported survival rates from sudden cardiac arrest are as high as 48 to 74 percent (Ex. 58). Studies have shown that for each minute sudden cardiac arrest is not treated, the probability of reviving the heart decreases by 7 to 10 percent (Exs. 57; 58). These data indicate that having responders at the worksite promptly could significantly increase the survival rates for injured/ill employees. Thus, if there is a possibility of a life-threatening injury/illness occurring somewhere in the shipyard, including aboard vessels, where the injured/ill employee could not be reached by an off-site responder or first aid providers from the employer's on-site infirmary within five minutes, the employer must ensure that another first aid responder could reach the victim within five minutes of the injury being reported to assist the victim until other emergency personnel, who will have more expertise in treating emergencies, arrive.

For example, performing CPR immediately can help to preserve heart and brain function until local emergency services are able to provide further medical treatment, such as administering oxygen or using an automated external defibrillator (AED) to restore normal heart rhythm. According to OSHA's Integrated Management Information System (IMIS), there were 13 fatalities in shipyards that were deemed "heart attack" or "coronary" within a 15-year period. Out of those 13, only 4 reports documented any basic life support, such as CPR, prior to rescue squads arriving on the scene. Even for injuries that are not immediately life-threatening, timely first aid can reduce further injury and significantly aid recovery by, for example, immobilizing fractures, reducing blood loss, or providing warmth for shock victims.

The five-minute response time is consistent with an OSHA letter of interpretation (Ex. 212; OSHA letter of interpretation to Charles F. Brogan, Jan. 16, 2007) that explained what "reasonably accessible" means with regard to off-site emergency-response services:

> [T]he requirements that emergency medical services must be "reasonably accessible" or "in near proximity to the workplace" are stated only in general terms. * * * While the standards do not prescribe a number of minutes, OSHA has long interpreted the term "near proximity" to mean that emergency care must be available within no more than 3–4 minutes from the workplace, an interpretation that has been upheld by the Occupational Safety and Health Review Commission and by federal courts.

Paragraph (c)(3), listing the factors that an employer must use in determining the number and location of employees who must have first aid training, is discussed above under paragraph (c)(1).

Paragraphs (c)(4) and (c)(5) require the employer to ensure that its first aid providers are trained to render first aid, including cardiopulmonary resuscitation (CPR), and maintain current first aid and CPR certification from the Red Cross, American Heart Association, or other equivalent organization. Although some shipyard employees may have received training in the past, appropriate and up-to-date training is necessary to ensure that injured employees receive correct intervention, since lack of training can also result in a lack of treatment when it is needed.

This provision is designed to give employers maximum flexibility in developing a first aid training program that is appropriate for the types of working conditions and hazards in their workplaces. With one exception, CPR training, the standard does not establish the specific content of the required first aid training program that employers must follow. As long as the certificate is issued by a responsible organization, such as the American Red Cross, the American Heart Association, or other equivalent organization that requires successful course completion as evidence of qualification, the requirements of the final rule would be met. Likewise, the final rule does not specify a frequency for first aid refresher training. The employer must comply with the frequency the certifying organization requires for retaining certification, usually two years.

In the proposal (72 FR 72452, 72467, Dec. 20, 2007) OSHA requested comments on whether the Agency should include in the final rule an appendix on the requirements of a first aid training program, similar to that in § 1910.266 or 1918.97, to ensure that employees are fully trained by qualified instructors. Topics under consideration included respiratory arrest, cardiac arrest, lacerations/abrasions, shock, burns, and loss of consciousness. Only the U.S. Navy commented on this issue: "A non-mandatory appendix outlining basic first aid training in CPR, assessing and stabilizing injured personnel[,] and wound treatment would be helpful" (Ex. 132.2). Due to the minimal comments received on this issue and the requirement in this final standard that employers must ensure that first aid providers are trained to render first aid (including CPR), as well as maintain current first aid and CPR certifications such as those issued by the Red Cross, American Heart Association, or other equivalent organization, an appendix will not be included in the final standard. These organizations (for example, Red Cross and American Heart Association) already have specific training modules in place that the Agency believes are effective, and that offer the same guidance that an appendix would provide.

Paragraph (d)—First Aid Supplies

Paragraph (d)(1) requires employers to provide and maintain adequate first aid supplies that are readily accessible to each worksite. The rule also specifies that an employer's on-site infirmary or clinic containing first aid supplies that are readily accessible to each worksite will comply with this requirement.

OSHA received many comments on using the term "adequate" as a modifier. For example, Trident Seafoods Corporation commented:

> The term "adequate first aid supplies" is a subjective term. What may seem adequate to us may not seem adequate in the eyes of others regardless of the objective factors considered. We work with our suppliers to stock the 1st aid kits with items appropriate for a given work location (Exs. 104.1; 107.1).

Because first aid needs can vary from worksite to worksite, an employer must be able to decide what is needed at each worksite. For example, while a small first aid kit might be all that a small shipyard or vessel needs, it might be completely insufficient for a large facility. OSHA has concluded that requiring "adequate" supplies will give employers the flexibility of determining which first aid supplies they need for their particular worksites. To assist employers in determining what is "adequate," OSHA is bringing forward the criteria set forth in proposed paragraph (d)(2) for determining the adequacy of first aid supplies. Those same criteria are specified in paragraph (c)(3) to help employers determine an adequate number of first aid providers.

Comments were received from several employers expressing a concern that requiring that first aid supplies be available for employees would lead to ineffective self-treatment. Atlantic Marine Florida, LLC, stated:

> [We maintain] first aid supplies on our in-house medical cart staffed by EMTs, and at our Medical treatment facility. The medical cart has less than a 3 minute response time throughout the shipyard. We do not provide first aid kits at each work location inside the shipyard, since this tends to support self-treatment, which can lead to larger issues if employees treat themselves incorrectly (Ex. 115.1).

The American Shipbuilding Association had similar concerns, stating:

> Paragraph (d)(1) proposes to revise existing requirements for first aid supplies. We are concerned that making it mandatory to have first aid kits at each work location would promote self-treatment on the part of employee[s] and enable treatment by untrained individuals. Such a mandate would also discourage employees from reporting minor injuries. We request that OSHA consider adding an exemption to this section if a shipyard utilizes an in-house ambulance service or has access to immediate response from an external ambulance service (Ex. 117.1).

In contrast, several commenters stated that, while they have in-house medical services, they also utilize first aid kits throughout their worksites. Manitowoc Marine Group explained that they have "a full medical facility on both sides. And there are some areas, some of the buildings, that will have smaller first aid kits for minor injuries, illnesses" (Ex. 168, pp. 106–107). When asked if they had first aid kits in their shipyard, Todd Pacific Shipyard confirmed that they did have first aid kits throughout their worksite. They explained that they allow employees to use the first aid kits as needed:

> Our injury program requires that any injuries more than a Band-Aid, the employee, the affected employee and his supervisor must both come to the medical facility and fill out our accident reports. The medical officer determines what the classification is, what the necessary treatment is and if we need any additional support at that time.
>
> But yes, we do have the first aid kits out there, and yes, they can put a band-aid on (Ex. 198, p. 49).

OSHA agrees that employers should use in-house medical services as a first resort if those services can be accessed in a timely manner, given the circumstances. However, there may be times when an employee is injured/ill at a shipyard when there is no on-site clinic, first aid providers are not readily available, or a first aid provider needs ready access to supplies. At such times, employees should have access to adequate first aid supplies. These supplies must be readily accessible to each worksite. This revision gives employers more flexibility and guidance about where first aid supplies need to be located. In addition, this provision clarifies that first aid supplies need to be located at all worksites throughout the shipyard, which include worksites on and near vessels, as well as those landside. Employers who have on-site medical facilities have the choice to maintain all first aid supplies at the medical facility, or to place them throughout the worksite. Employers who rely solely on outside medical assistance are required to provide first aid supplies so they are readily accessible to each worksite. OSHA concluded that, by requiring employers to provide first aid supplies through the worksite, employees would have access to these supplies until a trained first aid provider or healthcare provider arrives to assist them.

The Agency received several comments requesting that it provide employers flexibility in tailoring the type, amount, and location of supplies to the specific needs of the workplace (Exs. 104.1; 107.1; 113; 115.1; 118.1). Paragraph (d)(2), which carries forward the same language from the proposal, lists four objective factors, which are identical to those factors specified for determining the number and location of first aid providers. These factors will assist employers in meeting the requirements for placement, content, and amount of first aid supplies without prescribing a specific parameter. The four factors include:

- The Size and Location of Each Worksite

The size of the shipyard worksite is an important consideration. It is likely that large worksites contain many work areas that are spread out and, as such, need more first aid kits to ensure they are readily accessible if an employee gets injured. Employers also need to consider the locations of where employees are working throughout shipyards when determining the number, content, and positioning of first aid kits. For example, remote work areas or other shipyard work areas that are far away from rescue squads or hospitals may need to have more first aid supplies or a broader range of supplies to care for an injured/ill employee until additional help arrives or the employee can be transported for advanced care. Work areas that may be cut off by passing railcars also may need more first aid supplies in case access roads are blocked when an injury/illness occurs.

- The Number of Employees at Each Worksite

The employer needs to evaluate the ratio of employees to first aid kits and ensure that there are sufficient supplies for all employees. In general, when there are a great number of employees, or a surge in contract or temporary workers at a worksite, the employer would need to provide more first aid supplies to prepare for the possibility of multiple employee injuries/illnesses, or that several accidents could occur within a short period of time.

- Hazards Present at Each Worksite

Employers must assess the hazards present in each worksite to ensure that first aid kits contain the types and quantity of supplies needed to effectively treat the injuries and illnesses that could be expected for these hazards. For example, in shops where hot work is performed, first aid supplies for burns would be necessary, and in outdoor areas, first aid items for insect or animal bites may be needed.

- The Distance of Each Worksite From Hospitals, Clinics, and Rescue Squads

The distance from, and the time needed to get to, hospitals or clinics (on-site or off-site), and the time needed for rescue squads to respond, are also important factors in determining the location, amount, and type of first aid

supplies employers need to provide. A single first aid kit may be adequate for small worksites that are close to on-site infirmaries or local emergency services. However, additional kits and types of supplies may be necessary when medical services are farther away.

In addition to the four factors described above, non-mandatory Appendix A, "First aid kits and automated external defibrillators," has been added to the final rule. Appendix A references the most recent consensus standards regarding first aid supplies, consistent with the recently revised general industry standard (§ 1910.151). For example, Appendix A refers readers to ANSI/ISEA Z308.1–2009, "Minimum Requirements for Workplace First Aid Kits and Supplies" (incorporated by reference as specified in § 1915.5), for assistance in purchasing or assembling first aid kits that would be adequate for small worksites. The appendix also gives guidance to employers having large or multiple operations, or unique needs. OSHA believes that adopting a performance-based approach on the contents of first aid kits will give employers flexibility in tailoring their first aid supplies to the conditions and hazards present in their workplace and to changing the supplies as warranted by new developments in first aid.

Paragraph (d)(3) requires that first aid supplies be placed in a weatherproof container. Paragraph (d)(4) specifies that employers must maintain first aid supplies in a dry, sterile, and serviceable condition. The proposal included only the requirements of paragraph (d)(4). Taken together, paragraphs (d)(3) and (d)(4) require that any first aid kit that may be used at any time outside a clinic-type setting must be protected from the elements.

Although comments were not received about this particular requirement, OSHA believes that first aid supplies should be kept in a weatherproof container. While discussing the provisions in § 1915.81, Housekeeping, that specifically referenced weather, for example, § 1915.81(a)(2), OSHA heard testimony regarding some of the weather conditions in shipyards. Atlantic Marine stated: "In this region, rainfall averages 6 inches per month, with an inch or more common for a single rain event" (Exs. 115.1; 118.1). While discussing snow and ice conditions, Manitowoc Marine Group stated: "[A]s I well know [from] firsthand experience on the Great Lakes, conditions such as this may last several days" (Ex. 168, pp. 68–69). Given that shipyard employment often takes place outdoors, sometimes in wet conditions, and that injuries could occur under those conditions, OSHA believes that adding a requirement for first aid supplies to be in waterproof containers is reasonable. In addition, most industrial or commercial type first aid kits are constructed of weatherproof materials.

Further, some first aid supplies may degrade if exposed to the elements (sun, hot temperatures, extreme cold, and humidity), dirt, exhaust, grease, paint, solvents, and other contaminants common to shipyard work. Thus, OSHA is retaining the proposed requirement that first aid supplies be kept in a dry, sterile, and serviceable condition. For purposes of this provision, OSHA defines "serviceable condition" to mean the state or ability of supplies or goods to be used as intended by the manufacturer. Thus, if the first aid supplies contain instructions from the manufacturer on how to store them, the employer should comply with those instructions to ensure that the supplies remain effective for use.

Paragraph (d)(5) requires the employer to replenish first aid supplies as necessary to ensure an adequate supply when needed. This requirement was not expressly stated in the proposal, although it was implicit in proposed paragraph (d)(1) requiring the employer to provide and maintain adequate first aid supplies at each work location, and in proposed paragraph (d)(3) requiring the employer to ensure that first aid supplies are in a dry, sterile, and serviceable condition. Explicitly requiring replenishment of first aid supplies as necessary will protect workers by ensuring that there will be an adequate number of serviceable first aid supplies available in the event of an injury. That is, employers have an obligation to replace supplies that are found to be deficient or missing. This requirement also responds to the National Institute for Occupational Safety and Health's (NIOSH) suggestion that OSHA "add a sentence stating that any supplies that have been utilized shall be replaced as soon as possible" (Ex. 129.1).

Paragraph (d)(6) requires employers to inspect first aid supplies at sufficient intervals to ensure that the supplies are adequate and in a serviceable condition. This paragraph is nearly identical to proposed paragraph (d)(3), which would have required employers to inspect first aid supplies at intervals that ensure the supplies remain in a "dry, sterile and serviceable condition." This provision gives employers the flexibility to determine what inspection procedures would be most effective for ensuring that supplies remain in a serviceable condition and adequately replenished. For example, it allows employers to opt for stocking worksites with an appropriately sized supply of first aid supplies and to establish a maintenance and inspection schedule that is suitable for the particular shipyard, whether it be weekly or monthly. It also allows employers to stock a variety of suitably sized kits, such as small portable first aid kits for mobile work crews. Depending on the size of the first aid kits, they may need to be inspected and replenished frequently or, for larger, stationary kits assigned to a particular shop or location, less frequently.

NIOSH commented: "It would be useful for the written safety plan to state explicitly the first aid supply inspection interval" (Ex. 129.1). OSHA agrees that employers who establish a set inspection interval will be able to determine when depleted or defective supplies need to be replenished. However, OSHA believes that employers are in the best position to know what interval supplies should be replenished at their worksites and thus did not include an explicit inspection interval in the final standard.

Paragraph (e)—Quick-Drenching and Flushing Facilities

Paragraph (e) requires employers to provide quick-drenching or flushing facilities when the potential exists for an employee to be splashed with a substance that could result in an acute or serious injury. Under this paragraph, the employer must ensure that the quick-drenching or flushing facility is located for immediate emergency use within close proximity to the operations where such substances are being used. Proposed paragraph (e) would have required that quick-drenching or flushing facilities be provided where employees could be injured from being splashed with "hazardous or toxic substances" and that the facilities be "located within each work area for immediate use." Proposed § 1915.95 defines "hazardous or toxic substances" to include substances regulated by subpart Z of 29 CFR part 1915; materials listed in the Department of Transportation's hazardous materials regulations (49 CFR parts 171 through 180); any corrosive substance; or any environmental contaminant that could expose employees to injury, illness, or disease. OSHA reasoned that shipyard employees involved in operations such as cleaning, painting, and stripping were at risk of being splashed with solvents or other chemicals. Although these substances may not necessarily be corrosive, they can injure or burn the skin or eyes or be absorbed rapidly through the skin, causing harmful

surface and internal health effects (72 FR 72452, 72469, Dec. 20, 2007).

OSHA received many comments on the proposed provision and on the proposed definition of "hazardous or toxic substances." Several employers, including American Seafoods Company, the U.S. Navy, Bath Iron Works, Northrop Grumman Shipbuilding—Newport News, the American Shipbuilding Association, and International Safety Equipment Association, commented that the proposed language was too broad and would require an inordinate number of quick-drenching facilities in a shipyard (Exs. 105.2; 106.1; 116.2; 117.1; 120.1; 132.2). Atlantic Marine commented: "It can be inferred that a quick-drench facility would be required anywhere painting is occurring. Since painting occurs all over the shipyard, providing quick-drench facilities at these locations is not practical" (Exs. 115.1; 118.1). Trident Seafoods stated:

> Installing quick-drenching/flushing facilities wherever hazardous or toxic substances are located is not economically feasible when following the proposed definition of "hazardous or toxic substances" in the proposed rule 1915.95. This is a change from the current requirement of providing quick drenching or flushing stations where corrosives are used. It seems shipyards, vessel maintenance facilities, and vessels will be required to purchase numerous portable quick-drenching/flushing facilities in order to comply (Exs. 104.1; 107.1).

The Shipbuilders Council of America commented:

> Using the language *toxic* or *hazardous substances* greatly broadens the scope of applicability, and would include paint operations into the proposed rule jurisdiction, which we hold is unnecessary. Exposure to hazardous material within a paint shop can vary, especially considering the amount of [personal protective equipment] worn to prevent such exposures (Ex. 114.1).

Although Northrop Grumman Shipbuilding—Gulf Coast provides emergency flushing facilities for employees performing cleaning, painting, and stripping operations, the company stated:

> NGSB–GC believes the proposed definition is exceedingly broad and offers the employer minimal guidance in providing effective employee protection against contact/absorption hazards. * * * As written, 1915.87(e) would require quick drenching facilities at virtually every work area since even common commodities, such as copier cartridges and household-variety cleaners and disinfectants contain ingredients legally classified as "hazardous" (Ex. 112.1).

OSHA has considered these comments and, in the final rule, limited the requirement for quick-drenching and flushing facilities to those instances when employees may potentially be splashed by substances that could cause an acute or serious injury. Thus, if paints or other materials used by the shipyard could not cause an acute or serious injury if splashed on an employee, either because of the chemical components of the material or because the employee is wearing PPE that would eliminate the risk of splashes to the eyes or body, the employer need not provide quick-drenching or flushing facilities pursuant to paragraph (e). However, if PPE is not worn, and any material being used could cause an acute or serious injury if splashed on the employee, the employer must provide a quick-drenching or flushing facility within close proximity to where the work involving the material is occurring. Furthermore, the facility must be available for immediate emergency use; that is, it should work as soon as it is activated and should not require replenishment of water at the time of the emergency.

In work areas where it is impracticable to place permanent (for example, plumbed) quick-drenching facilities, such as confined spaces, the employer would need to provide portable facilities. OSHA does not believe this requirement should pose a problem for employers since many employers already have these portable facilities. The ANSI Z358.1 standard includes specifications for self-contained eyewash equipment, as well as personal quick-drenching equipment that could be used in such locations (Ex. 38, ANSI Z358.1–2009, "Emergency Eyewash and Shower Equipment," incorporated by reference as specified at § 1915.5). OSHA believes the requirement to have quick-drenching facilities within close proximity to workers using substances that could cause acute or serious injury is appropriate. Employees who may be splashed must be able to reach a quick-drenching or flushing facility in time to prevent an acute or serious injury from occurring. OSHA believes that this language will provide employers with flexibility in determining the number and location of quick-drenching or flushing facilities while addressing their concerns that some substances that may have been included in the definition of hazardous or toxic substances did not warrant the use of a quick-drenching or flushing facility.

The North Pacific Fishing Vessel Owners' Association (Ex. 197.1) suggested that OSHA permit the use of water from bottles or hoses in confined spaces or hazardous locations or in freezing temperatures. The Agency has considered this suggestion for times when it may be impossible for an injured employee to get out of a confined space or hazardous location in time to treat a splash injury at a quick-drenching or flushing facility. During the few situations when an employee would be working in a location where it would be impracticable to provide quick-drenching facilities and employees would be exposed to hazardous or toxic substances, an appropriate option would be for the employer to provide water bottles or a hose.

Several employers commented about the costs for installing quick-drenching or flushing facilities pursuant to proposed paragraph (e). American Seafoods Company stated:

> As difficult as it is for a shoreside facility to meet the requirements for volume and pressure, it is far more difficult and costly on ships and commercial fishing vessels that are designed from the outset to conserve potable water as much as possible. 30 gallons per minute for even the largest vessels can be an expensive challenge (Ex. 105.1).

Bath Iron Works commented: "OSHA's proposal will provide additional cost to employers to comply with this regulation adjustment, which is in opposition to Table [2] of the regulatory analysis" (Ex. 106.1). Northrop Grumman Shipbuilding—Newport News noted: "Costs associated with purchasing, transporting and maintaining significantly more eyewash and drenching facilities are not included in the Preliminary Economic and Regulatory Flexibility Analysis (PEA)" (Ex. 120.1).

OSHA believes that the revisions to the final rule that limit the types of materials requiring quick-drenching or flushing facilities in close proximity to these materials should not impose additional costs. Shipyard employers already must provide such facilities, pursuant to § 1910.151(c), which requires these facilities when employees may be injured by "corrosive materials."

Paragraph (f)—Basket Stretchers

Paragraph (f) requires that an adequate number of basket stretchers, or the equivalent, be readily accessible. It also requires that this equipment have permanent lifting bridles that enable the stretcher to be attached to hoisting gear that is capable of lifting at least 5,000 pounds. In addition, these basket stretchers must be capable of securely restraining the injured employee and must provide a blanket or other suitable covering. Finally, the basket stretchers must be stored in a clearly marked location, be protected from damage, and

be inspected to ensure they remain in a safe and serviceable condition.

Paragraph (f)(1) is a performance-based provision requiring that employers provide an adequate number of basket stretchers or the equivalent that are readily accessible to locations where work is being performed on a vessel or vessel section. Employers have several ways to comply with this provision. The requirement recognizes that, in some situations, having just one basket stretcher at a location where work is being performed on vessels or vessel sections may be adequate to ensure ready accessibility. A SESAC member stated that, if a crane is available to hoist a basket stretcher from any one of several barges docked together, then one stretcher may provide ready accessibility for that group of vessels (Docket SESAC 1993–1, Ex. 100x, p. 155). OSHA also believes that when a shipyard crane mounted on rail tracks can move back and forth to hoist a basket stretcher from one of several vessels or vessel sections, one stretcher may be adequate to remove injured employees from any of those vessels or vessel sections.

In other situations, however, one basket stretcher may not be adequate. In large shipyards that have several work areas with hundreds, if not thousands, of employees working far apart on vessels and vessel sections, more than one basket stretcher may be needed to ensure that one is readily accessible to each work area. Some SESAC members also said additional stretchers should be provided when it is necessary to speed up removal of injured employees (Docket SESAC 1993–1, Ex. 100X, p. 159). Having additional stretchers allows first aid providers to prepare other injured employees for removal while another employee is being lifted to shore.

OSHA believes that paragraph (f)(1) is a reasonable approach for providing effective protection for employees. In some circumstances, basket stretchers must be provided even when fewer than 10 employees are working on a vessel, an issue that concerned SESAC (Docket SESAC 1993–1, Ex. 100X, p. 147). At the same time, it gives employers flexibility to tailor their efforts to the specific conditions and equipment present at the work area.

In paragraph (f)(1), OSHA permits the use of basket stretchers "or the equivalent." Several commenters requested that OSHA include Skeds® in this provision because they believed Sked® stretchers are more useful on ships than other types of stretchers (Exs. 101.1; 104.1; 105.1; 107.1; 124; 126; 128; 130.1). A Sked® is a stretcher used for confined space, high-angle, or technical rescue, or for landside applications. For purposes of paragraph (f), OSHA concludes that a Sked® would be the equivalent of a basket stretcher.[1]

Paragraph (f)(1) contains an exception to employer-provided stretchers or equivalent if an emergency response service has the stretchers or equivalent that otherwise meet the requirements of paragraph (f). Proposed paragraph (f)(1) deleted language in existing § 1915.98(d) stating that the requirement to provide basket stretchers does not apply when ambulance services are available and carry such stretchers. OSHA believes this language was no longer necessary since the proposed language in paragraph (f)(1) requires that basket stretchers be "readily accessible." This term gives employers flexibility to provide their own stretchers or rely on stretchers provided by local emergency squads if they are readily accessible.

Two commenters questioned OSHA's removal of this exception from paragraph (f)(1). Trident Seafoods stated: "The allowance to count local emergency squad basket stretchers as being 'readily [accessible]' should be included in the regulation not only in the preamble" (Exs. 104.1; 107.1). Sound Testing, Inc., requested: "Could the requirements of § 1915.87(f) be substituted with the availability of a public professional emergency responder, such as the local fire department, paramedics, or HazMat response team?" (Ex. 121.1).

OSHA requested comment on whether local emergency squads are readily accessible to vessel worksites and whether they have basket stretchers that meet the proposed requirements. Many commenters explained that their local emergency medical services will not use the shipyard's basket stretchers, but instead will only use their own stretchers (Exs. 101.1; 121.1; 124; 126; 128; 130.1 198, pp. 81–82, 105–106). Seven Seas Fishing Company noted:

> For transporting employees off the ship, most medical service providers want to use their stretchers to move the injured off the ship. Also, if our stretcher is used, it may be difficult to get it back due to the distance the employee is transported away from the vessel and the logistics of getting that stretcher returned (Ex. 199, p. 206).

American Seafoods stated: "No outside agency will use our Basket Stretchers. Not the USCG, not any professional (paid or volunteer) fire department. Since they will never trust our equipment to lift an injured worker, how much should be invested for this type of equipment?" (Ex. 105.1). OSHA acknowledges that these comments have merit. Thus, the final rule clarifies that employers may provide their own basket stretchers (or equivalent), or they may rely on emergency response services to provide them. This exception applies to both in-house responders and outside responders, so long as the basket stretchers or equivalents are "readily accessible."

Paragraph (f)(2)(i) requires that basket stretchers, or the equivalent, have permanent lifting bridles that enable the stretcher or equivalent to be attached to hoisting gear capable of lifting at least 5,000 pounds (2,270 kg). Paragraph (f)(2)(ii) requires that basket stretchers, or equivalent, have restraints that are capable of securely holding the injured/ill employee while the stretcher is lifted or moved. These paragraphs are based on the Marine Terminals and Longshoring standards (§§ 1917.26(d)(4) and 1918.97(d)(4)) and are carried over unchanged from the proposal. OSHA deems it appropriate to apply the Marine Terminals and Longshoring provisions to shipyard employment because the use of basket stretchers and the working conditions are similar in all three industries. These requirements should not pose a problem for shipyard employers because most, if not all, basket stretchers or equivalents already meet the specified criteria. No comments were received on these two provisions.

Paragraph (f)(2)(iii) requires that each basket stretcher or equivalent have a blanket or other suitable covering to cover injured employees, thus protecting them from environmental conditions. General Dynamics NASSCO requested that this provision not be a requirement, but instead be added to Non-Mandatory Appendix A, stating, "Storage that prevents damage to a stretcher and bridle may not be sufficient to keep a blanket in a condition that is appropriate for use during a medical emergency" (Ex. 119.1). The Agency agrees with this commenter but, rather than moving this provision to Non-Mandatory Appendix A, has added a requirement to paragraph (f)(3) of the final rule to ensure that basket stretchers, or the equivalent, and related equipment (for example, blankets) are protected from the environment. OSHA concluded that equipment related to the use of basket

[1] The approval of this or any other product for purposes of this standard does not constitute an endorsement by OSHA of the product. The variable working conditions at jobsites and possible alterations or misapplication of an otherwise safe product could easily create a hazardous condition beyond the control of the manufacturer. However, when appropriate, OSHA provides guidance to help employers assess whether products are appropriate to use in light of Agency requirements.

stretchers must be kept with the basket stretcher to ensure quick access to, and efficient use of, the entire system in the event of an injury, and that all parts of the system should be protected when stored. Thus, paragraph (f)(2)(iii) is retained as proposed.

Paragraph (f)(3) requires that basket stretchers, or the equivalent, and related equipment be stored in a clearly marked location in a manner that prevents damage and provides protection from environmental conditions. This language is based on similar requirements in the Marine Terminals and Longshoring standards (§§ 1917.26(d)(7) and 1918.97(d)(7)). This provision would accomplish two goals. First, requiring storage areas to be clearly marked helps to ensure that stretchers are easy to locate when they are needed. Second, storing stretchers so they are protected from damage and environmental conditions prevents deterioration of the equipment. As Atlantic Marine pointed out, "Mounting stretchers on or near drydocks and piers exposes them to paint and the elements which break down the material that the stretcher is constructed of" (Exs. 115.1; 118.1). OSHA believes that, by requiring related equipment to be stored with the basket stretcher, deterioration or damage will be reduced significantly. For example, related equipment such as blankets and lifting bridles may deteriorate or become damaged if exposed to weather or impact. Thus, for this final standard, paragraph (f)(3) requires that basket stretchers and related equipment be stored to prevent damage and to protect them from environmental conditions.

Paragraph (f)(4) requires the employer to inspect stretchers and related equipment at intervals that ensure this equipment remains in a safe and serviceable condition, but at least once a year. General Dynamics NASSCO agreed with the need for inspection and suggested that this paragraph should read: "The employer shall inspect emergency baskets, stretchers and related lifting bridles at intervals that ensure they remain in [a] safe condition" (Ex. 119.1). Although the Agency is giving employers the flexibility to inspect stretchers and related equipment at intervals to ensure they are adequate in terms of safety and service, OSHA believes that the inclusion of the one-year interval is necessary, as basket stretchers are not used nearly as often as first aid kits, and, in fact, might not be used for over a year. This provision will ensure that lifesaving equipment functions properly when needed in an emergency and is particularly important if basket stretchers are not used frequently. In response to the comments received, OSHA retained the proposed language, but added the requirement that related equipment also must be inspected. Thus, OSHA is requiring that the employer inspect the basket stretcher and related equipment at intervals, but at least once a year, to ensure the equipment remains in a safe and serviceable condition. OSHA believes that this requirement will ensure that, in the event of an emergency, all of this equipment will be in a serviceable condition and ready to be used.

Non-Mandatory Appendix

Section 1910.151 includes a recently revised non-mandatory appendix to provide information on the contents of first aid kits (70 FR 1112, 1141, Jan. 5, 2005). OSHA is incorporating the § 1910.151 appendix, with revisions, and a new paragraph (4) on AEDs. The appendix provides guidance to employers on the contents of first aid kits, assessing workplace risks, OSHA's requirements for protecting first aid providers from possible exposure to bloodborne pathogens, and the use of AEDs. The appendix references the ANSI standard Z308.1–2009, "Minimum Requirements for Workplace First Aid Kits" (incorporated by reference as specified at § 1915.5) (Ex. 213). The ANSI standard should be of assistance to employers seeking guidance on classification and performance of containers, appropriate contents, and recommendations and cautions regarding the use and maintenance of first aid kits. The Agency has concluded that this non-mandatory guidance will help employers comply with first aid requirements.

The proposed Appendix referenced ANSI Z308.1–2003 (Ex. 84). However, since publication of the proposal, this ANSI standard has been updated. The Agency has determined that the most current version of ANSI Z308.1–2009 is as effective as the 2003 version, and will be incorporating this most recent version for this final rule.

Although OSHA received no comments on the proposed appendix, quite a few employers responded to the Agency's request for comments on whether shipyards should be required to have AEDs as part of their first aid and medical services (72 FR 72452, 72471, Dec. 20, 2007). These comments are discussed below. Based on those comments, OSHA has added a new paragraph (4) to the non-mandatory appendix to provide information and guidance to employers who are currently using AEDs and those who are contemplating installing them.

According to the American Heart Association, over 300,000 individuals die from cardiac arrest each year, with most occurring outside hospitals (Ex. 58). In 2001 and 2002, there were 6,628 work-related fatalities reported to OSHA—1,216 of these deaths were from heart attack, 354 from electric shock, and 267 from asphyxia (Ex. 56). Survival rates for out-of-hospital cardiac arrest are only one to five percent, but treatment of ventricular fibrillation (for example, chaotic beating of the heart) with immediate defibrillation (for example, within one minute) has achieved survival rates as high as 90 percent (Ex. 57). Therefore, fast and immediate defibrillation is the most critical step in the treatment of cardiac arrest because it is the definitive therapy for ventricular fibrillation.

AEDs restore normal heart rhythm with electrical shock (defibrillation). AEDs have been shown to significantly increase survival rates where they are used immediately after the event (for example, within three to five minutes). For example, in the first 10 months after Chicago's O'Hare and Midway Airports installed AEDs, 9 of 14 (64 percent) cardiac victims were revived and survived (Ex. 57).

In the past decade, there have been significant advances in AED technology, including advances in miniaturization and improvements in their reliability and safety. Today, AEDs are small, lightweight units in portable carriers; run on rechargeable batteries; analyze the heart rhythm; and automatically indicate when to shock with easy-to-follow audio prompts. These improvements have also greatly minimized the training needed to operate them. Many studies have shown that AEDs are nearly error free and effective when used by non-medical first aid responders in the workplace (Ex. 57).

OSHA's existing medical services and first aid standards do not require that AEDs be provided in workplaces or that employees be trained in their operation. However, many employers, concerned that local emergency services cannot respond quickly enough to medical emergencies, have been equipping their workplaces with AEDs and training employees in their use. While the cost of AEDs has dropped dramatically in recent years, it is still a significant cost. In 2001, for instance, AEDs cost $3,000–$4,500 on average. Now they are widely available for less than $1,500 (Ex. 55). OSHA anticipates that AED costs will continue to decline as the use of AEDs increases.

The Agency received several comments on this subject, both in

support of and in disagreement with the requirement to have AEDs in shipyard employment. Trident Seafoods stated:

> Shipyards should not be required to have AEDs as part of their 1st aid and medical services. While it is a good practice to have AEDs available, and many of us do, it should not be mandatory. Small independently owned vessels and maintenance facilities may not be able to afford AEDs. While the price may have decreased for AEDs constructed for use inside office spaces and controlled climates, it remains fairly expensive to purchase models designed to withstand exposure to the elements (Exs. 104.1; 107.1).

Several employers, including Bath Iron Works, Foss Maritime, Manitowoc Marine Group, Northrop Grumman—Newport News, Pacific Fishermen Shipyard, Todd Pacific Shipyard, and Trident Seafoods testified that they currently have AEDs at their facilities or on their vessels (Exs. 168, p. 313; 198, p. 10; 168, p. 58; 168, pp. 87–88; 168, p. 315; 198, p. 45; 198, p. 74; 199, pp. 195–196). Other commenters stated that AEDs, while useful, should not be mandatory. The U.S. Navy stated: "The Navy does not believe that AEDs should be 'required' as part of their first aid and medical services. Rather, Naval Shipyards have the discretion to decide whether AEDs should be installed at their shore facilities" (Ex. 132.2). Similarly, American Seafoods testified: "At this point we would encourage OSHA not to require AEDs and perhaps to recommend and suggest that they be considered. The industry is actually getting into this on its own" (Ex. 199, p. 267).

Despite the benefits of AEDs, the Agency has determined that costs may be overly burdensome to some, especially small, employers. However, since many employers, especially large and medium-sized shipyards, stated that they are currently using them, OSHA is addressing the use of AEDs in the non-mandatory Appendix A. Employers should use the same objective criteria listed in § 1915.87(c)(3) to determine if they need AEDs at their facility. In fact, Northrop Grumman Shipbuilding—Newport News advocated a similar approach:

> NGSB–NN believes shipyards should include provisions for the use of AEDs in their assessment of requirements for medical and first aid services. The proximity to outside emergency medical services, demographics, and types of work performed all need to be considered when determining the need for AED[s] (Ex. 116.2).

While OSHA believes that providing AEDs at all worksites, including shipyards, is an excellent safety precaution that can save lives, it is not requiring that employers provide them at this time. There is significant medical evidence that supports the use of AEDs. Employers who have AEDs should designate who will use AEDs and provide training to those designated employees. Proper training will ensure that the designated employees use the AEDs correctly. In addition, AEDs should be located so they can be used within three to five minutes of a report of an accident or injury, and they should be used, inspected, tested, and maintained in accordance with manufacturers' specifications. OSHA encourages all employers, large and small, to consider voluntarily providing AEDs.

Section 1915.88—Sanitation

In this section, OSHA updates and consolidates sanitation requirements applicable to shipyard employment. OSHA recognizes that, due to unique working conditions in shipyard employment, ensuring that sanitation needs and requirements are met may be somewhat difficult. For example, some work areas are in remote locations, without adequate piped water and sewer facilities. Also, much shipyard work is performed outdoors, often in extreme conditions.

OSHA believes that the sanitation needs of workers must be met in shipyard employment because the adverse health effects associated with the lack of appropriate sanitation facilities are well recognized and documented. They include communicable diseases, heat-related illness, health effects related to the delay of urination and defecation, and effects associated with ingestion or absorption of hazardous substances. These health hazards were discussed at length in the preamble to the final field sanitation standard for agriculture (52 FR 16050, May 1, 1987). OSHA updated that discussion and placed it in the docket of this rulemaking (Ex. 62). Although the adverse health effects associated with sanitation hazards may be more difficult to quantify than some other hazards, OSHA IMIS data has reported the death of a shipyard worker from heat exhaustion and heat stroke possibly due to not having enough drinking water readily accessible at his worksite (72 FR 72452, 72481, Dec. 20, 2007).

In developing the final rule, OSHA has carefully considered the working conditions observed during site visits, the comments received, and other information in the record in developing requirements that will take into account that workers need to have ready access to adequate and properly maintained sanitation facilities.

The final rule consolidates into § 1915.88 the existing sanitation requirements in § 1915.97 and the applicable general industry sanitation requirements in § 1910.141 (see Ex. 81, OSHA's Tool Bag Directive). The applicable § 1910.141 requirements cover those conditions that the existing 29 CFR part 1915 sanitation standards did not address. OSHA adopted both sections in 1972 pursuant to section 6(a) of the OSHA Act (29 U.S.C. 655(a)), and they have not been significantly updated since. Therefore, in addition to consolidating the applicable sanitation requirements, the final rule updates the sanitation requirements to reflect improvements in workplace sanitation that have been developed, such as single-use bottled water and waterless handwashing agents.

OSHA drew some of the updated requirements from sanitation standards the Agency developed for other industries, such as marine terminals (§ 1917.127), agriculture (§ 1928.110), and longshoring (§ 1918.95). In addition, pursuant to section 6(b)(8) of the OSHA Act (20 U.S.C. 655(b)(8)), OSHA also reviewed the ANSI national consensus standards on sanitation (ANSI Z4.1–1995 and Z4.3–1995 (Ex. 38 at Ex. 3–6 and 3–8)), and incorporated relevant provisions into proposed § 1915.88. ANSI Z4.1 addresses general sanitation in workplaces, while ANSI Z4.3 covers non-sewered waste disposal systems.

As mentioned, most of the changes in § 1915.88 reflect changes in technology and sanitation practices that have developed since the original standards were adopted. Further, the standard is designed to be more flexible than the existing requirements. The final rule also introduces a new term, "sanitation facilities" (defined in § 1915.80), to cover the wide range of facilities that employers must provide to ensure that employees' "health and personal needs" are met. Sanitation facilities include drinking water, toilets, handcleaning facilities, showers, changing rooms, and eating and drinking areas. The term also includes the supplies for those facilities, such as toilet paper, towels, soap, and waterless cleaning agents.

Paragraph (a)—General Requirements

Paragraph (a) incorporates a series of general requirements on the accessibility, adequacy, and maintenance of sanitation facilities in shipyards. It simplifies the existing standards, and makes them apply more uniformly throughout the shipyard.

A sanitation facility cannot meet employees' health needs unless it is

accessible, adequate, and properly maintained. For instance, if toilets are provided but are located far away from the worksite, employees may have to refrain from using the facilities or from drinking an adequate amount of liquids during the workshift. Employees may refrain from using toilets, particularly portable ones, that are dirty, not serviced regularly, or require a long wait. These actions can result in significant adverse health effects (Ex. 62).

Paragraph (a)(1), like the proposed rule, requires that sanitation facilities be (a) adequate and (b) readily accessible. Employers must provide sanitation facilities that meet both requirements in order to be considered in compliance with this paragraph.

Adequate sanitation facilities. This final standard at § 1915.88 specifies a general requirement regarding the minimum number of facilities that employers must provide (for example, 1 toilet for every 15 employees per sex, 1 shower for every 10 employees per sex, handwashing facilities at each toilet facility). OSHA included this general requirement in the final standard for several reasons. First, employers will be in compliance with the requirement to provide sanitation facilities only if they provide facilities that are adequate for the number of employees in the workplace. Second, as discussed in § 1915.80, the definition of "sanitation facilities" includes supplies for those facilities, such as toilet paper, towels, soap, and waterless cleaning agents. Paragraph (a)(1) reinforces the requirement that supplies for sanitation facilities also must be adequate. Third, sanitation facilities must be clean and well maintained to be considered adequate for the use of workers. This requirement for adequate sanitation facilities covers, generally, the specific requirements that are described in more detail below.

Readily accessible. Ready access to sanitation facilities helps to protect employee health and reduce the risk of adverse health effects by increasing the likelihood that workers will use the facilities. For example, a lack of ready access to drinking water can result in dehydration, which can be fatal, especially in hot and humid working conditions.

The existing sanitation rules that are applicable to shipyard employment, unlike the sanitation standards for marine terminals, longshoring, and agriculture (§§ 1917.127, 1918.127, 1928.110), do not directly address the accessibility of sanitation facilities. Paragraph (a)(1) remedies this omission with a performance-based requirement.

For sanitation facilities to be considered "readily accessible," employees must be able to reach the facilities quickly without facing obstacles. OSHA recognizes that ready accessibility depends on the type of sanitation facility, the sizes and locations of worksites, and the physical characteristics of the shipyard. In small shipyards, sanitation facilities may be readily accessible if they are located in one area. However, in cases where worksites are large and spread out, sanitation facilities (for example, toilets, handwashing facilities, drinking water) located in only one location likely would not be considered readily accessible.

Sanitation facilities also must be readily accessible to employees who work on vessels as well as landside. When employees work on small vessels, sanitation facilities may be readily accessible if they are located dockside. However, when employees work on a large vessel, they may not be able to get to facilities quickly enough if such facilities are located only on the dock. Sanitation facilities may need to be located on deck, or in various places throughout the vessel, to ensure that employees have ready access when they need to use them. When the ship's toilet and handwashing facilities are not available to shipyard employees working on vessels (for example, the ship is being built or systems are turned off during repair), the employer needs to make other arrangements to ensure that such facilities are readily accessible.

A number of stakeholders said they make sanitation facilities readily accessible to employees working on vessels, particularly when workers are not able to use the vessel's plumbed facilities (Exs. 101.1; 119.1; 124; 126; 128; 130.1). General Dynamics, for instance, said their "long standing practice is to provide portable toilets aboard ships" (Ex. 119.1). Other stakeholders said they provide portable toilets on vessels "precisely because we can't use the plumbed systems onboard a vessel" (Exs. 101.1; 105.1; 124; 126; 128; 130.1). Allen Rainsberger of Foss Maritime said that, to ensure toilet facilities are readily accessible for employees working on vessels, especially when vessel plumbing is tagged out, they provide portable toilets "out on the piers that are away from the main facility where the majority of toilets are" (Ex. 198, pp. 22–23).

Determining whether sanitation facilities are readily accessible is also related to how frequently they must be used during a workshift. For example, changing rooms and eating areas that are used only once or twice during a workshift may not need to be as close to the work area. By contrast, drinking water should be located at or in close proximity to the employee's immediate work area, especially during hot and humid weather. Employees who perform heavy manual labor, work with heat-producing equipment, or must spend time in spaces that are not well ventilated or air conditioned need to have enough drinking water close at hand to prevent dehydration. Northrop Grumman Shipbuilding—Newport News said that they make special arrangements to ensure employees working in insolated areas have enough drinking water:

> Ensuring * * * water is available and consumed by employees is an important factor in preventing heat-related injuries. * * * For more isolated work or jobs with a greater heat burden, we provide large thermoses for ice and water from onsite commercial sized ice makers and potable water sources (Exs. 116.2; 120.1).

As mentioned, the requirements in paragraph (a)(1) are stated in performance-based language. One stakeholder said the language in this provision was unclear and ambiguous and requested that OSHA define "readily accessible" (Ex. 121.1). However, when OSHA requested comment on whether the final rule should contain more specific requirements for the location of sanitation facilities such as the ¼-mile maximum distance for portable toilets in the field sanitation standard for agriculture (29 CFR 1928.110(c)(2)(iii)) or the 200-foot requirements in the ANSI Z4.1 standard (Ex. 38, §§ 5.1.1 and 6.1.2), only the National Institute of Occupational Safety and Health supported that approach (Ex. 129.1). Other stakeholders, including Northrop Grumman—Newport News, stated that OSHA should not specify locations or travel distances for sanitation facilities, such as toilets:

> Toilets are already installed per local and state building and plumbing codes. In the case of non-fixed facilities, such as ships and modules, toilets are located as close to where employees are working as feasible.* * * We recommend that OSHA maintain performance based language relative to placement * * * of toilet[s] (both sewered and portable) (Exs. 116.2; 120.1).

After reviewing the record and considering the comments received, OSHA believes that the performance-based approach will enable employers, who are in the best position to assess the needs of their particular worksites, to determine where to install sanitation facilities so that they are readily accessible. Thus, OSHA decided not to

specify a minimum time or distance to sanitation facilities.

Paragraph (a)(2) clarifies OSHA's longstanding policy that employers must supply and maintain sanitation facilities at the worksite in a clean, sanitary, and serviceable condition. OSHA defines "serviceable condition" in § 1915.80 as the state or ability of a device to operate as prescribed by the manufacturer. Obviously, toilets that do not flush, water faucets that do not turn on, and water fountains that do not dispense a suitable stream for drinking are examples of facilities that are not in a "serviceable condition." The current general industry standard specifies that employers must keep all places of employment clean (§ 1910.141(a)(3)(i)). Paragraph (a)(2) incorporates the existing general industry language that lavatories must be maintained in a sanitary condition (§ 1910.141(d)(1)). Paragraph (a)(2) also adds the requirement for employers to maintain sanitation facilities in a serviceable condition.

Regarding how often sanitation facilities are serviced, the U.S. Navy stated:

> The frequency of servicing and cleaning varies from daily to weekly, based on the type of facility, number of employees serviced and location and is addressed via contracts with janitorial services and portable toilet vendors (Ex. 132.2).

Sound Testing, Inc., stated:

> It's a fact that the toilets in any institution, facility or industry may become 'unclean' or 'un-sanitary' after one use! We hope that OSHA doesn't intend to require the employers be responsible for cleaning these toilets immediately after each use, or each time they become not 'clean' or not 'sanitary'. It's more practical and applicable to encourage the employers to maintain a regular housekeeping schedule of some sort (Ex. 121.1).

OSHA considered the above comments from the U.S. Navy and Sound Testing, Inc., and revised the language in paragraph (a)(2) to require that employers establish and implement a schedule for servicing, cleaning, and supplying each facility to ensure that it is maintained in a clean, sanitary, and serviceable condition. Sanitation facilities, especially toilet facilities, will become unsanitary if cleanings are spaced too far apart. Thus, employers need to ensure that they establish cleaning schedules sufficient to provide employees with clean and sanitary facilities. This requirement may mean adjusting schedules to add cleaning if the sanitation facility receives an increased level of usage. The Agency believes that a non-prescriptive approach that permits each employer to determine the necessary cleaning schedule is entirely appropriate, given that employers are in the best position to know how often and to what degree their sanitation facilities are used and, thus, how often they need to be cleaned, whether by in-house staff or an outside janitorial service.

Paragraph (b)—Potable Water

The current requirements found in the general industry standard at § 1910.141(b)(1) have been simplified and incorporated into subpart F in paragraph (b), which requires that employers provide adequate potable water from sanitary dispensers at all worksites. Paragraph (b)(1) of this final rule requires that employers provide potable water for all employee health and personal needs. In addition, the employer must ensure that only potable water is used for these purposes. Paragraph (b)(2) requires the employer to provide an adequate amount of potable water for all employees' health and personal needs. Paragraph (b)(3) requires that employers dispense drinking water from a fountain, a covered container with single-use drinking cups stored in a sanitary receptacle, or single-use bottles. Further, the employer must not permit the use of shared drinking cups, dippers, or water bottles.

Since the adoption of the general industry standard for potable water, the use of single-use water bottles has become commonplace. OSHA understands that some employers provide bottled water in single-use size for employees who work in mobile crews or in areas where it is not possible to install water fountains, such as on vessels and vessel sections. Provided that bottles of water are not shared among employees, OSHA believes this method of dispensing water is at least as effective in preventing contamination as dispensing water from water fountains or covered containers. The U.S. Navy supported the addition of using single-use bottles:

> Single use drinking water bottles should be a recognized option. Single use drinking water bottles are provided to supplement permanent facilities on a case by case basis as needed (for example, in remote locations during dry-docking evolutions during summer months) (Ex. 132.2).

OSHA believes that allowing employers to provide single bottles of water gives them greater flexibility in complying with the potable water requirement and, therefore, is carrying forward the language as proposed.

OSHA considered adding a provision to the final standard requiring employers to ensure that drinking water is "suitably cool," a requirement from OSHA's field sanitation standard for agricultural work (§ 1928.110(c)(1)(ii)). The preamble to that standard explained that, in hot and humid conditions, the temperature of drinking water needs to be low enough to encourage employees to drink and cool their core body temperature (52 FR 16050, 16087, May 1, 1987). Some shipyard employees also work in extremely hot and humid environments. Cool water could help promote adequate hydration and reduce the risk of heat-related illnesses. OSHA requested comment on this issue in the proposal, and three stakeholders responded. Northrop Grumman Shipbuilding—Newport News stated:

> Ensuring cool water is available and consumed by employees is an important factor in preventing heat-related injuries. We utilize plumbed drinking water fountains that provide cool water. For more isolated work or jobs with a greater heat burden, we provide large thermoses for ice and water from onsite commercial sized ice makers and potable water sources. Employees use individual containers to obtain water from these thermoses. Employees are also encouraged to bring and consume personal drinks, such as water and sports drinks. We hold an emergency contract for bottled water in the event of a power outage (Exs. 116.2; 120.1).

The U.S. Navy commented: "The term 'suitably cool' is too subjective and should not be part of the requirement. Water is supplied for fluids replenishment and is kept shaded or in thermal coolers to prevent overheating prior to use" (Ex. 132.2). NIOSH commented: "It would be useful to include in this rule the definition for 'suitably cool'" (Ex. 129.1).

While there is little doubt that water should be "suitably cool" for health and palatability reasons, OSHA believes that employers are already providing cool water or have a means to keep water cool for their employees working in hot or humid conditions. Therefore, OSHA is not adding a specific requirement that drinking water be maintained suitably cool. No other comments were received regarding paragraph (b).

Paragraph (c)—Non-Potable Water

Paragraph (c) combines and simplifies the current general industry provisions on non-potable water, found in §§ 1910.141(b)(2)(i) and (iii). OSHA condensed and incorporated these current provisions into subpart F as §§ 1915.88(c)(1) and (2). OSHA will not carry forward § 1910.141(b)(2)(ii), which addresses the construction of non-potable water systems, since State and local codes currently address this issue.

Paragraph (c)(1) permits employers to use non-potable water for purposes such

as firefighting and cleaning outdoor premises, so long as it does not contain chemicals, fecal matter, coliform, or other substances at levels that may create a hazard for employees. Sound Testing, Inc., commented:

> Non-potable water used for other purposes such as firefighting and cleaning outdoor premises might be pumped up from rivers, lakes, ponds, canals, bayous, bays, etc. * * * (Some city ordinances, USCG, and state environmental laws do not permit this practice.) The water from many of these sources most likely contains low doses of various kinds of chemicals, drugs, hormones, heavy metals, organics, FOGs, and possibly fecal matter and coliform from humans or animals. Hence, the term non-potable water.
>
> The contaminants in these waters may vary by the minute. It might be costly if the employers were not allowed to use these waters in non-potable operations. It would definitely be more costly and almost impossible for the employers to have to test for all of the contaminants in the water prior to each use.
>
> Would you consider allowing the use of gloves, or appropriate PPEs and the use of proper decontamination for those employees affected? We believe it would be much more effective, feasible, and realistic (Ex. 121.1).

OSHA recognizes that contaminants may be found in water pumped from rivers and lakes and that the use of PPE, in accordance with 29 CFR 1915 subpart I, Personal Protective Equipment, would be a good safety and health practice that employers should adopt when working with non-potable water. In fact, employees who are using non-potable water are most likely already utilizing PPE. During firefighting activities, for example, firefighting gear offers protection from both heat and exposure to potentially hazardous substances in non-potable water used to extinguish fires. However, while the use of PPE may protect the employees using the non-potable water, there is no guarantee that other affected employees will be protected as well. Should water particles become airborne, such as during a fire response, or if there is residue from contaminated water used to clean a surface where employees will be working, the potential still exists for those employees to be exposed to a hazardous substance present in the non-potable water. Therefore, to protect all employees engaged in shipyard employment, OSHA is carrying paragraph (c)(1) forward in this final standard as proposed.

Paragraph (c)(2) requires that the employer clearly mark non-potable water supplies and outlets as "not safe for health or personal use." The existing general industry standard that is applicable to shipyard employment, § 1910.141(b)(2)(i), requires that outlets for non-potable water, such as water for industrial or firefighting purposes, be posted or otherwise marked to clearly indicate that the water is unsafe and is not to be used for drinking, cooking, or washing the following items: people, clothes, food, cooking or eating utensils, food preparation or processing premises, and personal service rooms. This requirement is similar to some State and local laws that require the labeling of non-potable water. No comments were received on this paragraph. OSHA concluded that marking non-potable water supplies and outlets as "not safe for health or personal use" is necessary to protect workers from inadvertent ingestion of or exposure to contaminants in non-potable water and is therefore carrying this language forward as proposed.

Paragraph (d)—Toilets

Paragraph (d) adopts the existing requirements on sewered toilets found in the general industry standards, § 1910.141(c)(1)(i) and (ii), which are applicable to shipyard employment and which have been reorganized for clarity in this paragraph (d). In addition, and as proposed, OSHA included paragraph (d)(3), covering portable toilets, which are not addressed in the general industry standard.

Due to the addition of portable toilets in paragraph (d)(3), OSHA proposed to replace the existing term "toilet facility" with the terms "sewered toilet facility" and "portable toilet facility." However, this final standard adopts the simpler terminology "sewered toilet" and "portable toilet." These terms are used in the current ANSI Z4.1 and Z4.3 standards, respectively (Exs. 38 at Ex. 3–6, Sec. 2.4, and Ex. 3–7, Secs. 2 and 5). OSHA defines these terms in § 1915.80 as follows: a "sewered toilet" is "a fixture that is connected to a sanitary sewer, septic tank, holding tank (for example, bilge), or on-site sewage disposal treatment facility, and that is flushed with water," while a "portable toilet" is "a non-sewered portable facility that may be either flushable or non-flushable." In the final standard, toilet requirements are separated into four paragraphs: (d)(1) includes the general requirements that will be applicable to both sewered and portable toilets; (d)(2) includes the requirements for the number of toilets; (d)(3) covers the requirements for portable toilets; and (d)(4) includes an exception to provide toilets at normally unattended worksites.

Paragraph (d)(1)(i), which was proposed as (d)(1)(ii), requires the employer to ensure that both sewered and portable toilets provide privacy at all times. When a toilet facility contains more than one toilet, each toilet shall occupy a separate compartment with a door and either walls or partitions that are sufficiently high to ensure privacy. Paragraph (d)(1)(ii) requires that the toilets be separate for each sex, except as provided in (d)(1)(ii)(B). In paragraph (d)(1)(ii)(A), the number of toilets provided for each sex is based on the maximum number of employees of that sex present at the worksite at any one time during a workshift. A single-occupancy toilet room is counted as one toilet regardless of the number of toilets it contains. Paragraph (d)(1)(ii)(B) specifies that an employer does not have to provide separate toilets facilities for each sex if they will not be occupied by more than one employee at a time, can be locked from the inside, and contain at least one toilet. The requirements of paragraph (d)(1) are noncontroversial and do not represent a departure from current regulations in shipyard employment. They simply codify privacy and convenience conditions that have become well established in the workplace and contribute to employees' health and well-being. Therefore, these requirements are being carried forward in this final standard.

The Agency is adding a provision to this paragraph that requires the employer to establish and implement a schedule for maintaining toilets in a clean, sanitary, and serviceable condition. This requirement is included in paragraph (a)(2) but applies to all sanitation facilities. For emphasis, OSHA repeated this requirement for toilets in paragraph (d)(1)(iii). This provision requires each employer to set up and carry out a cleaning schedule to meet employees' health needs. Portable toilets that are not properly serviced can become unsanitary and foul, thereby exposing employees to contaminants or causing them to avoid using the facilities. OSHA believes this requirement will not impose an unreasonable burden on employers who are already cleaning toilets on a regular basis. Furthermore, it reinforces the employer's duty to maintain sanitary conditions for employees who must use the workplace toilet facilities.

Paragraph (d)(2) specifies, in Table F–2, the minimum number of toilets for each sex and allows for urinals to reduce the number of required toilets in men's facilities. Proposed paragraph (d)(2) retained the existing requirements of the general industry standard for the minimum number of sewered toilets employers must provide for each sex (see Table J–1 of § 1910.141). This provision raises two issues: first, the ratio of 1 toilet for every 15 employees;

and second, the proposed ratio being for sewered toilets only.

Regarding the first issue, the proposed provision required a basic ratio of 1:15 sewered toilets to employees. While the ratio slightly decreases with the number of employees at the worksite (see Table F–2 of paragraph (d)(2)), the basic requirement is commonly referred to as a ratio of 1 toilet for every 15 employees, and OSHA will use that convention. OSHA adopted the 1:15 ratio (Table J–1 of § 1910.141) from the 1968 ANSI Z4.1 standard through notice-and-comment rulemaking in 1973 (38 FR 10930, 10931 May 3, 1973). It has been the general industry standard since that time. In contrast, ANSI has revised the ratio to one toilet for every nine employees (ANSI Z4.1–1995).

In the proposal, OSHA requested comment on whether the Agency should retain the 1:15 toilet ratio from the existing standard, or adopt the 1:9 ratio from the current ANSI Z4.1 and IPC 2003 standards. The U.S. Navy stated that:

> In general, facilities (including industrial and support areas to which the standard applies * * *) are designed to meet or exceed the current version of the international plumbing code (IPC) and are upgraded accordingly during normal renovation cycles (Ex. 132.2).

The American Shipbuilding Association argued that OSHA should reference State or local codes:

> State or local building or plumbing codes should be utilized instead of the [1:9 toilet-to-employee ratio] proposed. This involves sewer and plumbing systems infrastructure. It is not just a matter of buying more toilets (Ex. 168, p. 236).

Other employers supported OSHA's current ratio. For example, Todd Pacific Shipyard testified that they believed the ratio of 1:15 was sufficient (Ex. 198, p. 31). Northrop Grumman-Newport News stated:

> Our review of this issue indicates that the existing number of toilets in 29 CFR 1910.141 and proposed Table [F–2] to Subpart F is adequate to meet employee needs. * * * Adopting the ANSI Z4.1 ratio would result in a 25 percent increase in toilets. This could pose significant costs in infrastructure, space utilization, and maintenance costs (Exs. 116.2; 120.1).

OSHA recognizes that State and local plumbing codes may differ from OSHA requirements. If those codes are more stringent than OSHA's regulations, employers may have a duty to comply with the more stringent requirements. However, where State or local codes are silent on the issue of toilet ratios, or where these codes are less stringent than OSHA's 1:15 ratio, employers must comply with OSHA's requirements. OSHA concluded that Table F–2 in paragraph (d)(2) sets forth the appropriate number of toilets for shipyard employment. These numbers have been the standard for nearly four decades, and OSHA did not receive any comments strongly disagreeing that the 1:15 ratio is inadequate. Thus, employers will be required to follow Table F–2 in subpart F to ensure that the minimum number of toilets is provided for employees. In addition, a note has been added to Table F–2 that clarifies that, when toilets will be used only by men, urinals may be provided instead of toilets. However, the number of toilets may not be reduced to less than two-thirds of the minimum specified. No comments were received on this note to Table F–2.

The second issue was that the proposal included only sewered toilets in the minimum number of toilets. Many employers challenged the Agency's proposal to limit the minimum number of required toilets to only sewered toilets. Further, commenters provided examples of situations in which the requirement for a fixed number of sewered toilets would be infeasible or impracticable, including: (1) Fluctuations in employee populations, making it difficult to plan for an adequate number of sewered toilets (Exs. 119.1; 132.2; 168, p. 236; 198, p. 202); (2) remote locations, such as graving or dry docks, piers, or other locations where it would be impracticable to run proper piping to install sewered toilets (Exs. 105.2; 168, p. 153; 198, p. 23); (3) ship's sewage systems that may be unavailable to workers because they are shut down for repair, use of the ship's sewage system would result in the discharge of waste directly overboard in violation of environmental laws, or employees are at a location on a vessel that is far from a working sewered toilet (Exs. 99; 107; 104.1; 116.1; 120.1; 198, p. 23); and (4) fishing vessels that do not have sewage holding tanks or adequate tank capacity for human waste, and that do not have moorages with sewered facilities, thereby requiring the vessel to discharge sewage directly over the side (Exs. 105.2; 199 p. 261).

Nearly all employers that commented or testified advocated flexibility for employers to provide portable toilets for employees when the installation of sewered toilets is infeasible or impracticable. General Dynamics commented:

> Sewered toilets can often not be placed in a position that is considered readily available on board ships in the water. The long standing practice is to provide portable toilets aboard ships. * * * Furthermore, the use of portable toilets accommodates the movement of employees within the shipyard (Ex. 119.1).

American Seafoods Corporation explained:

> For many small and medium vessels [meeting the minimum number of sewered toilets] is impossible as many moorages do not offer sewer connections, and the vessels do not have adequate tank capacity to store sewage and waste water onboard (Ex. 199, p. 261).

American Seafoods further commented:

> The reason ships, ship yards, ship repair facilities and fishing vessels use PORTABLE Toilet Facilities is that the "Sewered Facilities" are either shut down for repair or shut down because they are not permitted to be used due to environmental discharge issues. Many smaller vessels do not have sewage holding tanks and do not have the ability to connect to dockside sewer connections, should any such connections exist. Therefore the only "Sewered Facilities" available at what are often Municipal Docks are frequently a considerable distance away from the vessel (they tend to be built on shore). Portable toilets are used precisely because we cannot use the plumbed systems on a vessel (Ex. 105.1).

Todd Pacific Shipyard testified: "There are some [portable toilets] available out on the piers that are away from the main facility where the majority of the toilets are" (Ex. 198, p. 23).

OSHA's standards for marine terminals, longshoring, construction, and agricultural field sanitation all permit the use of portable toilet facilities (§§ 1917.127(a)(1)(iv); 1918.95(a)(1)(iv); 1926.51(c)(3); 1928.110(b); see also ANSI Z4.1 Sec. 2.9 and 6.4). In addition, OSHA issued an interpretation letter on May 18, 1999, indicating that the Agency would regard the substitution of portable toilets for water closets as a *de minimis* departure from § 1910.141(c)(1)(i) if the following circumstances were met: (1) The lack of water or the temporary nature of the installation makes water carriage systems impracticable; (2) the portable toilets are readily accessible by employees; (3) the portable toilets have adequate lighting, are secure, and have heating as necessary; and (4) they are well-maintained and properly serviced (Ex. 23; OSHA letter of interpretation to Michael G. Connors, May 18, 1999).

Based on comments and testimony in this rulemaking, as well as OSHA regulations and policy for other workplaces, the Agency amended proposed paragraph (d)(2) by including both sewered and portable toilets within the minimum requirements for toilets.

Sewered toilets that are already installed, such as in facilities and shops, must be maintained as long as the worksite is still in operation. It is not the purpose of this final rule to allow the employer to provide only portable toilets. In addition, shipyard employers should periodically reevaluate the number of employees using sewered toilets to determine if the number of toilets needs to be adjusted. For example, if employees on their way to a pier walk through a shop that has sewered toilets and use those facilities, the employer must accommodate any increased use of those toilets.

Proposed paragraph (d)(3) permitted employers to provide portable toilets in addition to the requirements for sewered toilets in Table F–2. However, several employers objected to this language, arguing, as discussed above, that there are times when it is not possible to install sewered toilets. For example, American Seafoods Company suggested, "Perhaps this section should read [,] 'In Lieu of the required sewered toilet facilities' instead of 'in addition to'?" (Ex. 105.1). Based on the many comments and testimony on the issue of portable toilets in shipyards, proposed paragraph (d)(3) has been revised and reorganized into two subparagraphs. Paragraph (d)(3)(i) requires that, any time the employer demonstrates that it is infeasible to install sewered toilets, or when there is a temporary increase in the number of employees for a short duration, the employer provide portable toilets to meet the minimum number of required toilets listed in paragraph (d)(2)(i) and table F–2 of this section. Such situations might arise when work is being performed at piers, on ships, in dry docks, or at remote work areas. Other circumstances might include when employers have an influx of temporary employees, where temporary employees are those employed for a limited time only, or whose performance is contemplated for a particular piece of work, usually of short duration. OSHA concluded that allowing the use of portable toilets when an employer demonstrates that it is infeasible to install sewered toilets in shipyard employment will enhance employee health and well-being because these sanitation facilities will be more accessible and, thus, more likely to be used. This option is particularly important in work areas on vessels, where a significant portion of shipyard employees work and where sewered facilities for workers may not be practicable. Therefore, new paragraph (d)(3)(i) will be carried forward in this final standard to require the employer to provide portable toilets when the employer demonstrates that it is not feasible to provide sewered toilets, or when there is a temporary increase in the number of employees.

This provision is further justified by the significant improvements in portable toilet technology in recent years. Portable toilets now contain the type of equipment necessary to provide for employee health needs at levels close to that of the existing standard for sewered toilets. For example, many portable toilets are now manufactured with handwashing facilities that include hand towels, waste receptacles, and either running water or waterless cleaning agents. In addition, some portable facilities have flushable toilets (Ex. 13). Allowing employers to provide portable toilets in certain situations will ensure adequate and readily accessible facilities without adding construction expenses and inconvenience.

Paragraph (d)(3)(ii) has been modified from proposed (d)(3), and requires that employers ensure that each portable toilet is vented and equipped, as necessary, with lighting. In the proposal, OSHA specified that portable toilets were required to be equipped with adequate venting and, as necessary, lighting and heating. The American Shipbuilding Association testified, "When is it necessary to provide heating and lighting in a portable toilet facility? I cannot recall ever seeing such a facility that is equipped to provide either heating or lighting" (Exs. 104.1; 107.1). American Seafood Corporation also objected to the venting and heating requirements for portable toilets:

> Adequate Venting?—We personally have never met a Portable Toilet Facility that was "Adequately Vented" and there were years of "Portable Toilet Facility Experience" in the rooms during the discussions. Adequate Lighting?—Again, we have personally never seen Portable Toilet Facilities that had extra lighting. Heating?—Again we are at a loss. What supplier provides pristine portable toilet facilities that have reading lights, vent fans, and heaters?" (Ex. 105.1).

While there are portable toilets that do have venting systems, heat, air conditioning, and lighting, they are expensive. Fishing Vessel Owners Marine Ways, Inc., testified:

> [T]he cost associated with portable toilets is a difference of $85 per week for a toilet that is unheated and equipped with hand sanitizer which includes regular inspections and servicing needs as compared to greater than $2000 a week for portable facilities equipped with heat and running water, plus additional costs for servicing (Ex. 198, p. 202).

OSHA will not impose these costs on employers or require that this type of facility be used in the workplace. Based on the comments received, OSHA revised this provision by eliminating the requirement for employers to ensure that portable toilets are equipped with heating. However, paragraph (d)(3)(ii) requires employers to provide portable toilets that are vented and equipped, as necessary, with lighting. Lighting would be necessary during workshifts occurring at night, or in areas where there is not sufficient lighting. While the standard does not require exhaust fans in portable toilets, some venting is necessary (for example, ceiling louvers and stovepipe vents) for employee comfort, health, and well-being.

Exception

Proposed paragraphs (d)(4) and (e)(3) exempted employers from providing toilet and handwashing facilities for mobile crews and for employees working in normally unattended worksites, provided that these employees have immediately available transportation to readily accessible sanitation facilities that meet the requirements of this section. Final paragraph (d)(4) retains the exemption for toilet facilities. This exemption implicitly extends to handwashing facilities in paragraph (e)(1), which requires employers to provide handwashing facilities at each toilet facility. The availability of vehicles at a worksite does not necessarily mean that the employees at that worksite are a "mobile crew." OSHA interprets the term "mobile crew" to be limited to employees who continually or frequently move from jobsite to jobsite on a daily or hourly basis, and to exclude employees who report to a single worksite for days, weeks, or longer (Ex. 31; OSHA letter of interpretation to Nicolas Mertz, June 7, 2002).

For purposes of these exceptions, "immediately available transportation" means that the vehicle is already at the specific worksite or can be summoned quickly enough so employees are able to get to facilities quickly. OSHA interprets "nearby" facilities as being within ten minutes of the employee's work area (Ex. 31). Nearby toilets must be in clean, sanitary, and serviceable condition, and adequate for the number of employees who need to use them. Nearby handwashing facilities must be equipped with waterless cleaning agents or soap, water (for example, hot and cold, or lukewarm), and hand towels or air blowers.

The U.S. Navy supported this provision, stating, "The proposed

exemptions are adequate" (Ex. 132.2). No other comments were received. OSHA has carried forward paragraph (d)(4) in the final standard.

Paragraph (e)—Handwashing Facilities

Paragraph (e)(1) requires that handwashing facilities be located at or adjacent to each toilet facility, sewered and portable toilets alike. This provision is necessary, in major part, to ensure that employees' health needs are met in those worksites where portable toilets are or will be used. Some portable toilets are not equipped with handwashing facilities, and separate or stand-alone facilities are not always placed next to or close to portable toilets, particularly on vessels and vessel sections. Often, employees must go to landside facilities, which may be located a significant distance from the work area, to clean their hands. As a result, employees may not be able to clean their hands when they are exposed to contaminants, after using a portable toilet, or before eating, drinking, or smoking, which puts them at risk of adverse health effects.

OSHA believes the use of performance-based language gives employers compliance flexibility, even at worksites where there is a lack of piped water or sewer lines. As stated previously, many portable toilets manufactured today contain either handwashing facilities or waterless cleaning agents. In addition, portable, stand-alone hand-cleaning facilities are readily available and can be placed adjacent to portable toilets. A single stand-alone handwashing facility may be able to serve several portable toilets that are placed in one location. The U.S. Navy supported this provision: "We agree that requiring provisions of handwashing facilities at or adjacent to toilet facilities is reasonable and appropriate" (Ex. 132.2). No other comments were received. OSHA has carried forward paragraph (e)(1) in this final standard as proposed.

Paragraph (e)(2)(i) requires employers to equip handwashing facilities with (1) soap and either hot and cold or lukewarm running water; or (2) waterless cleaning agents that can disinfect the skin or neutralize contaminants. Most of OSHA's other sanitation standards require that handwashing facilities have soap and running water (§§ 1910.141(d)(2)(ii) and (iii); 1910.142(f)(3); 1917.127(a)(1)(i) and (ii); 1918.95(a)(1)(i) and (ii); 1928.110(b)). However, the Bloodborne Pathogens (BBP) standard permits the use of alternatives (for example, antiseptic hand cleaners) in limited circumstances (§§ 1910.1030(d)(2)(iii) and (iv)).

Unlike the BBP standard, paragraph (e)(2)(i) does not restrict the use of waterless cleaning agents to situations in which the lack of water or the temporary status of the installation makes running water infeasible. Work covered by the BBP standard, which in some instances can require sterile conditions, is quite different from shipyard employment. OSHA does not believe the limitations in the BBP standard are necessary for this standard. Nearly all sewered toilets have handwashing facilities with running water, while waterless agents are usually used in conjunction with portable toilets. Moreover, whatever cleaning agents are used, the employer will be responsible for ensuring that the agents are effective in disinfecting the skin or removing the contaminants to which employees are exposed. In addition, the employer should select waterless agents that will not result in absorption of contaminants, sensitization of the skin, or other adverse health effects.

A number of shipyard operations are performed at worksites where it may be difficult to provide running water and soap. Therefore, OSHA believes there is a practical need to allow the use of waterless cleaning and decontamination products in shipyards. Northrop Grumman—Newport News supported this addition: "Waterless cleaners are provided whenever non-plumbed portable toilets are present. They have been received favorably and we have noted no problems" (Exs. 116.1; 120.1). In addition, the U.S. Navy stated: "The use of waterless cleaning agents is a viable option, enabling the provision of handwashing facilities at all toilet facilities. Some waterless hand cleaners are in limited use in the shipyards, but data is not currently available on employee's acceptance of this alternative" (Ex. 132.1). OSHA concluded that waterless cleaners have become widely accepted and used in workplaces across many industries, and their antibacterial qualities protect workers from health hazards when water and soap are not available. Therefore, the Agency is carrying this provision forward as proposed.

Paragraph (e)(2)(ii), identical to the proposal, requires that if the handwashing facility is equipped with soap and water, the employer must provide clean, single-use hand towels. These towels must be stored in a sanitary container, and the employer must provide a sanitary means for disposing of them. Alternatively, the employer may supply clean individual sections of continuous cloth toweling or an air blower. No comments were received on this paragraph. Because the requirements of this provision are noncontroversial, and are standard hygiene practice in shipyards pursuant to compliance with the general industry standards at § 1910.141(d)(2)(iv), OSHA is carrying paragraph (e)(2)(ii) forward with no changes.

Proposed paragraph (e)(3), an exception to providing handwashing facilities for mobile crews and at normally unattended work locations, has been deleted from the final regulation. As noted above, paragraph (d)(4) exempts employers from having to provide toilets for mobile crews or at normally unattended worksites. Because handwashing facilities must be provided at or adjacent to each toilet facility, any exception to the requirement to provide toilets automatically extends to handwashing facilities.

Paragraph (e)(3) in the final rule requires employers to inform each employee who is engaged in the application of paints or coatings, or in other operations in which hazardous or toxic substances can be ingested or absorbed, about the need for removing surface contaminants from their skin by thoroughly washing their hands and face at the end of the workshift and prior to eating, drinking, or smoking. This provision was proposed as paragraph (e)(4), but since proposed (e)(3) was omitted from the final rule, OSHA renumbered this paragraph as (e)(3). No comments were received on this provision. Because shipyard employment can require workers to handle various hazardous or toxic substances, OSHA continues to believe that employees must be informed of the need to wash their hands and faces after working with certain surface contaminants so they can protect themselves from dermal exposure or exposure through ingestion. Thus, OSHA is carrying forward this requirement as proposed.

Paragraph (f)—Showers

OSHA has set forth the requirements for showers in paragraph (f), which is substantially identical to the general industry standard found at 29 CFR 1910.141(d)(3). Paragraph (f)(1) specifies that when showers are required by an OSHA standard, the employer must provide one shower for each 10, or fraction of 10, employees of each sex who are required to shower during the same workshift. Paragraph (f)(2) requires the employer to ensure that each shower is equipped with soap, hot and cold water, and clean towels for each

employee using the shower. No comments were received on either provision. OSHA has concluded that the shower requirements are necessary for employee safety and health and have been a requirement for shipyards through the general industry standard. Carrying these requirements forward in the final standard thus responds to the shipyard employment industry's request to consolidate requirements for general working conditions in shipyard employment into one subpart.

Paragraph (g)—Changing Rooms

Paragraph (g) sets forth the requirements for changing rooms. When an employer provides protective clothing to employees to prevent exposure to hazardous or toxic substances, the employer must provide: A changing room that offers privacy for each sex (paragraph (g)(1)), and storage facilities for street clothes, as well as separate storage facilities for protective clothes (paragraph (g)(2)). Paragraph (g)(1) is a new requirement, but the provisions in (g)(2) are identical to the general industry standard, § 1910.141(e), which has applied to shipyard employment. No comments were received on these provisions. Therefore, OSHA concluded that the new provision for privacy for each sex is necessary for workers' health and well-being, as well as personal comfort and dignity. The rest of paragraph (g) addresses the shipyard employment industry's preference to consolidate requirements for general working conditions in shipyard employment into one subpart. Thus, OSHA is carrying these provisions forward in this final standard.

Paragraph (h)—Eating, Drinking, and Break Areas

Currently, there are five requirements that address eating, drinking, and break areas (§§ 1910.141(g), (g)(1), (g)(2), and (g)(4), and § 1915.97(c)). OSHA combined these requirements into a single provision in subpart F, and simplified the provision to prohibit food, beverages, and tobacco products from being consumed or stored in any area where employees may be exposed to hazardous substances. Proposed paragraph (h) prohibited food, beverages, and tobacco products from being consumed or stored in any area where hazardous or toxic substances may be present.

Many commenters argued that prohibiting eating, drinking, or using tobacco products whenever hazardous or toxic substances may be present unreasonably increased the number of areas where employees would not be able to eat, drink, or smoke (Exs. 105.2; 106.1; 112.1; 121; 101.1; 124; 126; 130.1; 125; 168, pp. 57–58, 245–247). OSHA responded to this concern in two ways. First, the Agency revised the definition of hazardous substances in the final rule to mean a substance that may cause injury, illness, or disease, or otherwise harm an employee by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful. The proposed definition was much broader, and raised concerns that eating or drinking would be prohibited near generally innocuous, but potentially harmful, substances such as common household cleaning products or copier cartridges (Ex. 112.1). The narrower definition that was adopted in the final rule substantially limits the universe of substances that would trigger the restrictions of this paragraph.

Second, OSHA deleted the proposed phrase "where hazardous or toxic substances may be present," and replaced it with "where employees may be exposed to hazardous or toxic substances." The change in wording was in response to commenters pointing out that, even if a toxic substance is present, it is not necessarily a hazard. For example, American Seafoods Company commented: "If an employee cannot smoke anywhere 'hazardous chemicals are present' does that mean employees cannot smoke in the same room in which there is a sealed can of some chemical?" (Ex. 105.1). The Shipbuilders Council of America commented:

> The proposed language directs that food, beverages, tobacco and etcetera may not be consumed or stored in areas where hazardous or toxic materials may be present. SCA believes this is too general. The nature of a shipyard is such that there is small potential that every location within the grounds may contain small levels of hazardous or toxic substances. * * * We believe OSHA should acknowledge this and alter the language in the section, for instance, that the employer shall ensure that food, beverages, and tobacco products are not consumed or stored in any area where hazardous or toxic substances exists in such a concentration that they have the ability to harm employees (Ex. 168, pp. 69–70).

Several other commenters agreed with adding language similar to that suggested by SCA, including Bath Iron Works, Atlantic Marine Florida, Atlantic Marine Alabama, American Shipbuilding Association, and Manitowoc Marine Group (Exs. 106.1; 115.1; 117.1; 118.1; 125). It is not OSHA's intent to prohibit employees from eating, drinking, or smoking in areas where unopened cans or containers of hazardous substances are present. However, employees should not be eating, drinking, or smoking in areas where they could consume, inhale, or otherwise ingest hazardous substances. The final provision requires employers to ensure that employees do not eat, drink, or smoke, or store food, beverages, or tobacco products in any area where employees or these items may be exposed to a hazardous substance that is airborne, on an eating surface, in a refrigerator or other food storage container, spilled on the floor, or in another similar state or condition.

Paragraph (i)—Waste Disposal

Paragraph (i) addresses waste disposal, including the construction of receptacles, the number of required receptacles, and employees working around uncovered garbage. The current general industry provisions that are applicable to shipyard employment, found in §§ 1910.141(a)(4), (a)(4)(i), and (g)(3), have been combined and reorganized into the following final provisions. Paragraph (i) requires that the employer provide waste receptacles that are corrosion resistant, leak-proof, and easily cleaned or disposable (paragraph (i)(1)(i)); fitted with a solid, tight-fitting cover (paragraph (i)(1)(ii)); provided throughout the worksite in numbers, sizes, and locations that promote their use (paragraph (i)(1)(iii)); and emptied often enough to prevent overfilling, and in a manner that does not create a hazard for employees, with waste receptacles for food emptied at least daily unless the receptacles have not been used (paragraph (i)(1)(iv)).

Although there were no comments on the specific requirements for waste receptacles, several commenters questioned who was responsible for providing waste receptacles, including Lake Union Drydock Company, Puget Sound Shipbuilders, Dakota Creek Industries, North Pacific Fishing Vessel Owners Association, and iWorkWise (Exs. 101.1; 124; 126; 128; 130.1). Trident Seafoods questioned, "Is the shipyard or maintenance facility responsible for the ship's crew waste receptacles?" (Exs. 104.1; 107.1). Similarly, American Seafoods Corporation asked, "Is the shipyard responsible for garbage cans on ships in their yard?" (Ex. 105.1).

OSHA's Multi-Employer Citation Policy directive (CPL 2–0.124), which applies to shipyard employment, specifies that on multi-employer worksites, more than one employer may be responsible and citable for hazardous conditions that violate OSHA standards. The directive spells out a two-step process for determining whether more than one is responsible and citable. Step

one involves determining the role of each employer at a specific multi-employer worksite and whether they fall into one of the categories (for example, creating, exposing, correcting, or controlling employer) that has obligations with respect to OSHA requirements. Step two is determining whether employers' actions are sufficient to meet the obligations of the applicable employer category.

Multi-employer worksites engaged in shipyard employment can vary widely in the categories of employers that may be present and the factors that may affect the responsibilities of various employers (for example, whether contract provisions establish control over specific safety and health issues at the worksite). The directive includes examples and scenarios of various common workplace situations to help employers understand their responsibilities in a specific type of multi-employer worksite. OSHA believes that these examples will provide useful guidance for determining who is responsible for garbage cans on vessels in specific situations and specific multi-employer worksites.

Paragraph (i)(2) specifies that employees are not to work in the immediate vicinity of uncovered garbage that could endanger their safety and health. Sound Testing, Inc., commented:

> Please define the terms 'uncovered garbage' or 'garbage.' There are many instances in Shipyard Employment when workers may be working on, near, or in the vicinity of 'uncovered garbage.' The difficulty is in the differentiation of what may look like 'garbage' and what constitutes actual garbage (Ex. 121.1).

OSHA does not believe that defining garbage is necessary. The provision requires that when uncovered waste could endanger employee's safety and health, they should not work in the vicinity of the waste. If there is no substance in the receptacle that might endanger them, they can work near the waste. OSHA is retaining this paragraph with no changes from the proposal.

Paragraph (i)(3), identical to the proposal, requires employers to ensure that employees working beneath or on the outboard side of a vessel are not contaminated by drainage or waste from overboard discharges. This paragraph protects employees working in dry docks, or on piers or decks, from overhead discharge. No comments were received on this paragraph. The Agency believes that it is common practice in shipyards not to discharge drainage and waste from above the worksite onto employees working at the worksite below.

Paragraph (j)—Vermin Control

OSHA proposed to revise the application of the existing general industry requirement (§ 1910.141(a)(5)) on vermin control to make the provision more appropriate to shipyard employment. The existing requirement, § 1910.141(a)(5), specifies that employers clean and maintain the workplace in a manner that prevents the infestation of vermin in "enclosed workplaces." Paragraph (j)(1) extends this application by requiring the employer to take those steps necessary to control vermin throughout the shipyard. Thus, to comply with this requirement, employers need to expand their vermin control efforts to include outdoor worksites. "Vermin" is defined in § 1915.80 as "insects, birds, and other animals, such as rodents and feral cats, that may create safety and health hazards for employees." Sound Testing, Inc., questioned, "Does this definition include animal species regarded as pests or nuisances and especially to those associated with the carrying of disease?" (Ex. 121.1). While OSHA recognizes that many types of animals may be found on shipyard property, the concern is with animals that are safety and health hazards. Evidence in the record shows that employees working at outdoor worksites, as well as in enclosed spaces, need to be protected from the hazards associated with exposure to vermin (Ex. 22). For example, employees working near water are at risk of disease if mosquito populations are not adequately controlled. In addition, birds and rodents can transmit disease directly, as well as through their feces (see *http://www.hhs.gov* and *http://www.cdc.gov* for information on vermin-related diseases). Sound Testing, Inc., commented:

> Many of these 'vermin' are often detected in Shipyard Employment, some are even considered as 'friends' to the employees! To 'implement and maintain an effective control program' as required in this section would probably be very expensive, near impossible or even illegal * * * [S]eagulls and eagles are 'frequent fliers' at fish processing plants, packing plants, canneries, and fish processors * * * (Ex. 121.1).

OSHA recognizes that it is not possible to prevent all vermin, especially birds and insects, from entering outdoor worksites. Therefore, the provision retains the existing requirement that employers take only those steps that are "reasonably practicable" to prevent vermin infestation.

Paragraph (j)(2) retains unchanged the existing general industry requirement applicable to shipyard employment (§ 1910.141(a)(5)) that employers implement and maintain an effective vermin-control program when vermin are detected. OSHA believes that such programs are necessary to protect workers from the health and safety hazards associated with uncontrolled vermin. Including this general industry requirement in the final standard responds to the shipyard employment industry's request to consolidate requirements for general working conditions in shipyard employment into one subpart.

Section 1915.89—Control of Hazardous Energy (Lockout/Tags-Plus).

In § 1915.89, OSHA establishes the requirements for the control of hazardous energy during the servicing of machinery, equipment, and systems in shipyard employment. OSHA proposed to incorporate the general industry standard (§ 1910.147), with minor revisions, into subpart F, since maritime employment is exempt from the general industry standard (§ 1910.147(a)(1)(ii)(A)). In the preamble to the subpart F proposal, OSHA discussed the need for a comprehensive lockout/tagout rule in shipyards, why OSHA was proposing to adopt the general industry approach, the requirements of the general industry standard, and the differences between § 1910.147 and proposed § 1915.89. The preamble to the proposal also included an in-depth discussion of the application of the lockout/tagout standard while servicing commercial vessels (72 FR 72452, 72484, Dec. 20, 2007).

The Agency received many comments regarding the adoption of § 1910.147 for shipyard employment, most of which were not in favor of adopting the general industry requirements verbatim. After considering the many informative comments and testimony OSHA received during the comment period, the Agency decided to develop a final rule that includes the substance of the general industry lockout/tagout provisions, while adding provisions that are more compatible with protecting workers in shipyard employment. In addition, the requirements in the final rule have been organized and set forth differently than the general industry standard due to the unique conditions in shipyard employment, both on land, and on vessels, including fish-processing vessels.

This final standard addresses the control of hazardous energy through the use of locks and tags-plus applications, employee training, written program and procedures, and program audits, as well as other requirements. The provisions in

this final rule are based on the Agency's detailed review and analysis of the entire rulemaking record, which included all pre-hearing and post-hearing comments from the public, as well as testimony obtained at the public hearings. The Agency believes the final approach developed from this information and data resulted in regulations that are compatible with providing optimal safety in shipyard employment.

The following discussion covers the need for a comprehensive lockout/tags-plus standard in shipyard employment. Further, the discussion addresses why OSHA has adopted in this final rule a standard that, while similar to the general industry standard, differs in ways that protect workers in the unique environment of shipyard employment. An in-depth discussion of commercial fishing vessels is included in the scope and application section of this lockout/tags-plus standard (see summary and explanation of § 1915.89(a)).

The Need for a Comprehensive Lockout/Tags-Plus Standard in Shipyards

OSHA believes that a comprehensive rule protecting shipyard employees from hazardous energy during servicing, maintenance, and repair operations is needed. In the proposal, OSHA listed the following three reasons why shipyard employment needs a comprehensive lockout/tagout program (72 FR 72452, 72484, Dec. 20, 2007):

1. Potential hazardous energy exposures are present throughout shipyard employment, on vessels and vessel sections, and in landside facilities (Exs. 9; 11). Employees servicing ships' systems face considerable risk of injury or death from the energization of those systems because they are often large and complex, and frequently have multiple power sources. That risk is compounded when ships' crews and outside contractors also work onboard the vessel. According to 2002 data from the Bureau of Labor Statistics (BLS) annual survey of occupational injuries and illnesses, 30.3 percent of the shipyard injury and illness cases involving days away from work resulted from contact with an object or equipment, and 1.8 percent of the cases resulted from being caught in equipment (72 FR 72452, 72484, Dec. 20, 2007). BLS Census of Fatal Occupational Injuries data from 1993–2002 show that 10 shipyard fatalities (6.3% of shipyard work-related fatalities) resulted from contact with electrical current, and 31 fatalities (19.5%) occurred because of contact with objects and equipment (72 FR 72484–85).

2. The general industry lockout/tagout standard specifically exempts "maritime employment" from its scope (§ 1910.147(a)(1)(ii)(A)). In the preamble to the final general industry standard, OSHA explained that shipyard employment was excluded because of the unique conditions present in this industry; further, the means to minimize injuries and fatalities to maritime workers required additional analysis and consideration, which had not been undertaken during the lockout/tagout rulemaking (54 FR 36644, 36657–58, Sept. 1, 1989). As a result, OSHA had insufficient information about hazardous energy in shipyard employment to conclude that the general industry approach would address those hazards effectively. OSHA said it would continue to review information on hazardous energy in shipyard employment, evaluate the need to initiate rulemaking, and determine whether the general industry rule, or an appropriate modification of that rule, would provide optimal protection for shipyard employees.

3. The existing lockout/tagout provisions applicable to shipyard employment (§§ 1910.331–.335, 1915.162–.164, 1915.181) do not provide comprehensive or adequate protection for shipyard employees. The existing provisions in 29 CFR 1915 establish specific, but isolated, practices for controlling hazardous energy, and no provisions establish a comprehensive program for addressing those risks. For example, none of the existing part 1915 provisions requires written lockout/tagout procedures, employee training, verification of deenergization or isolation, or periodic inspection.

Commenters supported the reasoning in OSHA's discussion in the preamble to the proposal regarding the need for a comprehensive lockout/tagout standard. Several employers stated: "We agree with OSHA that comprehensive energy control procedures are important and support OSHA in applying the 'cornerstone' part of the rules to ship repair" and that "positively securing all energy sources before servicing equipment and verifying that the energy control has been achieved is an obvious way to save lives and prevent injury" (Exs. 100.1; 101.1; 105.1; 123; 124; 126; 128; 130.1).

Some commenters confirmed that shipyard employers, as well as commercial vessels, are already utilizing a version of lockout, tagout, or tags-plus in their facilities, and have done so for a number of years. Manitowoc Marine Group testified that:

> [A]s far as the land base, we do follow the general industry standard on lockout/tagout. * * * [For vessel and vessel sections] we have tried to somewhat model the general industry to a point. We will identify the energy sources as best we can with the crew (Ex. 168, pp. 109–111).

Northrop Grumman-Newport News, Bath Iron Works, American Seafoods Company, Foss Maritime, Trident Seafoods, and several other commenters also confirmed that they use lockout, tagout, or tags-plus in some fashion for both their landside facilities, and vessels and vessel sections (Exs. 99; 100; 104.1; 105.1; 107.1; 116.1; 120.1). American Seafoods Company stated: "Many vessels have implemented some form of lockout procedures even though maritime has been exempted by OSHA for the past 18 years" (Ex. 105.1). Arctic Storm Management Group testified:

> All three vessels have lockout/tagout programs. All three of them have been tailored to the vessels, because they're different sizes in different places. I have worked with my engineering staff and electricians to design the programs, but they are vessel specific (Ex. 199, p. 90).

OSHA believes that a comprehensive hazardous-energy control program is essential for shipyard employment for the reasons listed above, and as explained in the proposal (72 FR 72452, 72484–85, Dec. 20, 2007). As discussed below, OSHA is adopting a lockout/tags-plus program, which is a modified version of the general industry lockout/tagout program. The shipyard employment lockout/tags-plus standard will establish uniform minimum procedures that shipyard employers must follow in all shipyard servicing operations to protect employees on land and on vessels and vessel sections.

Why OSHA Developed a Modified Version of the General Industry Standard

In the proposal, OSHA discussed how it determined to follow the general industry lockout/tagout standard. The Agency listed the following five reasons, with an in-depth discussion of each reason, in the proposed rule (72 FR 72452, 72487, Dec. 20, 2007): (1) The general industry standard has provided effective protection for affected employees; (2) many shipyard employers have already implemented lockout/tagout programs modeled on the general industry standard, and have reported that these programs are effective in reducing the risk of harm associated with servicing operations; (3) the comprehensive energy-control procedures, that are the cornerstone of the general industry standard, are particularly appropriate for addressing

the types of workplace conditions and hazardous energy present in shipyard employment; (4) shipyard employment also includes landside operations, which are similar to general industry worksites; and (5) the requirements of the general industry standard would be effective in controlling hazardous energy in complex shipyard work environments and in servicing complex ship's systems because the standard has proven effective under similar complex conditions in general industry sectors.

Almost uniformly, the comments on the proposed hazardous-energy standard disagreed with OSHA's justifications for adopting the general industry standard for shipyard employment in § 1915.89. As an example of a recurring concern, Northrop Grumman–Newport News stated: "The proposed standard is essentially identical to the existing General Industry standard and does not adequately address the uniqueness of Shipyard Employment" (Exs. 116.1; 120.1). DeWitt Davis stated:

> [Section 1910.147] works well when [t]here is one source of energy and in an assembly line process. Assembly lines are rare in shipyard construction. * * * [A] cookbook approach [cannot] be applied to multi-hazardous-energy-source work space (Ex. 122).

American Seafoods Company pointed out that, in contrast to general industry operations, shipyard work changes with each new vessel that needs repair work:

> The complexity in a shipyard does not just arise from the fact that there are many complex systems but that in large part, the equipment and systems in a facility completely leave and are replaced with entirely new ones dozens to hundreds of times per year (Ex. 105.1).

Moreover, as Northrop Grumman–Newport News discussed, systems on large vessels are extremely complex and interrelated, may involve thousands of workers, and may be relatively inaccessible:

> A significant number of energy-isolating devices or authorized individuals are involved. Overhaul of a nuclear-powered aircraft carrier typically involves 75,000 energy-isolating device(s) and over 3,000 authorized employees on a daily basis. * * *
>
> The energy-isolating device(s) are relatively inaccessible. Many isolating devices are located remotely from the area of actual work or are in areas where access is restricted to certain groups of employees.
>
> There is interdependence and interrelationship of the system components. Navy vessels, and to a lesser extent other vessels, are designed for survivability. As a result, they are designed and constructed with redundancy in mind. Isolation of components must take this redundancy into consideration, requiring an extensive effort to understand, identify, and account for all sources of energy (Exs. 116.2; 120.1).

Other commenters noted the complexity of vessels' energy systems and the difficulty that workers, including contractors, have in making sense of those systems:

> The employees or contractors who perform work on a particular system are unlikely to have the capability of identifying all energy sources, either initially based on engineering drawings and schematics or physically on the ship.
>
> The employees who perform the work on a particular system are unlikely to have the capability of coordinating the interface between multiple jobs that have overlapping points of isolation (Ex. 105.1).

Difficulties in deciphering a vessel's energy system may stem from the fact that schematics may be outdated:

> Inaccurate or no drawings or schematics—older ships, particularly commercial or foreign, may no longer have ship's drawings. Even newer ships may not have been constructed exactly as indicated on the drawing or the engineering drawings may not have been updated to reflect alterations.
>
> Failure to label components—a part of ship construction includes labeling of the components. Components should be labeled before they become live. In other cases, labels may be missing, damaged, or worn (Ex. 105.1).

At the Washington, DC, public hearing, Northrop Grumman–Newport News gave a further explanation about the challenges of adopting the § 1910.147 general industry standard for shipyard employment:

> I think, number one, is the complexity on an aircraft carrier, for example, you may have 75,000 devices that you are isolating at any one time. You may have 3,000 people that are engaged in some way of that lockout/tagout process, so I think sheer volume is one, complexity is another. It is one thing to talk about lockout and tagout of an engine lathe in a machine shop, and it is another to talk about a complex tagout of an electrical system on a nuclear-powered aircraft carrier. There is just no comparison in the breadth and depth of those systems (Ex. 168, pp. 250–251).

Manitowoc Marine Group gave examples of some of the complexities that they encountered on older vessels it repairs:

> But some of these older vessels actually use belting systems which will—you will have gates and a cargo hold that will dump the product on the gate as it is moving, and this belt will eventually sandwich into another belt, bring it up to the open deck of the vessel, and into a chute which will unload. So you have got a lot of complex equipment and motors and drives that [have] to be identified. And there may be a situation where one energy source may drive this motor, but you may have another energy source hooked to it as well, because it has an additional system which drives it (Ex. 168, pp. 113–114).

Commenters also confirmed that employers who were using the general industry lockout/tagout standard were struggling in various ways. American Seafoods Company stated:

> In response to recent accidents, many fishing industry vessels have reexamined their lockout/tagout procedures and worked to improve them. Some have used OSHA general industry regulation as a framework. As a result, they have struggled with application of the general industry rules to their equipment installations, and application of those rules to the unique circumstances of work aboard ships. Unfortunately, the general industry approach is not one size fits all and has not worked well. The principles are valuable, while the details of implementation have been difficult (Ex. 105.1).

iWorkWise explained how various fishing vessel owners were attempting to apply § 1910.147 to their vessels but were running into difficulties:

> [On] some vessels it's with a few specific pieces of equipment, and some vessels * * * the problem is throughout the whole vessel. So people are doing the best they can with it, and trying to use 1910 and trying to make it fit, because it's really all anyone has it for is a guideline. * * * They try to use 1910 until they get to the point where, oh, it won't work here. Now what? And that happens I think on every vessel in this industry (Ex. 199, p. 166).

Prowler LLC and Ocean Prowler LLC, as well as American Seafoods Company, stated:

> We agree with OSHA that comprehensive energy control procedures are important and support OSHA in applying the 'cornerstone' part of the rules to ship repair, however we believe that there is much in the OSHA standard that is not 'cornerstone' material. OSHA should minimize the requirements that are not performance oriented energy control procedures to allow employer's real flexibility in creating effective lockout programs, as well as training programs, that achieve full energy control (Exs. 100; 105.1).

Several of the commercial vessel operators and owners at the Seattle public hearing described their current hazardous-energy-control procedures. Dave Fraser of FV Muir Milach stated:

> We have remote starts on the bridge for the engine that we use to drive the hydraulics. So if the chief was going to work on that, you know, service it, he'd come up, and he'd take a piece of, if nothing else, duct tape, put it over the starter switch and write on it, 'Do not start. I'm working on the generator' (Ex. 199, p. 62).

Supreme Alaska Seafoods described how its § 1910.147 lockout/tagout program is not meeting its needs:

> We have basically a full-blown lockout/tagout program [modeled after § 1910.147]

onboard the boat. * * * It doesn't take into consideration the ship's systems. Some areas you can't access it. We have—electrical is my biggest problem right now. I have panels that weren't designed with that in mind. When this vessel was designed, it was considered adequate enough to shut the breaker off and put a little tag or something on it, and everybody was supposed to know better. It's no longer acceptable. So it won't take a blockout device. * * * So [§ 1910.147] doesn't meet our needs, all right? And the thing is—the first thing someone says is, well, can you change it? Yeah, we can change it. But there's so much of this throughout the boat * * * to do it in one blanket-type process (Ex. 199, pp. 161–163).

Amy Duz of iWork Wise testified: "I don't know of any vessel that's following 1910 a hundred percent, not even one. And the reasons—the first reason is probably that they just can't physically lock everything out, so it gets more complicated" (Ex. 199, p. 166). Icicle Seafoods, Inc., testified:

At Icicle we have a lockout/tagout program on every vessel and every land plant. I guess before you ask specifically, it's loosely modeled after 1910. I wish I could say that we're actually a hundred percent compliant, and every single time a situation arises we're doing exactly what we need to do. That doesn't happen. We're not in compliance with 1910, and we can't be (Ex. 199, p. 231).

OSHA also received comments and testimony from shipyard employers who had concerns over using the general industry lockout/tagout standard as an industry-wide approach. Manitowoc Marine Group explained that, on landside, it is using the § 1910 lockout/tagout standard. However, it commented that vessels present special circumstances:

[J]ust with the different vessels that come in, ranging [from] very, very old vessels—I mean, we are talking vessels that were built in the '20s and '30s that are actually still operational—it is a little more difficult, but we do try to use safe practices and develop a procedure that will protect them from energy sources (Ex. 168, pp. 84–85).

OSHA maintains that the shipyard industry needs a comprehensive hazardous-energy control program, for landside facilities as well as vessels and vessel sections. However, it is apparent from the comments made by large and small employers that applying the general industry lockout/tagout standard verbatim would present many challenges for this industry. The comments and testimony, which the Agency carefully reviewed and considered, convinced OSHA that a modified version of the general industry standard is necessary to protect workers who confront the unique conditions and complex situations of shipyard employment.

OSHA is adopting lockout/tags-plus requirements for shipyard employment due to the complexity of the worksite; the large number of workers involved in the work force; the involvement of multiple employers; and the vast array of machinery, equipment, and systems that employees may be servicing. These requirements build on the general industry lockout/tagout standard, but offer shipyard employers some flexibility in choosing the best method to control hazardous energy, given their special circumstances. The American Shipbuilding Association (ASA) argued that due to the complexity of shipboard system operations, the imposition of traditional general industry standards would increase an employee's risk exposure (Ex. 168, pp. 194–195). OSHA agrees with this and other similar comments, and revised the final rule to address the industry's concerns while ensuring that shipyard employees working under § 1915.89 are protected at least as well as their counterparts in general industry working under § 1910.147.

The change from lockout/tagout to lockout/tags-plus is one of clarification. Currently, § 1910.147 requires that, when an employer uses a tagout system on an energy-isolating device that is capable of being locked out, the tagout system must provide full employee protection. That full-employee protection provision requires that an additional safety measure be used in conjunction with all of the tagout requirements: essentially, a tags-plus system requires an additional safety measure. This final rule simplifies and clarifies that requirement by changing the definition and more explicitly specifying those particular requirements. In addition, when possible, OSHA has revised the language in the provisions to clarify the requirements, without changing the substantive requirements of §§ 1910.147 and 1910.269. For example, § 1910.147(c)(3) has two requirements written into one paragraph. Without changing the substantive provisions, § 1915.89(c)(6) separates those requirements into two paragraphs, and adds additional clarifying language. The Agency believes that the maritime industry will embrace the clarified language in the provisions, and be better able to understand and comply with the provisions in this section.

Due to the number of regulatory text changes that OSHA made from the proposed rule, this section of the preamble will explain the final regulatory text language, rather than track subsequent changes from the proposal, as is typically done in OSHA preamble discussions. OSHA will explain how the changes came about, and provide explanations and examples, when appropriate, for specific provisions. OSHA believes that this approach will assist employers in understanding the requirements in the final standard. In addition, this preamble references two tables that list the specific provisions OSHA revised between the proposed and final rules. Table 2 of this preamble (see below) is a side-by-side listing of sections and headings in both the final standard and the proposal. Table 3, found at Ex. 215, is a side-by-side table that compares the final regulatory language to the language in the proposal for the revised provisions. (The purpose of Table 3 is to assist the regulated community in understanding the revisions made to these provisions, and is not to be relied upon for regulatory language.)

TABLE 2—CONTROL OF HAZARDOUS ENERGY SIDE-BY-SIDE COMPARISON

Final regulatory text	Proposed regulatory text
(a) Scope and application	(a) Scope
(1) Scope	(1) Scope
(2) Application	(2) Application
(4) Exceptions	(3) Purpose
(b) Lockout/tags-plus program	(b) General
(c) General requirements	(1) Energy control program
(6) Full employee protection	(2) Lockout/tagout
(7) Lockout/tags-plus coordination	(3) Full employee protection
(d) Lockout/tags-plus written procedures	(4) Energy control procedures
(e) Procedures for shutdown and isolation	(5) Protective materials/hardware
(f) Procedures for applying lockout/tags-plus systems	(6) Periodic inspection

TABLE 2—CONTROL OF HAZARDOUS ENERGY SIDE-BY-SIDE COMPARISON—Continued

Final regulatory text	Proposed regulatory text
(g) Procedures for verification of deenergization and isolation	(7) Training
(h) Procedures for testing	(8) Energy isolation
(i) Procedures for removal of lockout/tags-plus systems	(9) Employee notification
(j) Procedures for startup	(c) Application of control
(k) Procedures for group lockout/tags-plus	(1) Preparation
(1) Primary authorized employee	(2) Shutdown
(2) Authorized employees	(3) Isolation
(l) Procedures for multi-employer worksites	(4) LLOTO application
(2) Host employer responsibilities	(5) Stored energy
(3) Contract employer responsibilities	(6) Verification
(m) Procedures for shift or personnel changes	(d) Release from lockout/tagout
(n) Lockout/tags-plus materials and hardware	(1) Machine/equip./system
(i) Durable	(2) Employees
(ii) Standardized	(3) Lockout/tagout removal
(iii) Substantial	(e) Additional requirements
(iv) Identifiable	(1) Testing
(o) Information and training	(2) Outside personnel
(1) Initial training	(3) Group lockout/tagout
(2) General training content	(4) Shift change
(3) Additional training requirements for affected employees.	
(4) Additional training requirements for authorized employees.	
(5) Additional training for lockout/tags-plus coordinator.	
(6) Employee retraining.	
(p) Incident investigation.	
(q) Program audits.	
(r) Recordkeeping.	
(s) Appendices.	

Special provisions apply to repairs to Navy vessels. When the Navy conducts repairs on its vessels, the Navy ship's force maintains control of the vessels' machinery, equipment, and systems, and performs the procedures for controlling hazardous energy. To a large extent, the Navy's system is consistent with OSHA's final rule on lockout/tags-plus. However, differences between the Navy's system and the final rule required the agencies to work together to craft exceptions to the final rule to accommodate the operational needs of the Navy regarding its ships that are under repair.

OSHA recognizes that Navy vessels and vessel systems undergoing repair may have to become operational quickly for purposes of national security. Furthermore, in its comments to the proposal (Ex. 132.2), the Navy described how its energy-control system is applied to vessel systems that are uniquely complex:

> The Navy vessels' expert based tags plus system under the control of the ship Commanding Officer provides the Commanding Officer ultimate control of what is happening aboard his/her ship in accordance with U.S. Navy Regulations.* * * Our group Tags Plus expert-based hazardous energy control program involves an interaction of expert systems operators [the ship's force] and shipyard *maintenance* personnel. Maintenance is used differently in shipyards it should be changed to repair or remove it altogether here!
>
> * * *
>
> The Navy has developed shipboard energy control process requirements codified in formal Naval Instructions. These instructions were specifically designed to provide for work safety when dealing with energy control of complex systems which require specialized system qualification, knowledge and experience as well as multi-layered technical reviews to ensure proper isolation of work areas is established. Work isolation is often directly linked to maintaining combat system requirements and ship safety (fire protection, list, trim, buoyancy, should be: hotel systems, ventilation, lighting etc.) on combat ships with redundant systems. This required the development of an energy control process that utilizes system experts and trained work control professionals. * * * Placing responsibility for adequate isolation and system conditions in the hands of personnel performing work [shipyard maintenance personnel] is unsafe when the equipment and systems are so complicated that workers could not be reasonably expected to correctly determine safe isolation or it's affect [sic] on critical ship systems.

Because of these factors, the Navy ship's force always maintains control over vessels and vessel systems undergoing repair, and exercises control of hazardous energy in these vessels and vessel systems, even when private-sector contract employers provide the workforce that performs the servicing operations. The Navy asserts that its hazardous-energy control program provides employees, including contractor employees, with a sufficient level of protection from hazardous energy, while permitting it to retain control of the vessels under repair should operational needs arise. For these reasons, OSHA provided several exceptions to the provisions of its lockout/tags-plus standard (see the notes to paragraphs (c)(4), (c)(6), (c)(7), (e), (f), (h), (i), (j), (k)(2), and (l) of this section); the preamble below discusses these exceptions more fully. OSHA believes that contractors performing servicing operations onboard U.S. Navy-owned and -operated vessels already are coordinating with the Navy ship's force during these operations, as required by these notes. Thus, the notes codify practices that already exist in situations when the Navy has control over its vessels and the vessel's machinery, equipment, and systems during servicing operations. These notes also apply to the servicing of machinery, equipment, or systems that takes place during new construction of naval vessels once the ship's force takes control of those machines, equipment, or systems. While these exceptions to the final lockout/tags-plus requirements accommodate the Navy's need to exercise control over the machinery, equipment, and systems of its vessels that are undergoing repair, OSHA nevertheless continues to exercise authority over private-sector employers, under contract with the Navy, performing repair work on Navy vessels. Those employers still must protect their employees to the full extent required by

the remainder of the lockout/tags-plus rule. For example, paragraph (q) addresses program audits. Even those employers who service vessels and vessel systems that are under the control of Navy ships' force are required to conduct audits. OSHA does not require or expect the employer to audit the Navy's lockout/tags-plus system. However, during the audit of its own participation in the Navy's program, the employer may identify deficiencies in the implementation of the program or may identify ways that a procedure could be improved. In those instances, the employer should coordinate with the Navy to address such concerns.

Finally, the exceptions in § 1915.89 that apply to Navy vessels do not amend the requirements of any other OSHA standard that regulates the control of hazardous energy.

Paragraph (a)—Scope and Application

Paragraph (a)(1)—Scope

Paragraph (a)(1) specifies that the lockout/tags-plus section covers the servicing of machinery, equipment, and systems when an employee could be injured if the machinery, equipment, or system is energized, is started up, or releases hazardous energy. The scope of the final rule is the same as the proposed rule with minor clarifications and streamlining to address stakeholder comments that the language should be more self-explanatory and less confusing (Ex. 121.1).

As mentioned in the discussion to § 1915.80, OSHA made changes to two terms in paragraph (a) of this section. First, to streamline paragraph (a)(1), OSHA states that the lockout/tags-plus section covers "servicing" operations, instead of using the "servicing and maintenance" terminology from the proposed rule. The definition of "servicing" includes the maintenance, as well as the construction, installation, adjustment, inspection, modification, testing, repairing, and servicing, of machines, equipment, or systems. (See definitions, § 1915.80(b)(26).) Thus, there is no need to pair the term "maintenance" with "servicing."

Second, OSHA replaced "release of stored energy" with "release of hazardous energy," a term that covers all energy that could be released, not just stored energy. In response to stakeholder comments (Exs. 121.1; 199, p. 152), OSHA also added a definition of "hazardous energy" to the final rule (see definitions, § 1915.80(b)(8)). OSHA defines "hazardous energy" as "[a]ny energy source, including mechanical (for example, power transmission apparatus, counterbalances, springs, pressure, gravity), pneumatic, hydraulic, electrical, chemical, and thermal (for example, high or low temperature) energies, that could cause injury to employees." Forms of hazardous energy include active, residual, and stored energy. This definition is consistent with the one OSHA uses in general industry (CPL 02–00–147, 2/1/2001). As such, many shipyard employers will be familiar with the definition because they have implemented the general industry lockout/tagout standard in their landside facilities, and some have used a form of the general industry standards on vessels (see preamble discussion above). Adopting this definition both clarifies and emphasizes that many servicing operations in shipyard employment involve multiple types and sources of energy, and that the lockout/tags-plus section covers all of those types and sources of energy when the energization or startup of machinery, equipment, or systems, or the release of energy, may occur. Requiring that all releases of hazardous energy be controlled will provide more protection to workers than if they were simply protected from the release of stored energy.

Paragraph (a)(2)—Application

After considering all the comments received in response to OSHA's questions in the preamble to the proposed standard (72 FR 72452, 72498, Dec. 20, 2007), and analyzing the record, the Agency determined that the record supports changing the application of the lockout/tags-plus section. The final standard is a complete standard for all shipyard employment.

Paragraph (a)(2) of the final rule applies the lockout/tags-plus section to any servicing operation that is performed:

- In any landside facility that performs shipyard employment work; and
- On any vessel or vessel section.

In addition, if such servicing is conducted on a vessel, the standard applies to any employee on a vessel, including, but not limited to, the ship's officers and crew, unless such application is preempted by the regulations of another federal agency.

The proposal would have required employers to control hazardous energy by complying with the following provisions: Section 1915.89 when servicing machinery, equipment, and systems on vessels and vessel sections (proposed paragraph (a)(2)(i)); and § 1910.147 for "inherently general industry operations" performed aboard vessels, such as fish processing (proposed paragraph (a)(2)(iii)(C)) (72 FR 72452, 72489–93, Dec. 20, 2007).

OSHA received many concerns from stakeholders describing the unique situations in shipyard employment in which the application of different standards for controlling hazardous energy in shipyard work would be impracticable (Exs. 100.1; 101.1; 124; 126; 128; 130.1; 168, pp. 368–369; 199, pp. 149–150). Some stakeholders (Prowler LLC and Ocean Prowler LLC; American Seafoods Company; and the U.S. Navy) said OSHA should apply the general industry lockout/tagout standard (§ 1910.147) to landside facilities (Exs. 100.1; 105.1; 132.2). Other commenters referred to the 2004 National Shipbuilding Research Program (NSRP) report, "Review of Current and Best Practices for Hazardous Energy Control (Tagout) in Shipyards," which stated that shipyards have, in most cases, adopted § 1910.147 for land-based operations (Ex. 105.2). For example, American Seafoods Company, citing the NSRP report, commented that land-based servicing operations at shipyards were conducive to the general industry standard because, compared to shipboard servicing jobs, land-based jobs are usually of shorter duration and involve a single authorized employee, have means of isolation that generally can be readily identified, and have employees who perform servicing are capable of identifying the energy sources and applying energy-control devices (Ex. 105.1). In addition, a number of stakeholders said they have implemented the general industry standard in their landside operations (Exs. 116.2; 120.1; 132.2).

In contrast to the commenters mentioned above, Northrop Grumman—Newport News expressed a preference for one hazardous-energy control standard that applies to all servicing operations, on landside and on vessels and vessel sections (Ex. 168, pp. 263–264). Northrop Grumman stated that it favored a single hazardous-energy control standard in part because its employees work both aboard vessels and in landside shops:

> [Employees] do go onboard and often the workload shifts, we will bring work into the shops and we will work in the shops, and we will take it back [on the vessel] and reinstall it, so there is some movement back and forth between shop and ship (Ex. 168, pp. 221–222).

Northrop Grumman also said that having a single hazardous-energy control standard for landside and vessel-servicing operations would make it easier for the company to move employees between Northrop

Grumman's shipyards without having to retrain them (Ex. 168, pp. 222).

The International Association of Drilling Contractors (IADC) noted that problems could arise when a vessel in active operation is undergoing repairs by both the ship's crew and shipyard workers because the two groups could potentially be working under different standards for controlling hazardous energy:

> It is IADC's view that the lockout/tagout program on a vessel should generally be administered by the vessel's owner (represented by the ship's Chief Engineer)—this is particularly the case on a vessel that remains in active operation while undergoing repairs or when repairs are being undertaken concurrently by ship's crew and 'shipyard workers.'* * * The shipyard lockout/tagout program must be subordinate to that of the ship's lockout/tagout program when the ship remains in service (Ex. 103.1).

Amy Duz of iWorkWise testified about the value of having shipyard employees and a ship's crew using one standard for controlling hazardous energy:

> The proposed two-standard approach creates more questions and problems than it attempts to solve. One hazardous energy control standard should be applied to the fishing industry * * * [T]hese vessels will be in shipyards and ships and shipyard personnel need to interface. This interface will be more seamless, making people safer if everyone is accustomed to using the same standard (Ex. 168, p. 373).

Based on its analysis of the record, OSHA believes that applying a single lockout/tags-plus rule to all servicing operations, both landside and on vessels and vessel sections, will ensure that employers have a cohesive strategy to protect employees from hazardous energy. A single standard responds to the comments of Northrop Grumman—Newport News and the IADC. It will require shipyard workers to have knowledge of only one hazardous-energy standard, whether the employees are working on vessels or in a landside facility, and regardless of the shipyard involved. In addition, it ensures that a ships' crew follow the same rules as shipyard workers, thereby avoiding conflict or confusion when repairs to a vessel's equipment are being conducted by both groups. In sum, OSHA believes that having one standard will facilitate employer implementation and maintenance of an effective lockout/tags-plus program, and will ensure that employees understand and follow the program.

OSHA added language to paragraph (a)(2)(i)(A) to clarify that the final lockout/tags-plus section only applies to servicing equipment at landside facilities that "perform shipyard employment work," that is, those facilities that perform shipbuilding, ship repair, shipbreaking, or other related employment. OSHA added this language to clarify the limited scope of this regulation with regard to the two industry sectors. First, the final lockout/tags-plus section, as in the proposed rule, does not apply to servicing equipment at facilities that manufacture components and parts used in shipyard employment when these manufacturers do not perform shipyard employment work at these facilities. These manufacturers are covered by the general industry lockout/tagout standard. (See, also, summary and explanation of § 1915.80, Scope, application, and definitions.) Second, the final rule does not extend to landside fish-processing facilities. Fish processing at landside factories is general industry manufacturing, not shipyard employment. This position is consistent with OSHA policy that fish processors on land must follow the general industry lockout/tagout standard (see CPL 02–01–047, 2/22/2010); thus, the general industry lockout/tagout standard continues to apply to servicing operations on equipment at land-based fish-processing facilities.

OSHA also deleted the exemption in proposed paragraph (a)(2)(ii) for "normal production operations," defined at § 1915.80(b)(20) as "the use of machinery or equipment, including, but not limited to, punch presses, bending presses, shears, lathes, keel press rollers, and automated burning machines, to perform a shipyard-employment production process." The proposal exempted servicing that takes place during "normal production operations" unless an employee would be required to (a) remove or bypass a guard or other safety device, or (b) place any part of his or her body into an area on a machine, piece of equipment, or system where work is actually performed upon the material being processed, or where an associated danger zone exists during an operating cycle. OSHA believes that deleting the exemption for "normal production operations," including the exceptions to the exemption, clarifies that the lockout/tags-plus standard for shipyard employment applies to all servicing operations on any machine, equipment, or system that is used in shipyard employment, whether at a landside location, or on a vessel or vessel section. This application is consistent with other subparts of § 1915, which apply a single standard for vessels and vessel sections, and on landside operations, regardless of where the work is performed. (See 29 CFR part 1915, subpart B, Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment; 29 CFR part 1915, subpart I, Personal Protective Equipment; and 29 CFR part 1915, subpart P, Fire Protection in Shipyard Employment.)

Paragraph (a)(2)(i)(B) of the final rule specifies that the lockout/tags-plus section applies to servicing of all machinery, equipment, and systems on vessels and vessel sections. This application includes servicing shipboard equipment that is used for processing fish. Proposed § 1915.89 would have applied to servicing ships' systems (i.e., systems and equipment that are "an inherent and permanent part of the vessel") (72 FR 72542, 72489, Dec. 20, 2007), while § 1910.147 would have applied to the servicing of "inherently general industry equipment such as fish-processing equipment" (*Id.*). In the proposed rule, OSHA acknowledged that this approach would not result in a completely uniform application of standards onboard vessels. Nevertheless, OSHA preliminarily concluded that the proposed approach was appropriate under the assumption that equipment such as fish-processing equipment is not a core component of vessels, and that activities involving such equipment are more closely associated with general industry manufacturing operations than with shipbuilding, ship repair, shipbreaking, and related employment. *Id.* Further, the Agency opined that servicing such equipment aboard vessels is performed by production employees, and not by employees who service ships' systems. *Id.*

Stakeholders uniformly opposed OSHA's proposed two-standard approach (Exs. 100; 101.1; 104.1; 105.2; 107.1; 121.1; 123; 124; 126; 128; 130.1; 132.2; 168, pp. 194–195, 309–313), expressing their concern that applying two different standards for controlling hazardous energy on vessels would cause confusion (Exs. 130.1; 132.2). Icicle Seafoods Inc., stated:

> The proposed standards approach to lock and tagout will be confusing * * * Having to flip flop between two standards will only breed indifference and non-compliance. Asking an engineer to first determine what system he's working on before he's deciding how it should be locked out is asking too much. This is like asking my grandmother to follow one set of traffic laws on the weekend, and drive by a completely different set of laws during the week (Ex. 199, pp. 213–214).

Prowler LLC and Ocean Prowler LLC also agreed that the two-standard approach would be confusing for

employees working on fish-processing vessels: "It would mean that part 1910 standards would apply when [fish-processing employees] process fish and operate the equipment for production, but proposed 1915.89 would apply when they clean up or perform maintenance work on that same equipment" (Ex. 100).

iWorkwise also commented that OSHA's approach was confusing: "This approach can be summed up as follows: * * * 1915.89 applies to all the people, but only to part of the equipment and only for some of the time, but to all of the equipment for the rest of the time" (Ex. 130.1). iWorkwise elaborated on this issue at the informal public hearing:

> Two [lockout/tagout] standards will not make a single person more safe. It will introduce confusion and burden that will very likely make people less safe. Not a single vessel or fleet owner that I am aware of support this two-standard approach. * * * The two-standard approach begins by asking the impossible. * * * For example, when a ship's hydraulic system powers both processing and fishing equipment, where will one standard end and the other begin, or if processing equipment, such as a grinder sump pump is critical to keeping the ship afloat, is that ship's equipment or processing equipment, or when panels provide power for engineering and processing needs, what standard will be followed? (Ex. 168, pp. 368–369).

Prowler LLC and Ocean Prowler LLC raised the same concerns, saying that OSHA's proposed two-standard approach is confusing and arbitrary (Ex. 100). American Seafood Company agreed: "Application of general industry rules to one part of the ship, some of the time is folly. As is switching between two different standards for the same maintenance on the same equipment" (Ex. 105.1).

A number of stakeholders said the reasons OSHA provided in support of the two-standard approach were based on faulty assumptions about fish-processing operations. For example, several stakeholders said OSHA was incorrect in saying that fish-processing equipment is not "an inherent and permanent part of the vessel," in the way that, for instance, propulsion or navigation systems are (Ex. 168, pp. 369–370). American Seafood Company commented:

> The ship's purpose is processing, therefore processing is an essential ship function; the equipment is as essential to the ship's purpose as a dredge is to a dredging ship. We find the division of ship and ship's equipment on fish processing vessels by OSHA arbitrary (Ex. 105.1).

Stakeholders also said that OSHA's determination that most employers replace the fish-processing equipment on vessels at the end of each fishing season was inaccurate. At the informal public hearing, OSHA heard testimony from iWorkwise, stating that only a "minority of vessels change out their processing equipment between seasons" (Ex. 168, pp. 371–372). Although Trident Seafood Corporation said that their vessels replace processing equipment each season, the company added that they only replace some components, not the entire fish-processing system (Ex. 199, pp. 172–173). Trident Seafood Corporation also stated that the new equipment is plugged into the same electrical or hydraulic power sources that power the rest of the vessel (Ex. 199, p. 173).

Some stakeholders pointed out that OSHA was incorrect in stating that employees who service fish-processing equipment on a vessel do not service the ship's systems and vice versa (Exs. 104.1; 107.1; 168, p. 371; 199, pp.176–178). For example, Trident Seafoods Corporation commented, "Electricians, engineers and other technicians can and do work in various areas throughout the vessel" (Ex. 107.1). iWorkwise concurred, saying:

> In the vast majority of cases, [maintenance of fish-processing equipment] is done by the [ship's] engineer. It is a ship—the person works on everything. On some vessels, they will have factory technicians who will handle, for instance, a filet machine, but they will also help out the ship's engineer and engineering when they are not busy watching their machine (Ex. 168, p. 410).

Supreme Alaska Seafoods agreed:

> All personnel onboard ship are sailors first and foremost. Regardless of department, rank, or time at sea, all personnel are responsible for maintaining the ship. The term ship encompasses her hull, all machinery and its cargo. Some sailors are more skilled than others, but those of less skill will be used as helpers on the same machinery or systems. Furthermore, personnel from different departments will be called upon to work in other spaces on other machinery, or transferred to other departments as the needs of the ship dictate. This practice is not exclusive to the fishing industry, but it is standard and common practice in the maritime world (Ex. 199, pp. 148–149).

FV Muir Milach said that interchanging jobs between servicing ships' systems and fish-processing equipment is also prevalent on small vessels: "[E]verybody, including the engineer, is going to spend the majority of their time on the fishing end of things" (Ex. 199, p. 61). FV Muir Milach added that interchanging jobs is particularly prevalent when the vessel is at sea: "Our fishing seasons are fairly lengthy and discrete. * * * So from the vessel owner's perspective, the duties of crew are as broad as their skills" (Ex. 199, pp. 64–65).

After considering stakeholder comments and testimony, as well as analyzing the record as a whole, OSHA is convinced that having a single standard for vessels will best protect employees from injury due to energization, startup, or the release of hazardous energy anywhere on a vessel. Accordingly, OSHA incorporated that change into paragraph (a)(2)(i), and deleted proposed paragraph (a)(2)(iii)(C), which would have excluded servicing fish-processing machinery, equipment, or systems on vessels from the lockout/tags-plus section. Thus, § 1915.89 will apply to servicing fish-processing equipment aboard vessels. However, as noted above, the general industry lockout/tagout standard (§ 1910.147) continues to apply to servicing operations at landside fish-processing facilities, which is consistent with the similarity of those plants to other general industry facilities, current practice in the landside fish-processing industry, and OSHA policy (CPL 02–01–047).

Paragraph (a)(2)(ii) applies the final lockout/tags-plus section to any employee, including ships' officers and crew, who services equipment used during shipyard employment, unless the application of the lockout/tags-plus standard is preempted by the regulations of another federal agency. The proposed lockout/tagout section contained a similar provision (proposed § 1915.89(a)(2)(i)(A)).

The language in paragraph (a)(2)(ii) clarifies longstanding OSHA policy that part 1915 applies whenever a ship's crew performs ship-repairing operations. OSHA included this issue in this rulemaking to address concerns that some courts have raised about the scope and coverage provisions in part 1915, subpart A, General Provisions. Although § 1910.15(a) specifies that part 1915 applies to "every employment and place of employment of every employee engaged in ship repairing, shipbreaking, and shipbuilding, or related employment," some language in part 1915 suggests that the part does not cover certain shipyard employment activities or employees. Specifically, § 1915.4(d) implies that part 1915 does not apply to some employees who perform shipyard employment activities:

> The term employee means any person engaged in ship repairing, shipbuilding, shipbreaking or related employments.* * * other than the master, ship's officers, crew of the vessel, or any person engaged by the master to repair any vessel under 18 net tons.

Section 1915.4 was taken from the Longshore and Harbor Workers' Compensation Act (LHWCA) (33 U.S.C. 901 *et seq.*), which, along with the OSH Act, provides OSHA with rulemaking authority over shipyard employment. Prior to enactment of the OSH Act, the Secretary of Labor, pursuant to authority under the LHWCA, promulgated occupational safety and health standards for shipbuilding to protect the life, health, and safety of shipyard employees (33 CFR 941(a)).

When Congress enacted the OSH Act in 1970, it authorized OSHA, within the first two years after the effective date of the Act, to promulgate as occupational safety and health standards any established Federal standard without following normal rulemaking requirements (29 U.S.C. 655(a)). Pursuant to this authority, OSHA adopted all established Federal workplace safety and health standards in effect as of April 28, 1971, that pertained to employers, employees, and employment covered by the OSH Act (29 CFR 1910.11(a); 36 FR 10466, May 29, 1971), including the safety and health standards enacted under the LHWCA.

OSH Act coverage, which extends to employers engaged in a business affecting interstate commerce, is broader than LHWCA coverage. As such, OSHA has consistently asserted that the Agency is not bound by the coverage limitations in the LHWCA standards. To clarify this position, OSHA issued an interpretive rule amending its incorporation of established Federal standards (37 FR 26008, Dec. 7, 1972). Specifically, OSHA added paragraph (b) to § 1910.11 specifying that the Agency was incorporating "only substantive rules affecting safety and health" from established Federal standards. *Id.* "The incorporations by reference of Parts 1915, 1916, 1917, 1918 * * * are not intended to include the discussion in those parts of the coverage of the Longshoremen's and Harbor Workers' Compensation Act * * *" (§ 1910.11(b)). OSHA explained that when it adopted the LHWCA safety and health rules, the Agency had "no intention of incorporating [into OSHA rules] * * * any other rules having special applicability under the laws under which the 'established Federal standards' were initially adopted" (37 FR 26008).

OSHA has taken this position before the Occupational Safety and Health Review Commission (OSHRC) and the Federal courts of appeal. OSHRC accepted OSHA's approach as delineated in § 1910.11(b) (*Dravo Corporation,* 7 O.S.H. Cas. (BNA) 2089 (1980)), but this provision has not been universally accepted. See *Dravo Corp.* v. *OSHRC,* 613 F.2d 1227 (3rd Cir. 1980).

In *Dravo,* the court said that, notwithstanding § 1910.11(b), OSHA would be held to the plain-language meaning of its part 1915 standards, including the coverage standards carried over from the LHWCA. *Dravo,* 613 F.2d at 1232–33. The language at issue in *Dravo* concerned the location of covered shipyard employment activities, that is, whether part 1915 covered shipbuilding activities performed at a waterfront fabrication shop on an island in the Ohio River. The court looked to the definitions of "employer" and "employee" in § 1915.4, which indicate that the terms are limited to persons engaged in shipyard employment "on the navigable waters of the United States, including dry docks, graving docks and marine railways" (§ 1915.4(c) and (d)). The court said the plain meaning of the definitions did not include fabrication shops ("they include only waters, docks, and marine railways," *Dravo,* 613 F.2d at 1232), and declined to construe the definitions more broadly.

The *Dravo* court concluded that if OSHA intends a different coverage scheme, the Agency must amend part 1915 through rulemaking. *Id.* Thus, in accord with the *Dravo* court and to avoid confusion, OSHA proposed to change the coverage of § 1915.89 to apply to servicing performed by any employee, including ships' officers and crew of the vessel (proposed § 1915.89(a)(2)(i)(A)). OSHA did not receive any comments opposing this language. As OSHA said in the proposed rule, this change should not come as a surprise to employers, since OSHA has consistently applied part 1915 whenever a ship's crew performs shipyard employment work (Ex. 81; see also CPL 02–01–047). OSHA believes that this provision will reduce any confusion related to the split in the courts and the language in § 1915.4.

To address a question posed by the International Association of Drilling Contractors (Ex. 103.1), OSHA is clarifying that the final lockout/tags-plus section also applies, in certain circumstances, to seamen who perform servicing operations on vessels. CPL 02–01–047 outlines OSHA's authority over seamen. The Coast Guard exercises full authority over the safety and health of seamen onboard inspected vessels; therefore, with the exception of OSHA recordkeeping requirements (29 CFR part 1904), OSHA may not enforce the OSH Act with respect to the working conditions of seamen on those vessels.

On commercial uninspected fishing industry vessels and other uninspected vessels, however, OSHA has authority over the working conditions of seamen that are not addressed by Coast Guard regulations. *Chao* v. *Mallard Bay Drilling, Inc.,* 534 U.S. 235 (2002). The Coast Guard has not regulated the hazards addressed by § 1915.89 on uninspected vessels. Accordingly, the final lockout/tags-plus section applies to seamen performing servicing operations on commercial uninspected fishing-industry vessels and other uninspected vessels. However, as paragraph (a)(2)(ii) states, the lockout/tags-plus standard is not applicable if such application is preempted by the regulations of another federal agency. Thus, the standard does not apply to the working conditions of seamen aboard inspected vessels since the Coast Guard regulates that area.

Paragraph (a)(3) adopts the proposed requirement that when other standards in part 1915, or applicable standards in part 1910, require the use of a lock or tag, employers shall follow those requirements and supplement them with the procedural and training requirements specified by final § 1915.89, Control of hazardous energy (lockout/tags-plus).

Part 1910 standards that currently contain lockout/tagout related requirements that may apply, with some exceptions, to shipyards include: § 1910.178 Power Industrial Trucks; § 1910.179 Overhead and Gantry Cranes; § 1910.181 Derricks; § 1910.213 Woodworking Machinery; § 1910.217 Mechanical Power Presses; § 1910.218 Forging Machines; § 1910.252 Welding, Cutting and Brazing; and § 1910.305 Electrical. The part 1915 standards that contain requirements for locks or tags include § 1915.162 Ship's Boilers; § 1915.163 Ship's Piping Systems; § 1915.164 Ship's Propulsion Machinery; and § 1915.181 Electrical circuits and distribution boards. The regulatory language for the 1915 standards has been modified to incorporate the requirements of this final rule, which modifications have been carried over from the proposal with minor changes for purposes of clarification and consistency. OSHA received no comments on these proposed modifications. Therefore, the Agency is retaining the proposed revisions, which it believes will bring consistency to the lockout/tags-plus requirements across the various sections of part 1915 and will afford employees increased protection compared to the existing requirements.

For example, an employee working on a ship's main engine, engaging the electrically driven jacking gear,

currently would follow § 1915.164 that requires that the circuit controlling the jacking gear be deenergized by tripping the circuit breaker, opening the switch, or removing the fuse, and then applying a tag at the breaker, switch, or fuse panel. With this final rule, the employer will now implement the additional requirements in § 1915.89 to ensure that all employees are protected while servicing machinery, equipment, or systems. Alternatively, an employee cleaning a space that has electrical wiring or the fire-suppression system running through it will not need to follow § 1915.89 since the employee is not servicing the wiring or fire-suppression system, but is merely cleaning the space. However, other 29 CFR 1915 standards may apply, and should be considered when working on machinery, equipment, or systems on vessels and vessel sections.

Exceptions

Paragraph (a)(4) lists exceptions from the final lockout/tags-plus section for two types of operations: Work on electric equipment that is connected with a cord and plug, and minor servicing activities performed during normal production operations. OSHA did not receive any opposition to these two exemptions, which were included in the proposal. The exceptions for electric plug-in equipment and minor servicing are the same as the proposal with only minor, non-substantive editorial revisions.

The exception in paragraph (a)(4)(i) refers to work on machinery, equipment, or systems that are connected by a cord and plug. When equipment is unplugged and under the exclusive control of the employee performing the servicing, the risk of the equipment starting up or hazardous energy being released no longer exists.

In paragraph (a)(4)(ii), OSHA recognizes that some servicing activities that occur during normal production operations, such as making fine adjustments to equipment, must be performed with the power on. This activity may include certain aspects of troubleshooting—for example, checking to ensure that the source of a production problem has been corrected. The final lockout/tags-plus rule exempts these servicing activities during normal production operations, provided these activities are routine, repetitive, and integral to the use of the equipment. However, the employer is required to provide employees with effective means of protection from the energization, startup, or the release of hazardous energy when they perform these activities. If employees are conducting other-than-minor servicing, they must follow the lockout/tags-plus procedures.

Proposed § 1915.89(a) Provisions Not in the Final Rule

In addition to deleting proposed paragraph (a)(2)(iii)(C), which would have removed fish-processing on vessels from § 1915.89 coverage, OSHA deleted three other provisions in proposed paragraph (a). All three provisions were taken from the general industry lockout/tagout standard.

OSHA did not include in the final rule the exception specified by proposed paragraph (a)(2)(ii). This proposed provision exempted "normal production operations" from the lockout/tags-plus standard. As explained in the summary and explanation of paragraph (a)(2)(i)(A), not including the exception for "normal production operations" results in uniform application of the final standard across all shipyard employment.

OSHA also excluded from the final rule the proposed paragraph (a)(2)(iii)(B) exception for hot-tap operations on transmission or distribution systems for substances such as gas, steam, water, and petroleum products. Bath Iron Works, Electric Boat Corporation, and the American Shipbuilding Association said the exemption was not necessary (Exs. 106.1; 108.2; 117.1). These stakeholders pointed out that § 1915.14 requires marine chemist certification for workers performing hot work on pipelines that contain or have contained flammable or combustible materials. Moreover, these stakeholders noted that National Fire Protection Association's 306 standard for the Control of Hazardous Gas on Vessels states, "Marine Chemists are not permitted to authorize hot tapping except in emergency situations where a vessel is in peril" (Exs. 106.1; 108.2; 117.1). OSHA agrees with the stakeholders that 29 CFR 1915, subpart B, fully covers hot-tap operations, and that including language in the final rule about such operations is unnecessary and may cause confusion.

Proposed paragraph (a)(3)(i) was not included in the final rule to simplify the lockout/tags-plus section. The Agency believes that this provision, which described the purpose of the lockout/tags-plus section, is unnecessary because paragraph (b) of the final lockout/tags-plus section provides the same information.

Paragraph (b)—Lockout/Tags-Plus Program

This final standard requires that the employer establish and implement a written program and procedures to control hazardous energy during the servicing of any machinery, equipment, or system. OSHA separated the requirements into paragraphs (b)(1) through (b)(6). The written energy-control procedures proposed in paragraph (b)(4) were moved to paragraph (d), Lockout/tags-plus written procedures, in this final standard.

Although the energy-control program applies to all employees, it is directed primarily at those workers who have the greatest exposure to hazardous energy, which include authorized and affected employees. The final standard defines "authorized employees" as those employees who execute the lockout/tags-plus procedures, install the lock or tags-plus system, or service any machine, equipment, or system under a lockout/tags-plus application (final § 1915.80(b)(3)). "Affected employees" include employees who normally operate the machinery or equipment on which service is being performed as well as those employees whose job duties require them to work in the area where the servicing is being performed (final § 1915.80(b)(2)). The definition also specifies that affected employees become authorized employees when they perform servicing operations on the equipment under a lockout/tags-plus application.

Paragraphs (b)(1) through (b)(6) specify the components of the employer's written lockout/tags-plus program: General procedures for the use of lockout or tags-plus systems in accordance with paragraph (c); procedures for protecting employees involved in servicing operations in accordance with paragraphs (d)–(m); specification for locks or tagout hardware in accordance with paragraph (n); employee training procedures in accordance with paragraph (o); incident investigations procedures in accordance with paragraph (p); and program audit procedures in accordance with paragraph (q). These procedures are more fully explained below.

The employer's program is required to be written. OSHA concludes that, because the requirements in the lockout/tags-plus standard are comprehensive, the employer's program must be in writing to assist both employers and employees in implementing the standard's many provisions, and to give those groups ready access to all of the requirements. OSHA believes this is standard industry practice, and that it is essential for employee safety. No comments were received on the requirement that the program be in writing. OSHA is

retaining this requirement in final paragraph (b).

Paragraph (c)—General Requirements

Paragraph (c)(1), proposed as § 1915.89(b)(2), requires that, before any authorized employee performs servicing when energization or startup, or the release of hazardous energy, may occur, all energy sources be identified and isolated, and the machinery, equipment, or system rendered inoperative. This requirement means that, prior to servicing, each source of energy must have a lock or tags-plus system applied to it. While this is a new paragraph in the final standard, it is not a new concept in lockout/tags-plus. Failure to identify an energy source prior to servicing could result in serious injury and death. For example, in 1999, an employee installing a support cable was electrocuted when he came into contact with the energized high-voltage line that he was servicing (Ex. 69). A secondary switch that should have been locked open to deenergize an electric panel had been left closed. Procedures to isolate all hazardous-energy sources may have prevented this accident (72 FR 72452, 72485, Dec. 20, 2007). No comments were received disputing the fact that machinery, equipment, or systems need a lock or tagout application before servicing.

A primary tool for providing protection under the standard is the energy-isolating device, which is the mechanism that prevents the transmission or release of energy and to which locks or tags are attached. The energy-isolating device guards against equipment startup or reenergization of equipment during servicing. For purposes of this final standard, there are two types of energy-isolating devices: Those that are capable of being locked, and those that are not. How energy must be controlled depends on whether the energy-isolating device can accommodate a lock.

The term "capable of being locked out" is being retained from the proposal, and is defined at § 1915.80(b)(4). An energy-isolating device is considered "capable of being locked out" if it: Has a locking mechanism built into it; has a hasp or other means of attachment to which, or through which, a lock can be affixed (for example, a lockable electric disconnect switch); or can be locked without dismantling, rebuilding, or replacing the energy-isolating device, or permanently altering its energy-control capability (such as using a lock/chain assembly on a pipeline valve, a lockable valve cover, circuit-breaker lockout, or fuse block-out devices).

As discussed in the major issues section of this preamble, OSHA recognizes that there are many important elements of any energy-control program, and that the choice of lockout versus tagout is just one of these elements. Further, OSHA also acknowledges that, in isolation, the attachment of a lockout device to an energy-isolating device will provide greater protection against reactivation than the attachment of a tag. Thus, in final paragraph (c)(2), OSHA requires that when an energy-isolating device is capable of being locked, a lock must be used unless the employer can demonstrate that the use of a tags-plus system will provide "full employee protection" equivalent to the protection obtained by using a lock. This requirement was proposed as § 1915.89(b)(2)(ii), and is being included in the final rule.

During the public hearing for this rulemaking, Amy Duz of iWorkWise stated: "I have a general preference for locks, but I realize they can't always be used" (Ex. 199, p. 186). When asked whether he would support locks for fishing vessels, Chris Kline of Icicle Seafoods, Inc., responded: "I would absolutely. It's the only real way to [ensure safety when] you have individuals working around equipment" (Ex. 199, p. 246). Asked the same question, Alan Davis of American Seafoods Company stated: "Yes. When I'm climbing into a piece of equipment, I want to make sure my lock is on it, because it is a very sure way of making sure that someone can't activate it without a willful act of malice" (Ex. 199, pp. 302–303). Allen Rainsberger of Puget Sound Shipbuilder's Association agreed: "Whenever it's capable of being locked up, that's the preferred method, yes." After considering these employers' comments, OSHA has concluded that applying a lock will provide workers with the most efficient means of protection and the highest degree of confidence in their personal safety.

However, there are also data in the record on programs that effectively use tags-plus systems. Northrop Grumman—Newport News and Bath Iron Works stated that they believe their tags-plus systems are "as effective" as locks (Ex. 168, p. 340). While OSHA has historically preferred locks over tags, the Agency will defer to employers who use the latter, as long as they can demonstrate that their tags-plus system offers full employee protection equivalent to that provided by a lock.

In evaluating whether to implement lockout or tags-plus systems, the employer should use the following clarifications. First, as a general rule, lockout must be implemented as part of the overall energy-control program for machinery, equipment, or systems that are "capable of being locked out." Machinery, equipment, or systems that have a hasp or other attachment capable of accepting a lock, or that incorporate a locking mechanism, are obviously considered to be "capable of being locked out." However, other equipment without such a locking capability may still be considered "capable of being locked out," but only if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device, or permanently alter its energy-control capability.

Second, for machinery, equipment, or systems that are capable of being locked out, OSHA recognizes that employers may, nonetheless, prefer to implement a tagout program instead of lockout. OSHA will allow the use of tagout programs as an alternative to locks only if the employer can demonstrate that its complete tagout program will provide full employee protection. In most cases, for OSHA to consider a tagout program to be sufficiently protective, the elements of such a program will need to be detailed and intensive, and will necessitate far more commitment and day-to-day vigilance to make it effective than will a lockout program. This approach is necessary because a tag serves only as a warning and not as a positive restraint on hazardous energy. The final rule establishes criteria that OSHA will evaluate in determining whether a given tagout program does, in fact, provide full employee protection. Thus, when machinery, equipment, or systems are capable of being locked out, OSHA believes it will be easier for employers to use that capability than to bypass it in favor of a tagout program.

Paragraph (c)(3) states that a tags-plus system must be used when the energy-isolating devices are not capable of being locked out. If the employer wishes to perform modifications of the equipment to accommodate a locking device, OSHA encourages, but does not require, such modifications.

New provisions in paragraph (c)(4) describe the basic components of the tags-plus system. As required by paragraph (c)(4)(i), a tags-plus system includes an energy-isolating device, which is a mechanical device on a machine, equipment, or system that physically prevents the release or transmission of energy. Examples of energy-isolating devices are manually operated electrical circuit breakers, disconnect switches, line valves, blocks, or similar devices, but do not include push buttons, selector switches, or other types of control-circuit devices. Each

energy-isolating device must have a tag affixed to it. The second component, required in paragraph (c)(4)(ii) of the tags-plus system, is at least one additional safety measure. This additional measure provides an impediment (in additional to the energy-isolating device) to the energization or startup of the equipment being serviced, or the release of hazardous energy. Some examples of additional safety measures include, but are not limited to:

- Removing an isolating circuit element, such as removing a fuse;
- Blocking a control switch, including blocking a circuit breaker with clips;
- Opening an extra disconnecting switch;
- Using a blocking device, such as a tie wire on a valve handle;
- Blocking, blanking, or bleeding a line; including bolting a blank flange on a line;
- Removing a valve handle or wiring it in place; or
- Shutting a second valve (double-valve isolation).

As a last-resort option, an employer could choose to use an attendant as an additional safety measure. While this would not be a preferred method, this could be used should an employer not be able to identify an additional safety measure that would be feasible at that time. Phil Dovinh of Sound Testing, Inc., presented a long list of additional measures that he called "positive measures" in his testimony:

> When shipyard industry refers to lockout and tagout, we normally mean a positive measure of some kind is to be used, not only just to lockout or tagout, but also closing valves, removing handles, splash zoning, blanking, plugging, ballooning, stuffing with a rag, wedging, capping, drill, tap, plug, bandaging, securing manholes, closing doors and hatches, shutting portholes and ventilation ducts, tying ropes, duct-taping, guarding machinery, posting signs in confined space entry when hot work remains, reenergize, disconnect, pull the plug, tank cleaning, isolation, building containment, jerry rigging, hanging fire blankets, water blanketing, et cetera (Ex. 198, pp. 150–151).

While not endorsing all of the suggested "positive measures" listed by Mr. Dovinh as acceptable additional safety measures, OSHA appreciates the numerous ways that extra precautions can be taken during servicing operations. In addition, Sound Testing, Inc., confirmed that most employers are taking extra precautions, and are proactive in protecting their employees, including while they are performing servicing operations. Moreover, testimony from several commenters advocated taking an extra step, regardless of whether locks or tags were being used (Exs. 168, pp. 100–101; 198, pp. 39–40, 150–151; 199, p. 248). OSHA appreciates these comments, and believes that these additional provisions will not be burdensome for employers to implement.

A note [2] has been added to paragraph (c)(4) to explain that when the Navy ship's force maintains control of the machinery, equipment, or systems on a vessel and has implemented such additional measures it determines are necessary, the provisions of paragraph (c)(4)(ii) of this section do not apply, provided that the employer complies with the verification procedures in paragraph (g) of this section. Following the deenergization, isolation, and application of a lock or tag of any machinery, equipment, or system, the authorized employee must verify deenergization and isolation prior to beginning the servicing operation. In a group servicing situation, the employer's primary authorized employee must verify, and all of the employer's authorized employees must be given the option to verify, deenergization and isolation prior to beginning the servicing operation. This procedure will ensure that the employees who are not in control of the machinery, equipment, or system, are protected from the uncontrolled release of hazardous energy.

Paragraph (c)(5), which was carried over from proposed paragraph (b)(2)(iii), requires the employer to ensure that each energy-isolating device is designed to accept a lock whenever the machinery, equipment, or system undergoes extensive repairs, renovation, or modification, or whenever new machinery, equipment, or systems are installed. In the preamble to the general industry rule, OSHA explained that such modifications are most effectively and efficiently made as part of the normal equipment replacement or renovation cycle (72 FR 72452, 72494, Dec. 20, 2007).

American Seafood Company expressed concern over this requirement:

> It is also unlikely that [shipyards] will be able to insist that their customers perform a complete Hazardous Energy Control Plan and retrofit prior to getting serviced in a shipyard. * * * While all agree that as overhauls and replacements occurs it makes sense to upgrade to Lockable Disconnects, the scope and enormity of attempting to do so in anything other than a major refitting of a ship's system is financially daunting (Ex. 105.1).

However, Manitowoc Marine Group testified that they are already moving toward updating equipment during repairs:

> No, that is exactly what we do going forward. We have an electric superintendent. He has pretty much taken the job of the electrical technician for the new vessels, and he does the work and testing on some of the older vessels as well. And his main priority is to align ourselves with the up-to-date material and equipment, and so that we are in compliance going forward, for the vessel, for us, when we actually do the work (Ex. 168, pp. 119–120).

Atlantic Marine raised the following issue regarding shipyards that do not own the vessel under construction:

> It is typical for ownership of a vessel under construction to be the shipyard's until delivery of the vessel or some other contractually agreed-upon date. Many of these machines, equipment, and systems are owner furnished materials. How does an employer comply with this paragraph if the customer does not want a lockable system on the vessel? (Exs. 115.1; 118.1).

OSHA understands that, in some situations, shipyard employers do not control the equipment to the extent that they can have locks installed as the main energy-isolating device. The proposed rule, in paragraph § 1915.89(b)(2)(iii), made clear that this requirement would only apply to machines, equipment, and systems the shipyard employer owns. OSHA agrees that compliance with the requirement to install locks may not be possible when the shipyard employer does not own the machines, equipment, or systems, and is including this exception in paragraph (c)(5)(i) of this final rule. In addition, the Agency included a second exception, paragraph (c)(5)(ii), specifying that the requirement for installing or converting to lockable systems does not apply when a shipyard employer builds or services a vessel or vessel section according to customer specifications. Both Bath Iron Works and Northrop Grumman—Newport News testified that they must purchase materials and equipment for the vessels on which they perform construction. The vessel owners, who may not be subject to OSHA's authority, could specify that they do not want lockable systems. OSHA acknowledges this dilemma, and concludes that the two exceptions to installing locks are appropriate, especially since the tagout requirement will cover all systems that cannot be locked. By setting forth these exceptions in this final standard, shipyard employers will know when they are not required to modify energy-isolating devices to be lockable. In all other circumstances, however, the

[2] See rationale for this note in the summary and explanation above.

requirement in paragraph § 1915.89(c)(5) for lockable energy-isolating devices must be followed.

Paragraph (c)(6)—Full Employee Protection

Final paragraph (c)(6) clarifies the requirements when employers use a tags-plus system in lieu of a lock when a machine, piece of equipment, or system is capable of being locked. These provisions, proposed under § 1915.89(b)(3)(i) and (ii), are organized in this final rule to eliminate any misunderstanding of what OSHA requires for "full employee protection" under the control of hazardous energy.

Paragraph (c)(6)(i) requires that when a tag is affixed to an energy-isolating device instead of a lock, the tag must be attached at the same location that the lock would have been attached. As discussed, tags are prominent warning devices that provide protection by identifying the energy-isolating device as a source of potential danger. Improper placement of a tag could result in a serious injury.

Final paragraph (c)(6)(ii), which was proposed as paragraph (b)(3)(ii), requires an employer to demonstrate that a tags-plus system will provide a level of protection equivalent to that of a lock. Paragraph (c)(6)(ii)(A) requires that employers demonstrate full compliance with all tagout-related provisions of this subpart. Paragraph (c)(6)(ii)(B) requires that employers also implement such additional safety measures as are necessary to provide the equivalent safety available from using a lock.

The requirement for an additional safety measure(s) is a key element in demonstrating that the tagout program provides equivalent protection to a lockout program. In other words, at least one added safety measure must be used in addition to tagging the energy-isolating device to prevent unexpected reenergization. This independent, additional measure protects an employee from injury or death through the inadvertent activation of an energy-isolating device caused by human error, inadvertent contact, the loss or detachment of a tag, or from any other limitation of tags. As discussed above, additional safety measures might include, but are not limited to: Closing a second in-line valve (for example, double block and bleed); removing a valve handle to minimize the possibility that machines or equipment might be inadvertently energized or started; removing an additional isolating circuit element (for example, fuse); opening an extra disconnecting device (for example, disconnecting switch; circuit breaker); opening and then racking out a circuit breaker; grounding an electrical circuit if the grounding practice protects the employee should the tagged isolating device be activated; or locking, blocking, or barricading a controlling switch.

Any additional safety measure used must be integrated into an energy-control program through sound hazard-specific analyses on a case-by-case basis. For example, blocking a control switch as an additional safety measure to tagging an electrical disconnect may be an effective second layer of protection for preventing the mechanical activation of a machine, but this block may be an inadequate additional safety measure for the same machine's hydraulic or pneumatic hazardous-energy sources. In short, this additional control measure provides the authorized employee using a tagout program with a "second layer of protection" in the event the tagout device for the primary isolating device is defeated.

In paragraph (c)(6), a note [3] has been included to explain that when the Navy ship's force maintains control of the machinery, equipment, or systems on a vessel and has implemented such additional measures it determines are necessary, the provisions of paragraph (c)(6)(ii)(B) of this section do not apply, provided that the employer complies with the verification procedures in paragraph (g) of this section. Following the deenergization, isolation, and application of a lock or tag of any machinery, equipment, or system, the authorized employee must verify deenergization and isolation prior to beginning the servicing operation. In a group servicing situation, the employer's primary authorized employee must verify, and all of the employer's authorized employees must be given the option to verify, deenergization and isolation prior to beginning the servicing operation. This procedure will ensure that the employees who are not in control of the machinery, equipment, or system, are protected from the uncontrolled release of hazardous energy.

Paragraph (c)(7)—Lockout/Tags-Plus Coordination

Paragraph (e)(3)(ii)(C) of the proposal assigned responsibility to an authorized employee to coordinate affected work forces and ensure continuity of protection in a group lockout/tags-plus situation (that is, when servicing is performed by a crew, craft, department, or other group). During the comment period and at the public hearings, OSHA learned that shipyard employers use different, more comprehensive approaches such as a tiered approach, systems experts, or databases to provide coordination in extremely complex shipboard environments. iWorkWise stated:

> What a tiered approach to me is, the more complicated it gets, maybe the more qualified or the more people that need to be involved. So if I am going to lock out a pump and the pump has one 220 breaker, that is pretty simple, and it says Pump 1. You know, almost anyone can be trained to do that. But when you start getting back into the engine rooms and the control panels of these places, there * * * [are] going to have to be multiple people involved or a system expert, I should say, and when you are pulling in contractors and shipyard employees, there has to be a lot of coordination. So I think of it almost like the incident command system (Ex. 168, pp. 416–417).

Bath Iron Works uses a tiered approach when using a tag system:

> Every one of the tags, Joe, once a system's expert decides to tagout a system, we use a three-part carbon copy, so each tag has multiple copies, if you will. One goes to the supervisor, one goes into a log box that is transferred over to an administrator, who logs in all those tags, whatever information is on it, date, time, specific reason why we are tagging out, puts onto a log sheet that is reviewed at the operation level. The reverse is the same, when you go to take them off (Ex. 168, pp. 276–277).

When questioned about their log system, Bath Iron Works stated:

> The tag itself has a carbon copy, it is snapped off, put into a box. That box is sent up to an administrative clerk who enters all that information into a database. So, anytime, at that point, if someone has to get into that system or either secure it or non-secure it, has to go back to the supervisor, and they have logs of who has got the thing tagged out, and follow through that way (Ex. 168, p. 277).

In addition, a National Shipbuilding Research Program study (NSRP Study (Ex. 61)) entitled, "Review of Current and Best Practices for Hazardous Energy Control (Tagout) in Shipyards, June 30, 2004," which advocates a systems-expert approach, notes that a general industry-type lockout/tags-plus program does not work in shipyard environments because:

- The means of isolation are typically complex involving many points of isolation and types of energy. The points of isolation may require modification during the course of the work (roll back or roll forward).
- The employees who perform the work on a particular system are unlikely to have the capability of identifying all

[3] See rationale for this note in the summary and explanation above.

energy sources, either initially based on engineering drawings and schematics or physically on the ship.

• The employees who perform the work on a particular system are unlikely to have the capability of coordinating the interface between multiple jobs that have overlapping points of isolation (Ex. 61).

The NSRP Study also stated:

> Due to the complexity of shipboard systems, system experts are relied upon to identify and isolate systems to permit the safe work by non-system expert employees. * * * This process of using system experts is similar to the use of competent persons for a variety of other hazards (Ex. 61).

OSHA finds these comments and testimony persuasive, and concluded that employers must be given a different, more comprehensive method to coordinate servicing in complex conditions. Based on the information in the comments above, the findings of the NSRP Study, and OSHA's own expertise, the Agency added a requirement for a lockout/tags-plus coordinator and log in two situations: (1) When multiple employees service the same machinery, equipment, or system at the same time on vessels, in vessel sections, or at landside facilities; and (2) when employees service multiple machinery, equipment, or systems at the same time on the same vessel or vessel section.

Final paragraph (c)(7)(i)(A) requires the coordination of all lockout/tags-plus applications when employees are servicing multiple machinery, equipment, or systems at the same time on vessels and in vessel sections. This requirement for a lockout/tags-plus coordinator (hereafter referred to as "coordinator) applies when employees, whether contract or host employees, are performing separate, but concurrent, servicing operations on different machinery, equipment, or systems. Because of the complexity of machinery, equipment, and systems used in vessels and vessel sections, as well as the existence of shared and redundant energy sources, the Agency concluded that a requirement for coordination would heighten employee protection. For example, a generator aboard a U.S. Navy combatant vessel may supply power to the vessel's weapons system and to the lighting system for a particular part of a vessel. If the generator is secured for the servicing of both these systems, and the employee servicing the weapons system restores power to the generator for testing or troubleshooting, an employee servicing the lighting system at the same time would be at risk of electrocution. The presence of a coordinator, who would oversee removal of the lockout/tags-plus system for the two operations, would eliminate such a possibility.

Paragraph (c)(7)(i)(A) does not require that a coordinator be used when servicing multiple machinery, equipment, or systems at the same time at landside facilities. The Agency concluded that machinery, equipment, and systems at landside facilities do not have the same complexities and redundant or shared energy sources as those aboard vessels and in vessel sections. Further, machinery, equipment, or systems at landside locations often have their own individual disconnect or cutoff mechanisms that completely isolate them from other machinery, equipment, or systems. In such cases, a coordinator is not necessary because hazardous energy to a machine, piece of equipment, or system can be controlled through a single source that will not affect other machinery, equipment, or systems.

Paragraph (c)(7)(i)(B) requires a coordinator when employees, whether employed by the host employer or a contract employer, are performing multiple servicing operations on the same machinery, equipment, or systems at the same time on vessels, in vessel sections, and at landside facilities. Such a situation might arise during landside servicing operations, for example, when an electrician secures the power on a portable crane so that a machinist can inspect the crane's wire rope while ironworkers repair the crane's structural members. Another situation, while servicing is being performed on a vessel, could occur when two or more sets of employees work on high-pressure steam lines. In such a situation, the energy source would be secured, possibly using a single blank, in order for the piping to be repaired in one location, such as the forward location of a machinery space, while additional repairs are being performed in another separate location (*i.e.*, aft location of the machinery space two levels below the forward location). By complying with the requirement to have a coordinator, who would be aware of the status of each separate servicing operation, the employer can avoid situations when an employee servicing one part of a system is injured because another employee working on another part of the system, without knowledge of the first employee, restores power to that system.

As defined in § 1915.80, the lockout/tags-plus coordinator is an employee designated by the employer to coordinate and oversee all lockout/tags-plus applications for (a) multiple servicing operations on the same machinery, equipment, or system at the same time, whether on vessels, in vessel sections, or at landside facilities, and (b) servicing operations on multiple machinery, equipment, or systems on the same vessel or vessel section at the same time (§ 1915.80(b)(15)). Paragraph (c)(7)(ii) requires that the coordination process include both the lockout/tags-plus coordinator and a lockout/tags-plus log. In addition, the lockout/tags-plus log must be specific to each vessel, vessel section, or landside work area. The specific requirements for the lockout/tags-plus log are discussed below in paragraph (c)(7)(iv).

OSHA has not specified the number of servicing operations that must be taking place or the number of employees performing the servicing before a coordinator must be designated, nor does the Agency specify that the coordinator may only be responsible for the lockout/tags-plus coordination and log. By not including such specifications, OSHA is giving employers the flexibility to make decisions based on the need in their facilities to ensure employee protection. OSHA believes employers are in the best position to assess this need. However, employers must base this application on the complexity of vessels under construction or repair. For example, a large vessel that is undergoing extensive repairs and upgrades, with multiple contract employers and multiple servicing operations, will likely have one employee with the sole responsibility to be the lockout/tags-plus coordinator for that particular vessel. On the other hand, if an employer has two smaller vessels on adjacent piers with minimal servicing operations, that employer may choose to either have one coordinator for both vessels, or have an employee on each vessel with the collateral duty to serve as the lockout/tags-plus coordinator.

In paragraphs (c)(7)(iii)(A), (B), and (C), OSHA specified several responsibilities of the lockout/tags-plus coordinator. These three provisions require, respectively, the coordinator to oversee and approve: The application of each lockout and tags-plus system; the verification of hazardous-energy isolation prior to any servicing performed on any machinery, equipment, or system; and the removal of each lockout or tags-plus system. This requirement ensures that one coordinator is responsible for approving these three phases of the lockout/tags-plus process.

Paragraphs (c)(7)(iii)(A), (B), and (C) requires the coordinator to oversee and approve the application of each lockout/

tags-plus system, the verification of hazardous energy isolation before servicing begins, and the removal of each lockout/tags-plus system. This oversight and approval authority will require the coordinator to work closely with the authorized person for each lockout/tags-plus application. The coordinator will review the authorized person's plan and either approve or deny the request. Once the coordinator approves a request, the authorized person, in consultation with the coordinator, will apply the lock or tags-plus system, verify isolation of the hazardous energy, and remove the lockout/tags-plus system.

In addition to coordinating all lockout/tags-plus applications, the coordinator must maintain the lockout/tags-plus log. In paragraph (c)(7)(iv), OSHA specified six items that the coordinator must maintain in the log, including: The location and the type of the machinery, equipment, or system (paragraphs (c)(7)(iv)(A) and (B)); the name of the authorized employee applying the lockout/tag-plus system (paragraph (c)(7)(iv)(C)); the date that the lockout/tags-plus system was applied (paragraph (c)(7)(iv)(D)); the name of the authorized person removing the lock or tags-plus system (paragraph (c)(7)(iv)(E)); and the date that the lockout/tags-plus system was removed (c)(7)(iv)(F)). This information is needed so that the lockout/tags-plus coordinator can effectively oversee all lockout/tags-plus applications prior to servicing operations to ensure the safety of each authorized and affected employee. Inclusion of this information in the log will permit the coordinator to know, at all times, which systems are under lockout/tags-plus and which authorized person is responsible for each lockout/tags-plus application.

As stated previously, the Agency is aware of cases in which the U.S. Navy will designate its ship's force to coordinate and/or apply the lock or tags-plus systems on Navy vessels being serviced in a private-sector shipyard, and also to maintain control of the lockout/tags-plus log, rather than a shipyard-assigned employee. In those instances, OSHA believes that having a Navy-designated coordinator and authorized person who applies the lockout/tags-plus systems fulfills certain requirements as set forth in "Notes" in the applicable sections of the regulatory text and achieves the level of protection required by this section. In paragraph (c)(7), a note [4] has been included to explain that when the Navy ship's force is the lockout/tags-plus coordinator and maintains control of the lockout/tags-plus log, the employer will be in compliance with paragraph (c)(7) of this section when coordination occurs between the ship's force and the employer to ensure that applicable lockout/tags-plus procedures are followed and documented. Here, the term "employer" refers to the host employer, any of its contractors, or any employer contracted directly by the military. In these cases, all employers performing servicing work must coordinate all aspects of the lockout/tags-plus program with the Navy ship's force. The host employer should perform this coordination for all host employer personnel and for contractors and other personnel hired by the host employer.

Paragraph (d)—Lockout/Tags-Plus Written Procedures

Paragraph (d), Lockout/tags-plus written procedures, is a departure from the proposal (§ 1915.89(b)(4)), which was based on the general industry standard. Changes from the proposal primarily involve the recognition that servicing machinery, equipment, and systems in the shipyard environment often entails complexities that require a different approach regarding documentation of procedures.

Paragraph (d)(1) requires that employers establish and implement written energy-control procedures to prevent energization or startup, or the release of hazardous energy, during the servicing of machinery, equipment, or systems. This provision was proposed as paragraph (b)(4)(i). The written procedures must include all information employees must know in order to control hazardous energy during servicing.

OSHA received several comments requesting clarification whether OSHA was proposing to require a written procedure for every machine, piece of equipment, or system. Accordingly, a group of commenters, including Lake Union Drydock Company, American Seafoods Company, Puget Sound Shipbuilders, Dakota Creek Industries, North Pacific Fishing Vessel Owners Association, and iWorkWise, inquired: "How are they to require or generate such written procedures for all equipment when as shipyards they will not work on most of it, and they have no control over the existing equipment installations?" (Exs. 101.1; 105.1; 124; 126; 128; 130.1). Prowler LLC and Ocean Prowler LLC commented: "Will [ship]yards have to write procedures for every piece of equipment they work on?" (Ex. 100).

As OSHA stated in the proposal the standard does not require separate procedures to be written for each and every piece of equipment (72 FR 72452, 72493, Dec. 20, 2007). Similar machines and/or equipment (such as those using the same type and magnitude of energy) that have the same or similar types of controls can be covered with a single procedure. For example, employers may develop one set of procedures for all steering gear systems, ship's lighting systems, ship's refrigeration systems, fire-suppression systems, grinders, or lathes if the type and magnitude of energy and type of controls are the same or similar for the particular systems, and as long as the procedure satisfactorily addresses hazards and the steps that must be taken to control these hazards. However, if unique conditions are present, such as multiple energy sources or different means of connection, then the employer must develop specific energy-control procedures to address these conditions to ensure that employees are protected. For example, if a system requires that a unique shutdown sequence be followed, specific energy-control procedures will be required for that system.

OSHA added a note to paragraph (d)(1), specifically addressing this issue, which explains that employers only need to develop a single procedure for a group of similar machines, equipment, and systems if the machines, equipment, or systems have the same type and magnitude of energy and the same or similar type of controls, and if a single procedure can satisfactorily address the hazards and the steps to be taken. Under those circumstances, a separate procedure need not be written for each and every machine or piece of equipment.

Prowler LLC and Ocean Prowler LLC asked the following question: "If the ship has not clearly labeled their equipment or disconnects, will the [ship] yard then have to write a procedure prior to working on it as they are not 'readily identifiable'?" (Ex. 100). OSHA believes that whether a vessel undergoing repair is in a shipyard for a few weeks, a few months, or a few years, it is the responsibility of the shipyard employer to develop procedures that will cover all machinery, equipment, or systems on which it will perform servicing operations. OSHA understands that vessels typically do not return for repairs to the shipyards in which they were built, and that some vessels, particularly foreign-built vessels, may have components that are difficult to identify. However, the release of hazardous energy is a serious hazard, and OSHA concludes that

[4] See rationale for this note in the summary and explanation above.

employers must not exclude any machinery, equipment, or systems from their lockout/tags-plus programs. In this regard, it is the employer's responsibility to correctly identify all energy sources and the means to control them. When the shipyard employer cannot identify and control all energy sources, the entire systems may need to be shut down.

Manitowoc Marine Group described how its employees assist in this process:

> What we have tried to do is we have tried to somewhat model the general industry to a point. We will identify the energy sources as best we can with the crew. We usually have the crew members with us, walking through the processes. And what we try to do with this is, we identify a "boat boss," for lack of better phrase. He will actually shut the entire systems down, because in most cases, we are not working with the systems. We are doing physical repair of the vessel. All of these complex systems and beltings are all locked out physically, from pneumatics, hydraulics, whatever the case may be, identified, and placement of the locks (Ex. 168, pp. 110–111).

Paragraph (d)(1)(i) requires that the written energy control procedures include a clear and specific outline of the scope and purpose of the lockout/tags-plus procedures. As proposed (proposed paragraph (b)(4)(ii)), this provision would have required the procedure to have an outline of the scope, purpose, authorization, rules, techniques used to control hazardous energy, and the means to enforce compliance. After reviewing accident reports, comments, and testimony on conditions in shipyard employment, OSHA concluded that requiring documentation of the authorization and rules regarding the control of hazardous energy is not necessary or appropriate (see preamble discussion above). However, because the consequences of the release of hazardous energy can be serious, the Agency included the provision requiring a means of enforcement in paragraph (d)(1)(ii) of this final rule; this paragraph addresses the employer's enforcement responsibility. This requirement does not specify how an employer must enforce employee compliance with the lockout/tags-plus program and procedures, only that the employer must do so. OSHA made this requirement performance-based, allowing employers to establish disciplinary programs that will be effective under the unique conditions of each shipyard. OSHA believes this requirement will ensure that employers and employees understand the importance of following the established lockout/tags-plus procedures. At the same time, this provision will provide employers with flexibility to tailor their enforcement programs to their shipyard conditions.

Paragraph (d)(1)(iii) requires employers to provide the steps employees must follow when using each of the procedures specified by paragraphs (d)(1)(iii)(A) through (I). OSHA included paragraphs (A) through (E) in the proposal. These paragraphs specify, respectively, the following procedures: Preparations for shutting down and isolating the machinery, equipment, or system to be serviced in accordance with paragraph (e) of this section; application of the lockout/tags-plus system in accordance with paragraph (f) of this section; verification of isolation in accordance with paragraph (g); testing the machinery, equipment, or system in accordance with paragraph (h); and removing lockout/tags-plus systems in accordance with paragraph (i).

In addition to these procedures, OSHA added the procedures specified by paragraphs (d)(1)(iii)(F) through (I) to the final standard. Accordingly, employers are to provide the steps employees must follow when using each of these procedures. Paragraphs (F) through (I) specify: Starting up the machinery, equipment, or system in accordance with paragraph (j) of this section; applying lockout/tags-plus systems in group servicing operations in accordance with paragraph (k); addressing multi-employer worksites involved in servicing machinery, equipment, or systems in accordance with paragraph (l); and addressing shift or personnel changes during servicing operations in accordance with paragraph (m).

During the Washington, DC public hearing, Northrop Grumman—Newport News emphasized the benefit of training employees on their procedures, further illustrating how important a single set of standards can be:

> They [land-side employees] do go on-board and often the workload shifts, we will bring work into the shops and we will work in the shops, and we will take it back and reinstall it, so there is some movement back and forth between shop and ship, so it's not like there is never the twain shall meet. Furthermore, as there has been integration, for example, Newport News has been integrated with our Gulf Coast yards, and we are moving people back and forth between the Gulf yards and Newport News, and we think it is important, if we can get there, to have a consistent set of standard or standards that would apply across the board, so I don't have to retrain Gulf employees in my procedures and/or vice versa (Ex. 168, pp. 264–265).

OSHA agrees that, by establishing procedures that include all of the steps necessary for identifying each source of hazardous energy, applying the lockout/tags-plus system, releasing the energy, testing the equipment, removing the lockout/tags-plus system, and starting up the machinery, equipment, or system, the employer will have a comprehensive and easy-to-administer lockout/tags-plus program. In addition, employers will be able to establish the basic provisions of a lockout/tags-plus program throughout their facilities and with the entire workforce, which OSHA believes will enable employees to better protect themselves.

OSHA acknowledges that circumstances may arise when an employer must develop specific procedures that apply to only one work situation. Manitowoc Marine Group testified on a recent procedure it developed:

> We just recently developed a lockout procedure specifically for a self-unloading belt system, because of a potential that we did discover. But that is only as good as that system for that vessel. And that is where I guess where we struggle the most is the different types of exotic systems that come in here, identifying and developing the procedures. It will be wonderful if we identify all of these vessels and have all these procedures in place, and they would come back year after year. But as you well know, those things change season to season (Ex. 168, p. 111).

Paragraph (d)(2) provides an exception to the requirement to have written control procedures for particular machinery, equipment, and systems. In the proposal, OSHA specified the conditions limiting application of the exceptions in a note to paragraph (b)(4)(i). The note was lengthy, detailed, and composed of small print. To promote easy access to, and improve understanding of, these exceptions, OSHA included them in the text of paragraph (d)(2) of this final standard. Under these exceptions, employers need not have a written procedure for equipment when all of the following conditions exist: (1) The machine, equipment, or system has no potential for the release or re-accumulation of hazardous energy after shutting down or restoring energy; (2) the machine, equipment, or system has a single energy source that can be readily identified and isolated; (3) the isolation and locking out of the energy source will completely deenergize and deactivate the machine, equipment, or system, with no potential for re-accumulation of energy; (4) the machine, equipment, or system is isolated from that energy source and secured during servicing; (5) a single lock will achieve a locked-out condition; (6) the lock is under the

exclusive control of the authorized employee performing the servicing; (7) the servicing does not create hazards for other employees; and (8) the employer, in utilizing this exception, has had no accidents involving the activation or reenergization of this type of machinery, equipment, or system during servicing. The exception is the same as the proposed exception, and OSHA continues to believe it is warranted as there is little or no risk to employees when applied correctly. To require a written procedure under these conditions would divert resources from other, high-risk, situations. OSHA believes that this exception will primarily apply to landside facilities, not ship's machinery, equipment, or systems, due to the latter's complex nature.

Paragraphs (e)—(j) Procedures for Lockout/Tags-Plus

These paragraphs establish procedures that authorized employees must follow when applying energy controls. The energy-control procedures must include procedures for:

- Shutdown and isolation (paragraph (e));
- Application of lockout/tags-plus systems (paragraph (f));
- Verification of deenergization and isolation (paragraph (g));
- Testing (paragraph (h));
- Removing lockout/tags-plus systems (paragraph (i)); and
- Startup (paragraph (j)).

Paragraph (e)—Procedures for Shutdown and Isolation

Paragraph (e) establishes the provisions for the safe shutdown of, and the isolation of hazardous energy to, machinery, equipment, or systems. The procedures for shutdown and isolation were proposed as §§ 1915.89(c)(1)–(c)(3). Final paragraph (e)(1)(i) requires that, before any authorized employee shuts down any machinery, equipment, or system, the authorized employee must have knowledge of the source, type, and magnitude of the hazards associated with energization or startup of the machinery, equipment, or system; the hazards associated with the release of hazardous energy; and the means to control those hazards. American Seafoods Company stated: "The employee(s) performing the work typically [do] not have the expertise to determine all types and magnitudes of hazardous energy" (Ex. 105.1). OSHA understands that the machinery, equipment, and systems on vessels and vessel sections are complex and sometimes have multiple sources of energy. Under such conditions, the release of hazardous energy presents a grave risk to employees. This risk is the primary reason why OSHA retained the training requirements in paragraphs (o)(4)(i) and (o)(4)(ii): All authorized employees must have training so they know the types of energy sources and the magnitude of the energy present at the worksite. In addition, all authorized employees must know the means and methods necessary for effective isolation and control of hazardous energy. OSHA believes that authorized employees must have this knowledge prior to servicing operations to protect themselves and other employees. Therefore, OSHA is retaining this language for the final standard.

Paragraph (e)(1)(ii) of the final rule retains the proposed requirement (proposed § 1915.89(b)(9)) to notify affected employees when machinery, equipment, or systems are being shut down and a lockout/tags-plus system is being applied. OSHA has moved this requirement into the procedures for shutdown and isolation to emphasize the importance of this step in the process of safely shutting down and isolating machinery, equipment, or systems that are going to be serviced. OSHA has concluded that notification is necessary to protect affected employees who may not be aware that shutdown will take place and that the machine, equipment, or system they normally work on will be taken out of service for a period of time. When affected employees [5] are not aware of the shutdown condition, they may take actions that are not consistent with safe practices, such as attempting to restore power to the system. For example, some systems may run the length of the vessel and pass through several decks, or span several spaces within the vessel. Affected employees may be working on a system in various locations, or they may be working near where the servicing is taking place. These affected employees must be notified of the lockout/tags-plus application to ensure that they are aware that they must not energize or start up the machinery, equipment, or system because it is being serviced, that they must not remove or disable the lockout/tags-plus application, and that they cannot use the machinery, equipment, or system to perform their regular job until after they are notified that the lockout/tags-plus application has been removed. Without such notification, affected employees may inadvertently energize or start a piece of machinery, equipment, or system, thus endangering any authorized employee performing servicing.

Paragraph (e)(2) requires that the machinery, equipment, or system be shut down according to the written procedures that the employer established pursuant to paragraph (d). This action is the starting point for all subsequent steps necessary to put the machinery, equipment, or system in a state that will allow employees to work on or near it safely. As discussed above, the employer must establish and implement procedures for all machinery, equipment, or systems. The authorized employee must follow these procedures. Paragraph (e)(3) requires that an orderly shutdown be used to prevent exposing any employee to additional or increased hazards resulting from the release of energy. Paragraphs (e)(2) and (e)(3) were proposed as paragraph (c)(2). OSHA received no comments on the proposed requirement to shut down machinery, equipment, or systems in an orderly manner. OSHA is therefore retaining these critical first steps in the shutdown process in this final rule.

Paragraph (e)(4), which was proposed as paragraph (c)(5), requires the employer to ensure that the authorized employee relieves, disconnects, restrains, or otherwise renders safe all potentially hazardous energy that is connected to the machinery, equipment, or system that will be serviced. This requirement emphasizes that the authorized employee must ensure that every possible source of energy to the machinery, equipment, or system being serviced is deenergized. Thus if a system is deactivated but stored, residual, or otherwise hazardous energy remains, the authorized employee must relieve or disconnect that energy to fully protect the employees who will be servicing the system. Paragraph (e)(1)(i) is, of course, a prerequisite to paragraph (e)(4), since the authorized employee must fully understand all sources of potential energy associated with the machinery, equipment, or system that will be serviced. No comments were received on this provision, and OSHA retained it in the final rule.

A note [6] has been added to paragraph (e) describing that, when a Navy ship's force shuts down machinery, equipment, or systems and relieves, disconnects, restrains, or otherwise renders safe all potentially hazardous energy connected to the machinery,

[5] As a reminder, affected employees are those employees who either normally operate the machinery, equipment, or system that is being serviced, or who work in the area where the servicing is taking place.

[6] See rationale for this note at the summary and explanation of the note to paragraph (c)(7), above.

equipment, or system, the employer will be in compliance with paragraph (e) when the employer's authorized employee verifies that the machinery, equipment, or system being serviced has been properly shutdown, isolated, and deenergized. Here, the term "employer" refers to the host employer, any of its contractors, or any employer contracted directly by the military.

Paragraph (f)—Procedures for Applying Lockout/Tags-Plus systems

Once the machinery, equipment, or system has been shutdown, the next step is to apply the lock or tags-plus system. These procedures were proposed in § 1915.89(c)(4). The lock or tags-plus system (which is a tag attached to the energy-isolating device and an additional safety measure) must be located and applied in such a manner as to isolate the machinery, equipment, or systems from all energy source(s).

Paragraph (f)(1) requires that only the authorized employee apply the lock or tags-plus system. This provision was proposed as paragraph (c)(4)(i). Paragraph (f)(2), proposed as paragraph (c)(4)(ii), requires that when a lock is used, the authorized employee must affix the lock so that the energy-isolating device is held in a safe or off position. Paragraphs (f)(3) and (f)(4), which were proposed as paragraphs (c)(4)(iii)(A) and (B), specify the requirements for the use of tags. When a tags-plus system is used, tags must be affixed by the authorized employee directly to the energy-isolating device. The placement of these tags must clearly indicate that the removal of the device from the safe or off position is prohibited. When a tag cannot be affixed directly to the energy-isolating device, it must be located as close as possible to the device in a safe and obvious position. These requirements also are included in the training of both affected and authorized employees, as discussed in paragraph (o) below. OSHA did not receive any comments opposing the requirements in paragraphs (f)(3) and (f)(4). OSHA is retaining the language as proposed for this final standard because these steps constitute safe practices that are common and essential to all effective lockout/tags-plus programs.

Paragraph (f)(5), proposed as paragraph (c)(3), contains the requirements for energy-isolating devices. The employer is required to ensure that these devices control the energy to the machinery, equipment, or systems, and ensure that the device is effective in isolating the machinery, equipment, or system from all potentially hazardous-energy sources. The purpose of lockout/tags-plus is to eliminate or control hazardous energy, and the devices used to do so are critical to the success of the employer's program. Hazardous energy includes stored or residual energy. This type of energy presents a unique hazard to employees when, for example, the energy becomes trapped in a system or develops from gravity exerting pressure on spring-loaded components. As stated in the preamble to the general industry standard, such stored or residual energy cannot be turned on or off; it must be dissipated or controlled (54 FR 36677, Sept. 1, 1989). Nevertheless, there are ways to render this energy harmless. To control this potentially hazardous energy, the authorized employee may need to use blanks, blocks, bleed valves, or other physical components. Finding, and rendering safe, all potentially hazardous energy sources with appropriate energy-isolating devices and additional safety measures is essential to the success of all lockout/tags-plus programs. No comments were received on this provision; therefore, OSHA is retaining the language in this final standard.

As stated above there are instances when the Navy ship's force maintains control of the lockout/tags-plus program. For these instances, OSHA has included a note [7] to paragraph (f) that explains that when the Navy ship's force applies the lock or tag, instead of the employer's authorized employee, the employer will be in compliance with paragraph (f) of this section when the employer's authorized employee verifies the application of the lockout/tags-plus system or device. Here, the term "employer" refers to the host employer, any of its contractors, or any employer contracted directly by the Navy.

Paragraph (g)—Procedures for Verification of Deenergization and Isolation

Paragraph (g)(1), which was proposed as paragraph (c)(6), requires that, after the application of locks or a tags-plus system, the authorized employee, or the primary authorized employee in a group lockout/tags-plus application, must verify that the machinery, equipment, or system is deenergized, and that the hazardous energy has been isolated, before starting the servicing operation. Northrop Grumman–Newport News agreed with this provision, stating that this was currently a step of their lockout/tagout program. They indicated that their "Employees are required to know how to check for residual or potential energy when first entering into equipment or systems isolated as a secondary check following the expert based assessment and deenergization of systems" (Ex. 120.1). In addition, Foss Maritime confirmed that their procedures include provisions to ensure that all energy has been released: "I think the most important [action] that you can do is bleed the system out to make sure there is no energy left" (Ex. 198, p. 27). The U.S. Navy recommended that OSHA "delete the words 'Following the application of lockout or tagout devices to energy-isolating devices.' This leaves the key requirement that all stored energy must be relieved, but without a required order of performance which is not always possible" (Ex. 132.2). The Navy gave no examples of when verification cannot be conducted. OSHA disagrees with this commenter and believes that verification is always possible, needs to take place after the lock or tags-plus system has been applied to the energy-isolating device, and is necessary to ensure deenergization. Therefore, OSHA is retaining this provision in the final rule. OSHA added clarifying language that addresses group lockout/tags-plus applications (see § 1915.89(k)). For those instances when there is a group lockout/tags-plus application occurring, the primary authorized employee, rather than all of the authorized employees working in the group application, would verify that the machinery, equipment, or systems have been deenergized and all energy sources isolated.

Paragraph (g)(2) retains and expands the proposed requirement (proposed § 1915.89(c)(5)(ii)) to continue verification of isolation. The proposed rule specified that, if there is a possibility of reaccumulation of stored energy, verification must be continued until servicing is completed or the possibility of reaccumulation no longer exists. The final rule expands the verification of isolation requirement so it is continued throughout the servicing operation. Commenters, including Foss Maritime, said they already require employees to verify that the system continues to be deenergized and isolated prior to starting servicing on any machinery, equipment, or system (Ex. 198, p. 27). OSHA believes this good industry practice needs to be part of employers' lockout/tags-plus program and procedures. Continuous verification of isolation will ensure the ongoing protection of employees, particularly when a servicing operation cannot be accomplished quickly or during a single workshift. As stated above, OSHA included clarifying language that

[7] See rationale for this note in the summary and explanation above.

addresses group lockout/tags-plus applications. For those instances when there is a group lockout/tags-plus application occurring, the primary authorized employee would continue the verification of deenergization and isolation during servicing operations.

For this final rule, OSHA added paragraph (g)(3) to ensure that each employee working in a group lockout/tags-plus servicing operation is offered the option to verify the deenergization and isolation of machinery, equipment, or systems. Each employee will have this option even when the primary authorized employee verifies isolation for the group. This requirement has been OSHA's policy for general industry lockout/tagout and for lockout/tagout in the electric power generation industry. See *www.osha.gov/SLTC/etools/electric_power/hazardous_energy_control_loto.html* and *www.osha.gov/pls/oshaweb/owadisp.show_document?_table=PREAMBLES&p_id=1149*. Paragraph (g)(3) simply codifies, in subpart F, that longstanding policy as an additional protective element for authorized employees servicing machines, equipment, or systems in a group lockout/tags-plus situation. The option for all authorized employees to verify also applies when the Navy ship's force controls the application of lockout/tags-plus systems. In 1996, a shipyard employee was working on a Navy vessel. It was the Navy's policy at the time that military personnel, not the shipyard's authorized person, apply all tags. In this case, the authorized person did not verify isolation of a 480-volt electrical cabinet prior to beginning work. As a result, the disconnecting means were not properly identified, and the circuits in the cabinet had not been tested. The employee came into contact with energized parts in the cabinet, was electrocuted, and died (Ex. 38). This death could have been avoided had the shipyard's authorized person verified the isolation.

Paragraph (h)—Procedures for Testing

The standard allows for the temporary removal of locks or tags-plus systems and the reenergization of equipment during the limited time when power is needed for testing the equipment or positioning of its components. The procedures were proposed in § 1915.89(e)(1)(i) through (v). The restart operation must be conducted by the authorized employee in accordance with the following sequence of steps to ensure employees' safety when they transition equipment from a deenergized to an energized condition, and then return to a deenergized condition: (1) Clear the work area of tools and materials; (2) remove nonessential employees from the work area; (3) remove the lock or tags-plus system in accordance with the required removal procedures (see paragraph (i) of this section); (4) energize the machinery, equipment, or system and proceed with testing or positioning; and (5) when testing or positioning is completed, deenergize and shut down the machinery, equipment, or system, and reapply the locks or tags-plus systems in accordance with the required control application procedures (see paragraphs (e) through (h) of this section). Machine guarding or other safety equipment need not be replaced before energizing the system for testing, unless the employer establishes such a requirement in the lockout/tags-plus program and procedures. However, when servicing is completed, the safety equipment, including restraints and guarding, must be fully restored prior to reenergization.

OSHA added a note [8] to paragraph (h), similar to the notes for paragraphs (c), (e), and (f), that clarifies the employer's role when the Navy ship's force serves as the lockout/tags-plus coordinator, performs the testing, and maintains control over the lockout/tags-plus applications. During testing, the employer will be in compliance with paragraph (h) when the employer's authorized employee acknowledges to the lockout/tags-plus coordinator that the employer's personnel and tools are clear and the machinery, equipment, or system being serviced is ready for testing; and upon completion of the testing, verifies the reapplication of the lockout/tags-plus systems. Here, the term "employer" refers to the host employer, any of its contractors, or any employer contracted directly by the military.

OSHA received no comments on any of the provisions in paragraphs (h)(1) through (h)(5), which the Agency believes are necessary for the safe testing of machinery, equipment, and systems. These provisions permit the employer to conduct interim testing and still protect employees by ensuring that the procedures are orderly and complete. Therefore, OSHA is retaining these provisions in paragraphs (h)(1) through (h)(5) in this final standard.

Paragraph (i)—Procedures for Removal of Lockout and Tags-Plus Systems

Paragraph (i) establishes the procedures that authorized employees must follow when removing locks or tags-plus systems (*i.e.*, when the equipment is being released from lockout or tagout status). These procedures will assist the employer in returning the machinery, equipment, or system to an effective operating condition without exposing employees to the risk of injury while the lockout/tag-plus system is being removed or when the machinery, equipment, or system is reenergized. With the exception of minor editorial changes, the provisions in final paragraph (i) are the same as proposed paragraph (d).

Paragraph (i)(1) requires the employer to ensure that, before the lock or tags-plus system is removed and energy restored to the machinery, equipment, or system, the authorized employee takes three specific steps. The first step, set forth in paragraph (i)(1)(i), requires the authorized employee to notify all other authorized and affected employees in the work area that the lockout/tags-plus system will be removed. This provision was proposed as paragraph (d)(2)(ii), which required that the affected and authorized employees be notified after the lockout or tagout devices were removed but prior to starting the equipment. OSHA modified the language in the final standard to simplify the requirements and to clarify that the notification must take place prior to the lock or tags-plus system being removed.

Paragraph (i)(1)(ii), the second step, requires the authorized employee to ensure that all employees in the work area have been safely positioned or removed. This step is critical to guaranteeing that these employees are not harmed when the equipment is reenergized. Examples of methods employers may use to alert employees that they need to either be safely positioned or leave the work area may include conducting visual inspections, or using buzzers, bells, alarms, or whistles.

The final step, set forth in paragraph (i)(1)(iii), requires the authorized employee to inspect the work area to ensure that nonessential items have been removed and that the equipment components are operationally intact. A visual inspection may be sufficient to meet this requirement; however, the employer may choose to use a checklist, depending on the complexity of the equipment.

Paragraph (i)(2), proposed as (d)(3), requires that the lock or tags-plus system be removed by the authorized employee who applied it. This requirement ensures that the authorized employee, who is in direct control of the lockout/tags-plus device, and who also is exposed to potential injury while

[8] See rationale for this note in the summary and explanation above. See rationale for this note at the summary and explanation of the note to paragraph (c)(7), above.

servicing operations are in progress, remains in full operational control of the machinery, equipment, or system. Ensuring that the authorized employee who applied the device is the only employee permitted to remove it emphasizes the importance of the authorized employee and the employer's lockout/tags-plus program. Further, this provision will help prevent other employees from removing the device, either intentionally or accidentally.

Paragraph (i)(3) specifies that when the authorized employee who applied the lockout/tags-plus system is not available to remove it, the lockout/tags-plus system may be removed by another employee who is an authorized employee and is working under the direction of the employer. However, the employer must take specific actions prior to removal of the system by another authorized employee. As stated in the proposal, and now in paragraph (i)(3) of this final standard, the employer must develop and incorporate specific procedures and training in the lockout/tags-plus program that address removal of the system by another authorized employee. In addition, the employer must demonstrate that the procedures provide a level of safety that is equivalent to removal by the initial authorized employee.

Paragraphs (i)(3)(i) through (iii) establish the sequence of events that must take place prior to the removal of the lockout/tags-plus system by another authorized employee. As required in (i)(3)(i), the employer must first verify that the authorized employee who applied the lockout/tags-plus system is not in the facility. Paragraph (i)(3)(ii) requires the employer to make all reasonable efforts to contact the absent authorized employee to inform him/her that the lockout/tags-plus system has been removed. Finally, paragraph (i)(3)(iii) requires the employer to ensure that the absent authorized employee who applied the lock or tags-plus system knows that the lock or tags-plus system has been removed prior to the authorized employee resuming work. This provision does not apply to an absent authorized employee who is simply on a break, is using a sanitation facility, or is temporarily doing other work. In addition, the substitution of another authorized employee should not occur just because the original authorized employee left at the end of his/her workshift. Employers may apply this provision only in emergency situations, or when the absent authorized employee is on vacation or will not be returning to the worksite for an extended period of time (for example, employee is sick and is not able to return for the next assigned workshift). Finally, substitution of one authorized employee for another would not be a typical occurrence but, rather, would be a rare event. These provisions were proposed in paragraph (d)(3)(i) through (iii).

OSHA has added a note [9] to paragraph (i), similar to the notes for paragraphs (c), (e), (f), and (h), that clarifies the employer's role when the Navy ship's force acts as lockout/tags-plus coordinator and removes the locks or tags-plus systems. The employer will be in compliance with all of the provisions in paragraph (i) when the employer's authorized employee informs the lockout/tags-plus coordinator that the procedures in paragraph (i)(1) of this section have been performed. Here, the term "employer" refers to the host employer, any of its contractors, or any employer contracted directly by the military. It is imperative for employee protection that the lockout/tags-plus coordinator be informed that all employees servicing the machinery, equipment, or system have been notified, all employees are safely positioned or removed, and the work area is clear of nonessential items before the Navy ship's force removes the lockout/tags-plus system.

As stated earlier, this final paragraph (i) was proposed as paragraph (d). No comments were received on any of the proposed provisions. OSHA concludes that, because the employer needs to be able to remove a lockout/tags-plus application in the event that the authorized employee is unavailable to remove it, the requirements in paragraph (i) are necessary for the safety of employees. OSHA is retaining the provisions as proposed with only minor editorial changes in final paragraph (i).

Paragraph (j)—Procedures for Startup

For this final standard, OSHA added a new paragraph that establishes the procedures for startup of machinery, equipment, or systems. OSHA believes that paragraph (j) will assist employers and authorized employees to understand how to safely restart machinery, equipment, or systems after servicing operations are completed. Some of these provisions, which were implicit in the proposal, are similar to those described in paragraph (i), Procedures for removal of lockout/tags-plus systems. OSHA concludes that setting forth the procedures required for each step involved in servicing equipment safely will assist employers in developing programs that represent all actions that must be taken from start to finish in lockout/tags-plus applications.

Paragraph (j)(1) requires that, after servicing is completed and before an authorized employee turns on or reenergizes any machinery, equipment, or system, the authorized employee understand the source, type, and magnitude of all hazards associated with the energization process, and the means to control these hazards. This requirement specifies an important duty of the authorized employee; this requirement is integral with paragraphs (o)(4)(ii) and (iii), which provide that the authorized employee must be trained to know this information prior to the start of servicing operations.

Paragraph (j)(2) requires that an orderly startup must be implemented to prevent or minimize any additional or increased hazards to employees. As described previously, authorized employees may be servicing complex or large systems while other employees are in the area. An orderly startup will ensure that all of these employees are safe when the machinery, equipment, or system is reenergized.

Startup must consist of at least the following three steps, as specified in paragraphs (j)(2)(i) through (iii): (i) Tools and materials must be cleared from the work area; (ii) all non-essential employees must be removed from the work area; and (iii) the machinery, equipment, or system must be started according to the detailed procedures the employer established for that machinery, equipment, or system. The employer must comply with the first two requirements either by using a checklist or by having supervisors or foremen ensure, by inspection or any other effective means, that the work area is cleared of all tools, materials, and non-essential employees. OSHA did not include a provision in this paragraph that required that all guards be replaced prior to reenergization. The Agency believes that such a requirement is not necessary since employers know that having operationally intact machinery, equipment, or system means that the machine guarding or other safety components must be replaced. In addition, this condition is covered by other applicable provisions (29 CFR § 1910, subpart O) that address machine guarding. Therefore, OSHA concludes that these procedures for start-up are necessary to protect employees while reenergizing machinery, equipment, or systems.

[9] See rationale for this note in the summary and explanation above. See rationale for this note at the summary and explanation of the note to paragraph (c)(7), above.

OSHA has added a note [10] to paragraph (j), similar to the notes for paragraphs (c), (e), (f), (h) and (i), that clarifies the employer's role when the Navy ship's force serves as the lockout/tags-plus coordinator and maintains control over lockout/tags-plus during startup of the machinery, equipment, or systems, and the employer is prohibited from starting up the machinery, equipment, or system, the employer will be in compliance with all of the provisions in paragraph (j) provided that the employer's authorized employee informs the lockout/tags-plus coordinator that the procedures in paragraph (j)(2)(i) and (j)(2)(ii) of this section have been performed. Here, the term "employer" refers to the host employer, any of its contractors, or any employer contracted directly by the Navy. It is imperative for employee protection that the employer's authorized employee ensures, and communicates to the Navy's lockout/tags-plus coordinator, that the work area is clear of tools, materials, and nonessential employees before the machinery, equipment, or system is restarted.

Paragraph (k)—Procedures for Group Lockout/Tags-Plus

Paragraph (k) establishes the provisions for group lockout/tags-plus. Group lockout/tags-plus occurs when more than one employee is working on the same machinery, equipment, or system simultaneously. The term "employee" encompasses ship's crew, different yard crafts or departments, or employees from another employer (*i.e.*, contract employees). These group lockout/tags-plus procedures were proposed as paragraph (e)(3) and required that the employer designate an authorized employee to coordinate affected work forces (proposed paragraph (e)(3)(ii)(C)), and that each authorized employee affix a personal lock or tag to a group lockout device, group lockbox, or comparable mechanism (proposed paragraph (e)(3)(ii)(D)).

Several commenters expressed concerns with the group lockout/tags-plus proposal. Electric Boat commented on the impracticality of having each authorized employee attach his or her own tag to the energy-isolating device:

> This is one instance where trying to apply a general industry standard to the shipbuilding and repair industry does not make sense or increase safety. Electric Boat requests that OSHA consider changing or removing this requirement where each person working on a tagged system must place an individual tag(s) on the system. This proposed method would not provide any additional safety to a proven system and would present a substantial increase in the cost of repair, installation and testing for shipyards (Ex. 108.2).

OSHA received comments that several employers are using "systems experts" to perform a function similar to the group's authorized employee, and they would like to continue this practice. Trident Seafoods testified:

> It wouldn't make sense to have 10, 15 processors trudging someplace else in the vessel to go do a lockout, and then come back when we have system experts that can guarantee they're locked out. They go back in before they let people work and make sure everything's secured. They can push any button, turn any valve they want that may energize to assure themselves that it is locked out. And then they let them do their cleanup, do the work if it's on a dock side maintenance job, do their work. And then when they come back, get ready to reenergize, it has to go back to the system expert to reenergize and redo things (Ex. 199, p. 160).

Manitowoc Marine Group agreed, and noted that they also use one individual for multiple group lockout/tags-plus systems:

> The SCA member shipyard requires that the authorized employee, because of his or her training and designation, must interface with the authorized operator of said energized system to ensure that all energy is contained prior to commencing work on that job. This is far more effective at ensuring the safety of a group of employees such as laborers, who know nothing of those systems, to affect a lockout in an area such as a thruster tunnel (Ex. 125).

During his testimony, Roy Martin described how Manitowoc Marine Group performs group lockout/tag-plus on both construction and repair jobs:

> Well, on the construction or the repair side of it, we usually take leaders and supervision in each department as the vessels come in. And they all meet, they talk about the different types of work that they will be doing. Each one of those will place a lock on that system prior to any work taking place. And once again, as work progresses—and obviously, the reason for doing that is, as someone finished and they removed their locks, it is still physically locked out. So as far as the repair side of it goes, there is a group locking procedure, to where we actually have representatives from each one of the different departments place their locks on it (Ex. 168, pp. 128–129).

The U.S. Navy commented: "When using an expert representative as the authorized employee for group tagout applications, these experts will require training on ship's systems and equipments, and the energy control process, including device and tag attachment applications" (Ex. 132.2).

Based on the comments and testimony received, OSHA made several changes to this paragraph in the final standard, including reorganizing the provisions for clarity. This section has been divided into two sections: primary authorized employees and authorized employees.

Paragraph (k)(1) specifies the procedures for primary authorized employees that must be implemented in group lockout/tags-plus operations. First, paragraph (k)(1)(i) requires that the employer assign responsibility to one authorized employee (the primary authorized employee) for each group of authorized employees working on the same machinery, equipment, or system. For example, if three groups of employees are working on the fire-suppression system, there must be three primary authorized employees—one for each group. Each primary authorized employee will ensure that the members of the group have applied their own locks, have signed a group tag, or have otherwise complied with the employer's procedures for group servicing operations. This requirement was proposed as paragraph (e)(3)(ii)(A).

Second, paragraph (k)(1)(ii) requires the employer to develop and implement procedures for determining the safe exposure status of individual group member, and for taking appropriate measures to control or limit that exposure. This requirement was proposed as paragraph (e)(3)(ii)(B). The primary authorized employee, whether he or she has been called an expert representative or systems expert, must be designated the primary authorized employee and meet all the requirements in this standard for a primary authorized employee, including determining potential exposures to hazardous energy of the group's employees, regardless of the size or complexity of a worksite. If work needs to be conducted on a ship's system with which the primary authorized employee has no experience, it is the employer's responsibility to ensure that, prior to any servicing operation, the primary authorized employee receives the necessary training in accordance with paragraph (o)(4) of this standard. Knowledge of systems, and the ability to determine whether fellow employees are exposed to hazardous energy during servicing, are critical skills needed by the individual whom the employer designates as the primary authorized employee.

Third, paragraph (k)(1)(iii) is a requirement that recognizes the

[10] See rationale for this note in the summary and explanation above. See rationale for this note at the summary and explanation of the note to paragraph (c)(7), above.

responsibilities and duties of the lockout/tags-plus coordinators and the role they play in group lockout/tags-plus applications. This paragraph differs from proposed paragraphs (e)(3)(ii)(C), which required that one authorized employee be assigned control of the overall job-associated lockout/tags-plus process, and to coordinate efforts among all of the groups. OSHA believes that, when there are multiple groups or individuals performing servicing operations on the same machinery, equipment, or system at the same time, which is a common occurrence in shipyards, a lockout/tags-plus coordinator, who approves each group's lockout/tags-plus system, will be more effective in managing all lockout/tags-plus systems. Each primary authorized employee must obtain approval from the lockout/tags-plus coordinator before applying and removing each lock or tags-plus system when required by paragraph (c)(7)(i) of this section. In addition, paragraph (k)(1)(iv) requires that the primary authorized employee coordinates each servicing operation with the coordinator. Involvement of the coordinator will ensure that the safety of other authorized employees who are servicing equipment is taken into account, which is critical when an energy source that has been, or will be, isolated provides power to more systems than the one being serviced.

Paragraph (k)(2) includes the provisions for the authorized employees working in a group lockout/tag-plus operation. The provision specifies that, when servicing is performed by multiple authorized employees, the employer must either (i) have each authorized employee apply a personal lockout or tags-plus system, or (ii) use a procedure that the employer can demonstrate affords each authorized employee a level of protection equivalent to the protection provided by having each authorized employee apply a personal lockout/tags-plus system. These procedures must incorporate a means for each authorized employee to have personal control of, and accountability for, his or her own protection. This is similar to proposed (e)(3)(i). OSHA believes that the final language makes clear that employers have two options when more than one employee is working on the same machinery, equipment, or system at the same time: either each authorized employee applies his/her own lock or tags-plus system, or the employees must use another method that is just as protective as each authorized employee applying a personal lockout/tags-plus system.

Proposed paragraph (e)(3)(ii)(D) required each authorized employee to affix a personal lockout/tags-plus device to the group lock when they began work, or to use a group lockbox. Bath Iron Works gave an example of how they used lockboxes at their facility:

> On a group lockout/tagout, we were using multiple clips. I will give an example. If we do a substation lockdown for a weekend where we check all the substations out, it typically happens twice a year. On a group lockout we have had these clips, sometimes you would have 25 locks on these things. We have gone to a lockbox now, put the locks inside the box and have one authorized person doing that, so we have evolved into that (Ex. 168, p. 278).

During the public comment period, OSHA received testimony that employers would have difficulty complying with the group lockout requirements as proposed. Trident Seafoods Corporation explained why following a lockout/tagout program that was modeled after the general industry standard would be inappropriate:

> It's very difficult to meet the group lockout/tagout, whether it's working on our dock side on some of the vessels, or whether it's doing cleanups for the processing decks. * * * Some of the breaker boxes and isolation points for hydraulics are located in other areas. So it wouldn't make sense to have 10, 15 processors trudging someplace else in the vessel to go do a lockout * * * (Ex. 199, pp 159–160).

OSHA determined that, in certain situations, the safety of the servicing employees will be maximized if each employee in the group affixes his/her personal lockout or tags-plus system device as part of the group lockout. First, the placement of a personal lockout or tags-plus system device gives the employee a degree of control over his/her own protection. Second, the presence of an employee's lockout or tags-plus system will inform all other persons, including the other servicing employees and supervisors, that the employee is still working on the machinery, equipment, or system. Third, as long as the device remains attached, the primary authorized employee in charge of the group lockout or tagout knows that the job is not completed and that it is not safe to reenergize the machinery, equipment, or system. Fourth, the servicing employee will continue to be protected by the presence of his/her device until he/she removes it. The primary authorized employee is not to remove the group lockout device until each employee in the group has removed his/her personal device, indicating that employees are no longer exposed to the hazards from the servicing operation.

However, OSHA acknowledges that it is not always possible for each authorized employee to affix his or her own lock or tag to an energy-isolating device, especially when multiple employees are working on a highly complex system. Therefore, OSHA has clarified, in paragraph (k)(2)(ii), that the employer, as an alternative to having each employee apply a personal lockout/tags-plus system, may use a procedure that the employer can demonstrate affords each authorized employee a level of protection equivalent to that provided by having each authorized employee apply a personal lockout or tags-plus system. This level of protection requires each employee to take some sort of affirmative step, such as, but not limited to, a master or group lockbox or a group tag signed by each authorized employee, before servicing is started (sign-on) and after servicing is completed (sign-off).

If a single lock or set of lockout devices are used to isolate the machinery, equipment, or system from the energy sources, each authorized employee is afforded a means to utilize his/her personal lockout or tagout device so that no one employee has control of the means to remove the group lockout or tagout devices while employees are still servicing the machinery, equipment, or system. This requirement can be accomplished by the use of a group lockbox or other similar appliance. Once the machinery, equipment, or system is locked out, the key is placed into the lockbox, and each authorized employee places his/her lockout or tagout device on the box. When each individual authorized employee completes their portion of the work, they remove their lockout or tagout device from the group lockbox. After all of the personal lockout or tagout devices have been removed, the key for the group lockout devices for the machinery, equipment, or system can be used to remove the group lockout device. This method provides protection for all employees working under a particular group lockout/tags-plus device.

For employers who choose to implement a group tags-plus system using a group tag, such a system works similarly to the group lockout system in the sense that all authorized employees must take the affirmative action of signing the group tag. After the tag is properly placed, the employer must ensure that each authorized employee "signs on" by signing the tag. As each authorized employee completes his/her portion of the servicing, he/she will "sign off" by initialing or signing the tag. Once all employees have signed off, the

primary authorized employee will be able to proceed with removing the tag.

OSHA notes that paragraph (k)(2)(ii) gives employees flexibility to develop a system equivalent to the group lockout/tags-plus systems described above by including paragraphs (k)(2)(ii)(A) and (B) as examples of how employers can implement this system. The Agency included as examples signing a group tag or tag equivalent, attaching a personal identification device to a group lockout device, or performing some comparable action before servicing is started. Following the servicing operation, employees must then sign off the group tag or equivalent, detach their personal identification devices, or perform a comparable action that signifies they completed their work. Some employers may choose to use work permits or other systems for providing protection to employees in group servicing situations. Employers who elect that option must be able to demonstrate that their systems protect each authorized employee to the same degree as a personal lock or personal tags-plus system. That level of protection is significant; thus, the employer would need to develop well-designed and carefully monitored procedures that include "sign on" and "sign off" by each authorized employee, and provide thorough training to all authorized employees and lockout/tags-plus coordinators.

A note [11] to paragraph (k)(2) was added for those situations when the Navy ship's force maintains control of the machinery, equipment, or systems on a vessel and prohibits the employer from applying or removing the lockout/tags-plus system or starting up the machinery, equipment, or systems being serviced. In these specific instances, the shipyard employer is in compliance with the requirements in paragraphs (k)(1)(iii) and (k)(2) provided that the employer ensures that the primary authorized employee takes the following steps in the following order: (1) Before servicing begins and after deenergization, (a) verifies the safe exposure status of each authorized employee, and (b) signs a group tag (or a group tag equivalent) or performs a comparable action; and (2) after servicing is complete and before reenergization, (a) verifies the safe exposure status of each authorized employee, and (b) signs off the group tag (or the group tag equivalent) or performs a comparable action.

The U.S. Navy uses a system that incorporates procedures from the Navy's Tagout User's Manual (TUM) and Work Authorization Form (WAF) for controlling hazardous energy during servicing. This system requires the employer's primary authorized employee, but not each authorized employee, to sign the WAF. As discussed above, the Navy ship's force maintains control of the machinery, equipment, and systems during servicing, which removes control from the individual shipyard employers. Since it is the shipyard employer's authorized employees who perform the servicing operations and who are thus exposed, it remains the responsibility of the shipyard employer to ensure the safety of the authorized employees.

The requirement in this final standard for affirmative steps to be taken by each authorized employee in a group lockout/tags-plus situation duplicates requirements in OSHA's lockout/tags-plus standards for general industry and the electric power industry. As OSHA noted in the preamble to the final electric power generation standard, the fundamental premise of lockout or tagout is "personal protection." 59 FR 4319, 4360, Jan. 31, 1994. However, the Agency agreed that some "modification of the general rule" for employees to apply their own personal locks or tags is warranted under specific circumstances, including, to a limited extent, in group lockout or tagout situations. 59 FR at 4360. Accordingly, OSHA promulgated § 1910.269(d)(8)(ii), which includes the following provision:

> (8) *Additional requirements.*
>
> * * *
>
> (ii) When servicing or maintenance is performed by a crew, craft, department, or other group, they shall use a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device. Group lockout or tagout devices shall be used in accordance with the procedures required by paragraphs (d)(2)(iii) and (d)(2)(iv) of this section including, but not limited to, the following specific requirements:
>
> * * *
>
> (D) Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, *or comparable mechanism* when he or she begins work and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

§ 1910.269(d)(8)(ii)(D) (emphasis added).

In the preamble to the final electric power generation standard, OSHA explicitly rejected a system that did not specify the use of individual locks or tags by the individual employees of a group but, rather, accorded to a single authorized employee the responsibility for all employees in the group. 59 FR at 4361. OSHA acknowledged the difficulty of addressing LOTO when complex equipment is serviced by numerous employees extending across multiple workshifts. *Id.* Nonetheless, the Agency stressed its basic approach of requiring individual responsibility for application and removal of lockout or tagout devices, stating:

> (1) [I]rrespective of the situation, the requirements of the final rule specify that each employee performing maintenance or servicing activities be in control of hazardous energy during his or her period of exposure.
>
> (2) The procedures must ensure that each authorized employee is protected from the unexpected release of hazardous energy by personal lockout or tagout devices. No employee may affix the personal lockout or tagout device of another employee.
>
> (3) The use of such devices as master lock and tags are permitted and can serve to simplify group lockout/tags-plus procedures.* * * In a tagging system, a master tag may be used, as long as each employee personally signs on and signs off on it and as long as the tag clearly identifies each authorized employee who is being protected by it.

Id. at 4261–62.

The Occupational Safety and Health Commission addressed the group lockout/tags-plus provisions in the electric power generation standard in *Exelon Generating Corp.*, 2005 OSHRC No. 17 (Apr. 26, 2005). There, the Commission upheld a citation issued to Exelon for Exelon's failure to require each employee to affix a personal lock or tag to a group lockout/tags-plus device or sign on/off a master tag. *Id.*, slip op. at 1. As the Commission noted:

> Beginning with the general industry standard and carried forward into the power generation standard, the core concept of lockout/tags-plus is *personal* protection, that each individual worker controls his/her own lock or tag. This fundamental requirement does not convert the standard from performance oriented to a specification standard. Rather, individual control over the lockout/tags-plus devices constitutes a core performance requirement of the standard.

Id. at 5 (emphasis in original). Accordingly, the Commission rejected Exelon's contention that OSHA agreed to substitute verbal notification of the application and removal of LOTO protection for the requirement of individual worker sign on/off. *Id.* at 6. The Commission also referred to OSHA's compliance directive, which approved the use of a work permit or master tag in a group LOTO situation, provided each employee takes the physical step of personally signing on and off the job. *Id.* at 7.

[11] See rationale for this note in the summary and explanation above.

OSHA developed compliance directives for the control of hazardous energy both in general industry (CPL 02–00–147, Feb. 11, 2008) and in electric power generation, transmission, and distribution (CPL 2–1.38, June 18, 2003). Both directives describe alternatives to individual locks or tags in group situations. Whether a shipyard employer adopts an alternative system described in a compliance directive, or develops its own, the employer must demonstrate that the control and accountability procedures provide a level of protection to authorized employees that is at least equivalent to the protection afforded to them when they affix their own lock to the energy-isolating device. Such a system would comply with the group lockout/tags-plus provisions in shipyard employment.

Paragraph (l)—Procedures for Multi-Employer Worksites

Paragraph (l) of § 1915.89 sets forth requirements for exchanging information and coordinating responsibilities for a lockout/tags-plus program among host and contract employers.[12] These requirements are fundamental to any effective and safe lockout/tags-plus program on a multi-employer worksite.

The multi-employer requirements are necessary because the existence of additional employers and their employees at a workplace makes addressing safety and health conditions at the workplace complex. For example, one employer may introduce hazards into the workplace where employees of other employers are exposed. Because these situations cannot be prevented, the host employer must establish and implement procedures that will protect all workers. All employers need information about relevant hazards present at the worksite to enable them to fulfill their obligations to protect workers. For these reasons, communication and coordination among employers are essential.

The following accident description highlights the need for employers to understand and follow a host employer's energy control program. In 1987, a fatality occurred aboard a grain-carrying ship that was equipped with wing tanks on each side of the ship. A screw conveyor ran through each wing tank. At the time of the accident, two of the wing tanks were being washed. Simultaneously, a marine chemist and a shipyard employee were inside another wing tank that was not being washed. The shipyard employee was standing on the conveyor when it was turned on by a member of the ship's crew who was unaware that the employee and chemist were inside the other wing tank. The screw conveyor crushed the shipyard employee to death. Although a lockout procedure was in effect for the employees washing the tanks, this information was not conveyed to the other employees, nor was there any coordination between employers or tasks (72 FR 72452, 72496, Dec. 20, 2007).

Such tragic events, and the increased reliance on contractors throughout the shipyard industry, led OSHA to conclude that responsibilities for the control of hazardous energy must be assigned to all employers, and all employers must be held accountable for discharging those responsibilities properly. It is common practice to hire contractors for non-routine, specialized work, or as workloads fluctuate. Shipyard employers provided testimony on the use and number of contractors hired by shipyards. For example, Roy Martin of Manitowoc Marine Group testified:

> [Just] in my experience, you know, it can range as small as two different types of subcontractors up to four or five, just depending on the type of work, especially when you are discussing new construction versus repair, you will see a lot of multi-employer[s] in the repair end of the business (Ex. 168, p. 81).

Similarly, Trident Seafoods commented that it "employ[s] over 190 subcontractors at various times throughout the year at both locations" (Ex. 198, p. 70).

As a result of its analysis of the entire rulemaking record, OSHA made several changes to the proposed provisions affecting multi-employer worksites. Proposed paragraph (e)(2)(i) required that, when outside personnel, such as contractors or ship's crew, perform servicing operations at a worksite, the on-site employer and the outside employer must inform each other of their respective lockout or tagout procedures. Proposed paragraph (e)(2)(ii) required the on-site employer to ensure that his/her employees and contractors understand, and comply with, all restrictions and prohibitions of the outside employer's energy-control program. The purpose of the proposal was to ensure that each employer at a multi-employer worksite be responsible for the control of hazardous energy according to that employer's own lockout or tagout procedures, and communicate those procedures to other employers at the worksite. However, echoing the comments of other employers, American Seafoods Company stated that the host employer, and not the contract employer, should be responsible for lockout/tags-plus: "The employees or contractors who perform work on a particular system are unlikely to have the capability of identifying all energy sources, either initially based on engineering drawings and schematics or physically on the ship" (Ex. 105.1). OSHA finds American Seafoods' argument persuasive, and concludes that the control of hazardous energy must be assigned to the host employer, not outside employers. Thus, OSHA modified this section to place control of hazardous energy under the on-site, or host, employer. In response to comments requesting clarification of the roles of shipyard employers and contractors in lockout/tags-plus situations, OSHA added new provisions to paragraph (l) that specify, and differentiate between, the responsibilities of the host employer and the contract employer. Paragraph (l)(1) requires that the host employer establish and implement procedures to protect employees from hazardous energy in multi-employer worksites. The procedures must specify the responsibilities for both the host employer and the contract employer(s). The responsibilities of the host employer are established in § 1915.89(l)(2). Paragraph (l)(2)(i) requires the host employer to inform each contract employer about the contents of the host employer's lockout/tags-plus program and procedures, which may also include training. The host employer, in conjunction with the contract employers, must decide which employees to train. Manitowoc Marine Group testified that it will train employees of contract employers when necessary:

> And I have even seen cases where you will have another company—this is really important about the multi-employer work site where you actually have to deal with these other employees so that they know

[12] OSHA also replaced the proposed terms "outside employer" and "on-site employer" with "contract employer" and "host employer," respectively. These terms are used throughout the industry and in other OSHA regulations. To assist employers and workers, the Agency added definitions in § 1915.80(b) for both contract and host employers. For purposes of this subpart, a "contract employer" is often a subcontractor with employees who provide specialized trade services to the shipyard such as painting, joinery, carpentry, or scaffolding. The contract employer is under contract to the host employer, or to another employer under contract to the host employer at the host employer's worksite. This definition excludes employers providing incidental services not related to shipyard employment (such as mail delivery or office supply services). A "host employer" is an employer in charge of coordinating work or hiring other employers to perform shipyard-related work or to provide shipyard-related services at a multi-employer worksite.

there are other ways—even if you lockout, there are other ways to bypass some of these older systems and energize. So it is very important that we not only train our employees and safeguard them against the energies, we have to come in and train the contractors and actually get them, with our supervision, to understand what they are doing, what their processes are, and put in place our best practices (Ex. 168, pp. 113–114).

Paragraph (l)(2)(ii) requires that the host employer instruct each contract employer to follow the host employer's lockout/tags-plus program and procedures. Shipyard employers provided testimony on how they are already implementing this requirement at their facilities. Foss Maritime testified: "Subcontractors go through our supervision to do the lockout/tags-plus measures" (Ex. 198, p. 14). Trident Seafoods described how contract employers working on Trident vessels follow Trident's hazardous-energy control program:

We've developed a set of contractor safety guidelines that we have our subcontractors sign, and in that they have to follow, for instance, on like a tagout specifically, they have to come on and actually use the lockout/tagout on Rule 1910.1[4]7 on our vessels when they perform work for us (Ex. 198, p. 90)

Paragraph (l)(2)(iii) requires the host employer to ensure that the lockout/tags-plus coordinator knows about all servicing operations and communicates with each contract employer. This communication must involve each contract employer with employees servicing machinery, equipment, or systems, or working in an area where servicing is being performed. The lockout/tags-plus coordinator should communicate with contractors about the host employer's lockout/tags-plus program and procedures and the role of the lockout/tags-plus coordinator. Establishing open lines of communication between the lockout/tags-plus coordinator and contractors is important because the contractor is responsible for alerting the employer (i.e., lockout/tags-plus coordinator) of any new lockout/tags-plus hazards the coordinator identifies.

Bath Iron Works explained how contract employers must comply with Bath Iron Works' program, and report to Bath's system experts to apply a lock or tags-plus system:

Under our program at Bath * * * we have contractors come in, but they follow our standard, we have systems experts located within a facility on those halls that control hazardous energy. For example, our electricians, we have 500 electricians in the plant. Only 50 of those, 45 or 50 are what we call system experts. So, anytime anybody works on those ships, whether it is our own employees, contractors, vendors, anybody, they have to follow the guideline and the authority of that particular ship system expert. So, we lockout, we will tagout that particular system for that contractor. He validates it, so do we (Ex. 168, p. 252).

The comments and testimony cited above demonstrate that some shipyards are already successfully controlling hazardous energy by requiring contractors to follow the host employer's procedures. These and other comments in the record convinced OSHA that having contractors follow the host employer's lockout/tags-plus program and procedures is appropriate and provides the most reliable protection for all workers. Therefore, in paragraphs (l)(1) and (l)(2) of the final rule OSHA revised the multi-employer worksite procedures to now require contractors to follow the host employer's program rather than the reverse, as OSHA proposed (proposed § 1915.89(e)(2)).

Paragraphs (l)(3)(i) through (iii) set forth the requirements for contract employers. Under paragraph (l)(3)(i), the contract employer must follow the host employer's lockout/tags-plus program and procedures. As stated previously, OSHA believes that the ultimate responsibility for lockout/tags-plus must remain with the host employer. However, the contract employer has the important responsibility to ensure that its employees know and understand the host employer's lockout/tags-plus program and procedures. Adherence to the program will result in contract employees protecting themselves and others during potentially dangerous work involving hazardous energy.

Paragraph (l)(3)(ii) requires the contract employer to inform the host employer about any lockout/tags-plus hazards associated with the contract employer's work, and any abatement steps being taken by the contract employer to correct such hazards. Manitowoc Marine Group provided testimony regarding how it interacts with contract employers, and particularly how its shipyards obtains information regarding the work the contractor employer will perform, when it first arrives at the worksite:

When they come on site, we have a quick orientation with everybody that steps in the facility, myself or any of my staff will actually, once the general orientation is over with, try to get a grasp of what their work scope is, to identify the different processes. And if it is identified that there will be a lockout procedure or work near equipment that has been locked out, we will go through our process, what we expect, and ensure that they follow our procedure (Ex. 168, p. 124).

OSHA added paragraph (l)(3)(iii) to require that contract employers inform host employers (i.e., lockout/tags-plus coordinators) of any previously unidentified lockout/tags-plus hazards the contractor employer and employees identify at the worksite. As commenters explained, servicing operations on vessels are often complex, involving many employees and multiple employers. This provision ensures that the host employer is alerted and takes appropriate precautions if contractors discover new hazards during the servicing operation. OSHA believes this requirement is necessary to ensure that all employees, regardless of their employer, are protected from hazardous energy during servicing operations. Although OSHA did not propose this requirement, the Agency believes it is responsive to comments received during the rulemaking.

Finally, OSHA added two notes to paragraph (l) for clarification. The first note explains that the host employer may include provisions for the contract employer to have more control over the lockout/tags-plus program when those provisions would provide an equivalent level of safety for both the host and contract employers' employees. There may be situations when it is preferable for contract employees to comply with their own employer's lockout/tags-plus program when working at a host employer's worksite. The note acknowledges these situations, and gives employers flexibility in how they interact with their contractors.

The second note to paragraph (l) clarifies that when the U.S. Navy contracts directly with a contract employer, and the Navy ship's force maintains control of the lockout/tags-plus systems or devices, the contract employer shall consider the Navy to be the host employer for purposes of § 1915.89(l)(3). There are situations when the Navy will contract directly with a subcontract employer instead of the shipyard. As defined in § 1915.80, a host employer is in charge of coordinating work or hires other employers to perform shipyard-related work, or provide shipyard-related services. During these situations, that contract employer would follow the Navy lockout/tags-plus program and procedures, inform the Navy ship's force of any lockout/tags-plus hazards associated with their work, and inform the Navy ship's force of any previously unidentified hazards.

Paragraph (m)—Procedures for Shift or Personnel Changes

The standard requires that the employer's lockout/tags-plus program

include specific procedures to ensure the continuity of lockout or tagout protection during workshift and personnel changes. In final paragraph (m), OSHA adopted proposed paragraph (e)(4), and added a new requirement.

OSHA is cognizant that this standard covers servicing of complex machinery, equipment, and systems, and that work can extend across several workshifts. Under the basic approach of this standard, each authorized employee is responsible for the application and removal of his/her own lockout or tagout device. However, servicing of some of the larger vessels may take weeks or months, and require that hundreds or thousands of lockout/tags-plus devices to be used.

Paragraph (m) of this final rule requires that specific procedures be utilized to ensure the continuity of lockout/tags-plus protection for employees during shift or personnel changes. Paragraph (m)(1), which is adopted from the proposed rule, requires that the employer establish procedures for the orderly transfer of lockout/tags-plus systems between authorized employees when starting and ending their workshifts, and when there are personnel changes. It is essential that locks or tags-plus systems be maintained on energy-isolating devices through transition periods involving shift or personnel changes so that no employee is exposed to uncontrolled energy hazards associated with servicing machinery, equipment, or systems.

In paragraph (m)(2), OSHA clarified and expanded the application of proposed § 1915.89 (e)(4). Paragraph (m)(2) requires, for workshift or personnel changes, there be an orderly transfer of lockout/tags-plus protection between authorized employees coming onto, and leaving, a workshift. Paragraph (m)(2) specifies what basic steps must be included to ensure that workshift changes ensure continuity of lockout/tags-plus protection.

This provision was written in performance-based language so that the employer can conduct shift or personnel transitions in any manner that the employer determines is appropriate, safe, and effective. As stated in the preamble to the general industry standard, the transfer of responsibility can be accomplished by the on-coming shift's authorized employee accepting the control of the machinery, equipment, or system involved prior to the off-going authorized employee relinquishing such control (54 FR 36682, Sept. 1, 1989). Some employers may choose to have only one shift conduct work on any particular machinery, equipment, or system so that there will be no transfer of responsibility. Although such a restriction may not be practical for shipyards having at least two work shifts, it may be a reasonable alternative for some employers.

An alternative means of transfer may involve the on-coming authorized employee accompanying the off-going authorized employee to inspect and verify isolation, and to ensure that the lock or tags-plus system is still intact. This alternative provides the on-coming authorized person the assurance that the machinery, equipment, or system has been deenergized prior to work. The oncoming authorized employee may also initial the lockout/tags-plus log and tag after verifying isolation, or apply his/her own lock or tags-plus system. This action will inform all authorized employees who are working on the machinery, equipment, or system of the change in personnel.

There may be occasions when the authorized employee who applied the lock or tags-plus system is not the employee who completes the job. Because the authorized employee applying the lock or tags-plus system is being protected by that device or system, it is important that the device or system not be removed by anybody else. However, if removal by another authorized employee occurs at anytime, including during another workshift, the employer must comply with the requirements of paragraphs (i)(3)(i) through (i)(3)(iii) of this section.

Many shipyard employment employers commented that their lockout/tags-plus programs already include procedures for the orderly transfer of lockout/tags-plus systems and verification of isolation during workshift and personnel changes (Exs. 105.1; 116.2; 120.1). These comments indicate that employers consider such procedures to be essential to fully protect employees involved in servicing operations. Therefore, the final rule includes these procedures.

Paragraph (n)—Lockout/Tags-Plus Materials and Hardware

Paragraph (n) addresses the locks and tags-plus system hardware used to isolate, secure, or block hazardous-energy sources to any machinery, equipment, or system. When attached to energy-isolating devices, both locks and tags are tools that protect employees from hazardous energy. A "lock" (proposed as "lockout device"), as defined in the final standard, provides protection by holding the energy-isolating device in a safe position, thus preventing the release of energy and the startup or energization of the machinery, equipment, or system (§ 1915.80(b)(13)). A tag (proposed as "tagout device") is a prominent warning device that provides protection by identifying the energy-isolating device as a source of potential danger (§ 1915.80(b)(30)). The tag is used to indicate that the energy-isolating device, and the equipment being controlled by such device, may not be activated until the tag is removed by an authorized employee. An additional safety measure provides a barrier to the release of energy (§ 1915.80(b)(1)). When the use of tags is combined with an energy-isolating device and an additional safety measure, a tags-plus system is established (see the summary and explanation for paragraph (c)(4) above).

Whether a lock or tags-plus system is used, paragraph (n)(1) requires that the employer provide materials and hardware to block hazardous energy. With the exception of minor editorial changes, this requirement is the same as the requirement proposed in § 1915.89(b)(5)(i). OSHA removed the examples of such materials and hardware from proposed paragraph (b)(5)(i), and added them to the definition of "lockout/tags-plus materials and hardware" (§ 1915.80(b)(16)). These examples are not exhaustive; rather, they exemplify hardware and materials that currently exist. Employers may use other hardware or materials that effectively isolate hazardous energy from the machinery, equipment, or systems being serviced.

Final paragraph (n)(2) retains the same provision as proposed (b)(5)(ii), which required that each lock and tag be uniquely identified for lockout/tags-plus applications. One way for employers to comply with this requirement would be to use the same color lock, or tag, for all lockout/tags-plus applications. For example, the employer could select red locks for lockout applications only. This measure also would meet the requirements of paragraph (n)(3)(ii) that each lock be standardized in either color, shape, or size. Use of, for example, red locks will assist employees and contractors in a shipyard facility to immediately recognize that servicing is taking place under a lockout application. In addition, all employees and contractors would recognize that they are not to use red locks for any other purpose while in the shipyard. No comments were received on these provisions, and the final rule retains this practice to protect employees.

The remainder of paragraph (n) specifies the requirements for locks and tags. These requirements specify that

these items must be durable, standardized, substantial, and identifiable.

Durable—Paragraph (n)(3)(i)(A), proposed § 1915.89(b)(5)(ii)(A)(1), requires that locks and tags be able to withstand the environmental conditions to which they are exposed for the maximum duration of expected exposure. Proposed paragraphs (b)(5)(ii)(A)(2) and (3) were combined in this final standard as paragraph (n)(3)(i)(B), which states that each tag must be constructed and printed so that it does not deteriorate or become illegible in wet or damp environments, or when used in environments where corrosives (for example, acid and alkali chemicals) are used or stored. OSHA believes that combining these provisions into one paragraph simplifies the requirements for tags. No comments were received on either of these provisions, and OSHA is retaining the requirements in this final standard.

Standardized—Paragraph (n)(3)(ii) requires that locks and tags be standardized. Both locks and tags must be standardized in at least color, shape, or size so they are readily recognized and associated with the control of hazardous energy. As described above, an employer could elect to use red locks only for lockout and train employees in such use, thus meeting the requirements of §§ 1915.89(n)(2), (n)(3)(ii)(A) and (o)(2)(ii). In addition, tags must be standardized in print and format (paragraph (n)(3)(ii)(B)).

Several commenters stated that standardizing locks and tags would be difficult to accomplish in a shipyard (Exs. 101.1; 105.1; 117.1; 124; 126; 128; 130.1). American Seafoods Company and Lake Union Drydock Company asked: "How will shipyards ensure that [LOTO] devices are standardized within the facility in at least color, shape or size when working with hundreds of vessel crews and contractors? Wouldn't it be more appropriate and just as effective to ensure all devices are distinctive, [and] readily identifiable?" (Exs. 105.1; 101.1). Both Northrop Grumman-Gulf Coast and the American Shipbuilding Association stated: "[T]he lockout device standardization requirement * * * [is] an undue impediment to selecting the most effective devices for controlling hazardous energy" (Exs. 112.1; 117.1). The Agency disagrees with these commenters. The shipyard employer has control over work performed in its facility, and should never permit the use of unsafe tools or work practices. The requirement for standardized locks and tags enhances safety in shipyards, which may have hundreds, or even thousands, of employees. These employees, who may include ship's crew and contractors, will best be served if they can immediately recognize, by seeing standardized locks or tags, that the machinery, equipment, or system is being serviced.

Substantial—For this final standard, proposed paragraphs (c)(5)(ii)(C)(1) and (2) were divided into four provisions, (n)(3)(iii)(A) through (D), for clarity. Paragraph (n)(3)(iii)(A) requires that each lock be sturdy enough to prevent removal without the use of excessive force or special tools such as bolt cutters or other metal-cutting tools. Paragraph (n)(3)(iii)(B) requires that each tag and tag attachment be sturdy enough to prevent inadvertent or accidental removal. Paragraph (n)(3)(iii)(C) requires that the tag attachment have the general design and basic safety characteristics equivalent to a one-piece nylon cable tie that will withstand all environmental conditions, and paragraph (n)(3)(iii)(D) requires that the tag attachment be non-reusable, attachable by hand, self-locking, and non-releasable. It must also have a minimum unlocking strength of 50 pounds. Paragraphs (n)(3)(iii)(B) through (D), discussed above, were proposed as paragraph (c)(5)(C)(2). No comments were received on these provisions. OSHA continues to believe that all lockout/tags-plus system hardware and materials must be durable enough to prevent inadvertent removal and, therefore, has retained the requirements in this final standard.

Identifiable—Paragraph (n)(3)(iv), proposed (c)(5)(D), requires that each lock and tag clearly identify the authorized employee who applied it. Paragraph (n)(3)(v) (proposed paragraph (c)(5)(ii)) requires that tags warn of hazardous conditions that could arise if the machine or equipment is energized, and include a legend such as one of the following: DO NOT START; DO NOT OPEN; DO NOT CLOSE; DO NOT ENERGIZE; DO NOT OPERATE. Stamping the authorized employee's name or identification number on the lock will allow individuals to quickly identify who applied the lock. Manitowoc Marine Group testified that employees' names are on the locks (Ex. 168, p. 129). If an employer chooses not to have names, identification numbers, or other employee identifiers on the lock, the employee must apply a tag to the lock that contains identifying information. In such a case, the authorized employee's name or identification number may be written in indelible ink or with any medium that will withstand the conditions to which the tag will be exposed. No comments were received on these two provisions. OSHA believes that having the authorized employee's name or identification number on the lock or tag is necessary for the protection of all involved employees. Therefore OSHA retained this requirement in the final standard.

Paragraph (o)—Information and Training

Paragraph (o) sets forth the lockout/tags-plus training requirements. OSHA revised the training requirements to address the incorporation of the lockout/tags-plus approach to the final rule. The revisions also ensure that employees have adequate training targeted for their level of exposure and responsibilities under the lockout/tags-plus program. These new training provisions are as equally important whether the employee(s) involved in the servicing of machinery, equipment, or systems are employees of the host or contract employer. In the event that a contract employee is involved in the servicing of machinery, equipment, or systems, it is the contract employer's responsibility to provide the necessary training for the control of hazardous energy in accordance with the host employer's lockout/tags-plus program.

Commenters said that many employers in shipyard employment already have implemented hazardous-energy training. For example, Amy Duz of iWorkWise described lockout/tags-plus training programs are set up for fishing vessels:

> The training basically consists of orienting to whatever the procedure is used on the boat, whatever those procedures are within the scope of what their job is. So, for instance, you know, training for an engineer would be a little bit different. There'd be some hands on, some on-the-job training, as well as some initial orientation and, you know, going over drawings and what not, and a processing employee would only, you know, would be trained to the affected employee level, and if it is in their procedures that they would perform lockout, then they would be trained what to do in that regard. Getting them, for instance, to verify that energy has been disabled is a trick because they don't know what they are doing [or] working on (Ex. 168, pp. 428–429).

Roy Martin described Manitowoc Marine Group's lockout/tagout training program:

> It is a video portion—we actually do the video—but after the conclusion of a video, we will take out the lockout/tagout procedures that we have, the facility procedures, as well as the ones that we have developed on some of the vessels, especially if we are getting close to the repair time frame, and we will go through these procedures pretty much line item by line item, so they understand exactly what we

need to do. We will actually present them with the entire booklet of all the machine specifics that are in the facility itself. And then we will look at our lockout/tagout devices and ensure that they understand that and there are no issues. There will be a question-and-answer period, a general discussion, and at that point, pretty shortly after that, we will start our process of annual review to ensure that they are following the procedures. And we identify just specific people that are authorized lockout/tagout personnel (Ex. 168. pp. 122–123).

These and other comments discussing lockout/tags-plus training substantiate the importance of including lockout/tags-plus training in this final rule.

Paragraph (o)(1) specifies when employers must provide lockout/tags-plus initial training. It requires that employers complete initial lockout/tags-plus training for employees no later than 180 days after the effective date of this final rule (*i.e.*, 180 days after publication of the final rule in the **Federal Register**). A number of commenters said that it would take time for them to develop lockout/tags-plus programs and procedures, and to provide training to all affected employees, authorized employees, and lockout/tags-plus coordinators. OSHA believes that allowing employers 180 days to accomplish lockout/tags-plus training for employees will ensure that all employers, including small employers, have sufficient time to develop a training program.

OSHA believes training for new employees is common in shipyard employment. For instance, Dakota Creek Industries commented on its initial and ongoing training of employees:

It depends on the new crew that might be coming in. But for anybody new coming into the yard, they go through an orientation process in general which touches on that, and at the craft level they do regular monthly training sessions as needed as new people come in and join the staff (Ex. 198, p. 110).

In paragraphs (o)(2) through (o)(5), OSHA identified four categories of employees who must receive lockout/tags-plus training: Employees whose work operations are or may be in an area where a lockout/tags-plus system is in effect, affected employees, authorized employees, and lockout/tags-plus coordinators. With the exception of the lockout/tags-plus coordinator, these are the same categories that OSHA included in the proposed rule (proposed paragraphs (b)(7)(i)–(iii)).

Paragraphs (o)(2) through (o)(5) establish tiered training requirements for each employee category based on employees' level of exposure to hazardous energy and their duties and responsibilities under the employer's lockout/tags-plus program. All employees whose work operations are or may be in a lockout/tags-plus area receive the first level of training (paragraph (o)(2)). Since the work operations of affected employees, authorized employees, and lockout/tags-plus coordinators also are in a lockout/tags-plus area, they also must receive first-tier training. Northrop Grumman–Newport News supported this approach: "We concur with the need to provide a robust training program for all employees who work directly with or in the vicinity of isolated systems/equipment" (Exs. 116.2; 120.1).

In addition to first-level training, affected employees must have second-level of training (paragraph (o)(3)). Authorized employees receive the first, second, and third levels of training (paragraph (o)(4)); and lockout/tags-plus coordinators receive all four levels of training (paragraph (o)(5)). The relative degree of knowledge that authorized, affected, and other employees must acquire varies. The lockout/tags-plus coordinator and authorized employees need the most extensive training because of their responsibilities, respectively, for the entire lockout/tags-plus program and procedures, and for implementing energy control procedures (for example, shutting down and isolating energy sources, applying and removing locks and tags-plus systems) to perform servicing operations.

The U.S. Navy suggested the idea of tailoring training to employees' job duties under the lockout/tags-plus program:

Warship shipboard hazardous energy control program requires specific training of all personnel who execute process steps. It also requires general training for all workers on generic energy control issues which could be affected by any worker. Requiring all workers to be trained in aspects of the program for which they have no involvement or authority to apply is cumbersome (Ex. 132.2).

The U.S. Navy also recommended limiting the amount of training depending on the employees' duties. For example, in reference to training on attaching tags, the Navy said that "only personnel authorized to attach tags should require this training" (Ex. 132.2). OSHA agrees that focusing training on the information that is most essential to the employee's specific job duties will help to increase employees' proficiency in the work practices that are necessary to ensure they are able to safely perform their jobs and not expose others to hazardous energy.

To illustrate, the final rule requires that all affected employees and employees whose job requires them to pass through or briefly visit a lockout/tags-plus area be trained about the prohibitions against applying, tampering, or removing any lockout/tags-plus system and against starting up machinery, equipment, or a system that is under lockout/tags-plus. This information is critical for their protection, as well as the protection of authorized employees performing the servicing. However, in contrast to the proposal, the final rule does not require that those employees be trained so they know that tags and their means of attachment be made of materials that can withstand environmental conditions or be securely attached so they cannot be accidentally or inadvertently removed. Only authorized employees and lockout/tags-plus coordinators are authorized to apply tags; therefore, only they need to know what type of materials must be used for tags or how they must be attached. It is much more critical that all affected employees and employees passing through or briefly visiting a lockout/tags-plus area know and correctly follow the prohibition against applying or removing any lockout/tags-plus system, or starting equipment that is being serviced.

Similarly, the training requirements have been revised so they are more directly applicable to the lockout/tags-plus approach OSHA incorporated in the final rule. For example, since the final rule requires that employers use lockout/tags-plus systems, it is essential that employees be trained about the three basic components of those systems. At the same time, it reduces the need to train employees who work in a lockout/tags-plus area that tags may evoke a false sense of security because the final rule prohibits employers from using tagout alone.

As mentioned earlier, paragraph (o)(2) specifies the training requirements for all employees who are, or may be, in an area where a lockout/tags-plus system is used. As indicated by the phrase "all employees who are, or may be, in an area," this provision applies to employees who are incidentally exposed to a lockout/tags-plus system, as well as affected employees, authorized employees, and lockout/tags-plus coordinators; for example, employees passing through, or briefly visiting, an area where such a system is being, or may be, applied are covered by this provision. Each of these employees must know (i) The purpose and function of the employer's lockout/tags-plus program and procedures; (ii) the unique identity of the locks and tags that will be used, as well as the standardized shape, size, or color of these devices;

(iii) that tags-plus systems are comprised of an energy-isolating device with a tag affixed, and an additional safety measure; (iv) that lockout/tags-plus applications are not to be tampered with or removed; and (v) that machinery, equipment, and systems are not to be restarted or reenergized while being serviced.

Most of the training elements in paragraph (o)(2) were in the proposed rule, but OSHA also expanded, added, and deleted some requirements. For example, the proposed rule required that employees be trained that tags must be legible and understandable to employees. The final rule (paragraph (o)(2)(ii)) expands that provision to require that employees be trained in the unique identity of locks and tags used in lockout/tags-plus applications. Such training ensures that employees know what energy-control locks and tags look like versus other types of locks and tags, thereby ensuring that they know which locks and tags they must not remove. Training employees in the identity of locks and tags also will ensure that they have a better understanding of the components of tags-plus systems and their purpose in the overall lockout/tags-plus program.

OSHA also replaced the proposed requirement that employees be trained that tags may evoke a false sense of security, and that tags need to be understood as part of an overall energy-control program. Instead, the final rule (paragraph (o)(2)(iii)) requires that employees be trained that a tags-plus system includes an energy-isolating device with a tag affixed and at least one additional safety measure. OSHA made this change so the training requirements in the final rule would better address the types of measures employers must use to control hazardous energy. Moreover, since the hazardous-energy program in the final rule does not permit the use of tags alone, there is less need to train employees about the limitations of tags.

OSHA added a requirement in the final rule that employees working in or passing through a lockout/tags-plus area be trained that they are prohibited from starting or energizing any machinery, equipment, or system under lockout/tags-plus. This requirement reinforces the concept that only authorized employees, not employees working in or passing through the lockout/tags-plus area, are authorized to activate machinery, equipment, or systems that are under lockout/tags-plus. OSHA believes that this requirement, along with the prohibition against removing a lockout/tags-plus system, are the two most critical work practices that these employees must understand and follow.

Finally, as explained above, OSHA deleted three training requirements (proposed § 1915.89(b)(7)(ii)(A), (E), and (F)) that focused on tags-plus systems rather than lockout/tags-plus systems. OSHA believes it is more important for employees to know all components of the lockout/tags-plus systems being used rather than the limitations of tags in tags-plus systems, especially since the use of tags alone is not allowed in this final rule.

OSHA believes the training components in paragraph (o)(2) are important to ensure employees' complete understanding of the lockout/tags-plus program and procedures, as well as their awareness of what is occurring around their work areas so that they can protect themselves.

Paragraph (o)(3) sets forth additional training requirements for affected employees. An affected employee is any employee who normally operates, for production purposes, the machinery, equipment, or system that is going to be serviced. Working in a lockout/tags-plus area increases exposure to hazardous energy. Since the definition of affected employee also includes an employee whose job requires working in a servicing area, the training requirements for affected employees are almost identical to those of employees whose work operations are, or may be, in the lockout/tags-plus area. In addition to being trained in the requirements in paragraph (o)(2), paragraph (o)(3) also requires that affected employees be trained in the use of the employer's lockout/tags-plus program and procedures, which was in the proposed rule (proposed § 1915.89(b)(7)(i)(B)). OSHA believes that affected employees need to know the essential components of the employer's lockout/tags-plus program and how they work so they know that machinery, equipment, or systems are not to be operated while under a lockout/tags-plus application. Affected employees also need to understand which activities are servicing operations covered by § 1915.89, which of these servicing activities must be left to authorized employees, and which servicing activities they can perform.

Paragraphs (o)(3)(ii) and (iii) require that affected employees be trained to understand that they may not apply or remove lockout/tags-plus systems, and that lockout/tags-plus systems are not to be bypassed, ignored, or otherwise defeated. These two requirements are the most critical ones that affected employees need to understand to ensure their safety, as well as the safety of the authorized employees servicing the particular machinery, equipment, or system.

Paragraph (o)(4) specifies the training authorized employees must receive in addition to the training in paragraphs (o)(2) and (o)(3). Most of these training requirements were in the proposed rule.

Paragraph (o)(4)(i) (proposed § 1915.89(b)(7)(i)) requires that authorized employees be trained in the steps that are necessary for the safe application, use, and removal of lockout/tags-plus systems. Since authorized employees apply and remove locks or tags-plus systems, it is crucial that they fully understand the procedures and steps they must follow to safely accomplish those tasks. Paragraph (o)(4)(ii), which was in the proposed rule, requires that authorized employees be trained in the type of energy sources, and the magnitude of the energy available, in the workplace. Both of these provisions are particularly important for servicing operations onboard vessels, where several types of energy may be present (for example, electrical, steam, hydraulic), and where energy may be provided by off-vessel sources. The presence of multiple energy sources and multiple locations of energy sources heightens the potential for exposure to hazardous energy, and adds complexity to servicing operations. As such, OSHA believes that authorized employees need to understand the types, sources, and magnitude of available energy to successfully execute the necessary steps to prevent energization, startup, or the release of hazardous energy.

Paragraph (o)(4)(iii), which also was in the proposed rule, specifies that authorized employees be trained in the means and methods necessary for effective isolation and control of hazardous energy. OSHA retained this provision because the final rule now requires authorized employees to lock machinery, equipment, or systems that are capable of being locked, as well as apply both energy-isolating devices and additional safety measures if the machinery, equipment, or system cannot be locked. It is important that authorized employees understand this new control framework to ensure that employees are protected from hazardous energy during servicing operations.

Paragraph (o)(4)(iv), which is a new provision, requires that the authorized employee designated as a group's primary authorized employee be trained to know the means for determining the exposure status of other employees in the group. Since both the proposed and final rules require that the primary authorized employee determine the

exposure status for those employees in the group, OSHA believes that primary authorized employees need to receive training in this task to ensure their assessments are accurate. The training needs to provide the primary authorized employee with information necessary to understand how to determine whether, how, and to what extent employees in the servicing group are exposed to hazardous energy. This is a critical skill that primary authorized employees must possess because they have responsibility for the employees in the group, and for coordinating the lockout/tags-plus application with the lockout/tags-plus coordinator. If primary authorized employees are not trained to accurately determine the exposure status for the employees performing the servicing operation, their determinations may be incomplete, thereby leaving employees exposed to hazardous energy.

Paragraph (o)(4)(v), which was in the proposed rule (proposed § 1915.89 (b)(7)(ii)(C)), requires that authorized employees be trained so they know that tags must be written so as to be legible and understandable to all employees. Authorized employees are responsible for writing the information on the tags, and this requirement will ensure that they carefully write the information so other employees can read and understand the tag, thereby increasing the protection afforded to employees performing servicing operations. OSHA did not receive any comments on this provision, but the Navy generally suggested that training on other similar provisions be limited to authorized employees and lockout/tags-plus coordinators (Ex. 132.2), which the final rule does.

Paragraph (o)(4)(vi), which was in the proposed rule (proposed § 1915.89(b)(7)(ii)(D)), requires that authorized employees be trained so they know that tags must be made of materials which will withstand the environmental conditions encountered in the workplace. Tags must be constructed so that they do not deteriorate or become illegible in wet or damp environments, or when used in environments where corrosives are used or stored.

Paragraph (o)(4)(vii), which also was in the proposed rule (proposed § 1915.89(b)(7)(ii)(F)), requires that authorized employees be trained so they know they must securely attach tags to energy-isolating devices to prevent them from becoming detached during servicing. This training is particularly important in shipyard employment, where servicing operations may take place in all types of weather and environmental conditions. If tags are not firmly attached, they may fall off if there are strong winds. Also, many servicing operations in shipyard employment take place in tight and confined spaces where employees passing by a tag could knock it off if it is not firmly attached. Since it is the authorized employee's responsibility to ensure that the tag is attached, OSHA believes that they are the employees who must receive such training.

Paragraph (o)(4)(viii) requires authorized employees to be trained that tags are warning devices and do not provide the same physical barrier against the energization or startup or the release of hazardous energy that locks or additional safety measures provide. Similarly, paragraph (o)(4)(ix) requires authorized employees to understand that, because tags may evoke a false sense of security, they must be used in conjunction with energy-isolating devices. Both provisions were in the proposed rule. Once again, OSHA is limiting training on these provisions to authorized employees (and lockout/tags-plus coordinators) since they are the employees who apply lockout/tags-plus systems. OSHA believes they need to understand why OSHA is requiring employers to use lockout/tags-plus systems instead of tags alone. OSHA did not receive any comments opposing the proposed provisions.

Finally, paragraph (o)(4)(ix) requires that authorized employees be trained so they know that tags must be used in conjunction with energy-isolating devices to prevent energization, startup, or release of hazardous energy. OSHA proposed a similar provision, but revised it to better address the lockout/tags-plus system that the final rule requires. OSHA did not receive any comments opposing this provision.

Paragraph (o)(5) addresses the training that lockout/tags-plus coordinators must have in addition to the training in paragraphs (o)(2), (o)(3), and (o)(4). The requirements in paragraph (o)(5) are new provisions that apply to the lockout/tags-plus coordinator position that OSHA added to the final rule. The job of lockout/tags-plus coordinator is critical because it directly affects the safety of employees working in complex shipyard environments. The position requires a high degree of skill and expertise. The lockout/tags-plus coordinator is responsible for overseeing all servicing operations and lockout/tags-plus applications in those operations. As such, the lockout/tags-plus coordinator must have a thorough working knowledge of the employer's lockout/tags-plus program and procedures, as well as the available energy sources. In addition, the coordinator needs to have a full understanding of the machinery, equipment, and systems that employees are servicing, including the energy-isolating devices and additional safety measures that will need lockout/tags-plus applications. This coordination job will necessitate being able to read plans and schematics of the machinery, equipment, and systems to ensure that all sources of energy are identified. Once sources of energy are identified, the coordinator also must know the means of isolation that will be needed. To ensure that the coordinator has the critical knowledge and is proficient in all of the steps necessary to protect employees from hazardous energy, the final rule requires that the coordinator receive all tiers of lockout/tags-plus training that other employees must receive, plus training geared specifically to the coordinator position.

Paragraph (o)(5)(i) requires that lockout/tags-plus coordinators be trained so they know how to identify and isolate any machinery, equipment, or system that is being serviced. As mentioned previously, machinery, equipment, and systems used in shipyard employment may involve several different energy sources. The coordinator must be able to identify all of the energy sources so the sources can be shutdown and isolated. If any sources are missed, employees performing the servicing operation may be exposed to hazardous energy. Therefore, the coordinator must be able to accurately identify all energy sources, because they will be overseeing and authorizing, and possibly applying, the lockout/tags-plus systems necessary to protect authorized employees.

Paragraph (o)(5)(ii) requires the coordinator to be trained so he/she knows how to accurately document the lockout/tags-plus system and maintain the lockout/tags-plus log. Whatever methods and procedures the employer has established for the lockout/tags-plus log, the coordinator will need to be trained in them so the log is accurate. For example, if the employer uses an electronic log, the coordinator will need to be trained to operate that program.

In this final standard, paragraph (o)(6) specifies when employees must be retrained or receive additional training. The employer must retrain each employee applicable whenever:

- A change in the employee's job assignment presents a new hazard or requires a greater degree of knowledge about the employer's program or procedures (paragraph (o)(6)(i)(A));
- A change in machinery, equipment, or systems presents a new hazard for

which the employee has not received training (paragraph (o)(6)(i)(B));

- A change is made in the employer's lockout/tags-plus program or procedures (paragraph (o)(6)(i)(C)); and
- It is necessary to maintain the employee's proficiency (paragraph (o)(6)(i)(D)).

OSHA did not receive any comments opposing lockout/tags-plus retraining in general, and some commenters support the need for it. Northrup Grumman's—Newport News' comments were representative of stakeholders: "Periodic retraining ensures that lessons learned are shared with all employees" (Ex. 116.2).

In the final rule, OSHA clarified and expanded the scope of the proposed retraining requirements. The final rule states that paragraph (o)(6)(i) requires employers to retrain "employees as applicable." The proposed rule limited these retraining requirements to affected and authorized employees. The final rule clarifies that retraining must be provided to those employees whose jobs, tasks, or responsibilities may be affected by the changes. Thus, if changes in the lockout/tags-plus program or procedures affect any employee whose work operations are, or may be, in a lockout/tags-plus area, then all four categories of employees would need to be retrained. However, if the program or procedure changes pertain only to authorized employees and lockout/tags-plus coordinators, such as changes in communication procedures between these employees, then the retraining can be limited to those two categories of employees. OSHA believes these changes will assist employers to appropriately direct their retraining efforts.

The proposed rule (proposed § 1915.89(b)(7)(iii)(A)) required that employees be retrained whenever there was any change in their job assignment. Northrop Grumman—Newport News commented opposing that approach:

> [W]e do not believe it is feasible or necessary to retrain employees whenever there is a change in job assignment or equipment. By nature, vessel construction and repair is a dynamic environment and equipment and job assignments change regularly. We believe initial and periodic refresher training is the most practical and beneficial means to maintain employee proficiency and knowledge. Periodic training ensures that lessons learned are shared with all employees, not just those that had a job assignment (Exs. 116.2; 120.1).

The U.S. Navy raised similar concerns: "In the re-training section the words 'whenever there is a change to their job assignment' is too ambiguous. Recommend adding to this—whenever there is a change to their job assignment that changes their role or responsibility in performance of the energy program" (Ex. 132.2).

OSHA recognizes that there may be some changes in job assignments for which it may not be necessary to retrain employees. For example, if authorized employees are assigned to service the same types of machinery, equipment, or systems on a different vessel, they may not need to be retrained. In this case, additional program knowledge appears not to be required, and it does not appear that the employees will be exposed to new energy-release hazards. Likewise, if authorized employees are assigned to work on similar machinery, equipment, or systems in another area of the vessel, their current training may be sufficient.

Based on the record, OSHA modified the final language to specify that employers provide retraining when a new job assignment presents a new energy-release hazard or requires a greater degree of knowledge about the employer's lockout/tags-plus program or procedures. For example, if an affected employee is newly assigned to be an authorized employee, it is clear that the employee would need additional training because the new tasks and responsibilities require greater knowledge of the employer's lockout/tags-plus program. In addition, the job likely also would involve additional hazards as the employee's new responsibilities would include shutting down and isolating energy sources, applying lockout/tags-plus systems, and performing servicing on machinery, equipment, or systems that are under a lockout/tags-plus system.

Paragraph (o)(6)(i)(B), like the proposed rule, requires that employers retrain employees as applicable when there is a change in machinery, equipment, or systems that presents a new hazard. As with changes in job assignment, some changes in machinery, equipment, or systems are minor, and the hazards those jobs pose are within the scope of the employee's previous training. In such cases retraining may not be necessary. However, when there are substantial changes in the machinery, equipment, or systems being serviced, or the employee is unfamiliar with the new machinery, equipment, or system, retraining is necessary to prevent exposure of employees to hazardous energy.

Paragraph (o)(6)(i)(C) requires that employers retrain employees as applicable when there is a change in the employer's lockout/tags-plus program or procedures. The proposed rule included this provision.

In paragraph (o)(6)(i)(D), OSHA added a requirement that employers must retrain employees as "necessary" to maintain proficiency. Commenters generally supported retraining to maintain employee proficiency. Some commenters said they provide annual energy-control retraining. For example, Bath Iron Works and Northrop Grumman–Newport News stated that they provide annual lockout/tags-plus training (Ex. 168, p. 349). In addition, James Thornton explained that Northrop Grumman disseminates "reminders," and conducts refresher training on an as-needed basis:

> For example, during the year, if we have seen a lot of near misses, we might put out to the yard for general distribution, a communication that says okay, we saw a number of these kinds of things, be sensitive to this particular operation, and so it is not just the formal training, but it is also refresher training and a reminder if we have had near-misses and that sort of thing (Ex. 168, p. 349).

That said, OSHA notes that this provision is not a requirement to provide annual retraining. Rather, employers must provide retraining when it is necessary so their employees maintain proficiency. OSHA understands that many shipyard employees have long careers, and that it is not unusual for employees to continue in the same craft during their entire career. These employees may have been implementing lockout/tags-plus procedures for an extended period of time. It is likely that these employees maintain a high degree of expertise and proficiency based on their long experience. However, to the extent that routine and habit may lead to risky shortcuts or missed steps in procedures, this provision requires retraining to restore and refresh the high degree of proficiency essential to prevent employees from being exposed to hazardous energy during servicing operations. Therefore, employers will need to assess their workplaces and workforce to determine the appropriate retraining frequency necessary to maintain employee proficiency.

In sum, OSHA believes that the specific frequencies of training and retraining required in the final rule, as opposed to annual retraining, are correlated with the key times and situations in which employees need lockout/tags-plus training. Requiring annual retraining may not be adequate to ensure that employees have the critical information at the time they need it to perform their jobs safely. For shipyard employment worksites where

servicing operations change frequently, it may be possible that employees will receive training more frequently than once a year.

Paragraph (o)(6)(ii) requires retraining employees as applicable when an incident investigation or audit indicates there are deviations from or deficiencies in the lockout/tags-plus program or procedures, and when there are inadequacies in an employee's knowledge or use of the lockout/tags-plus program or procedures. The proposed rule (proposed § 1915.89(b)(7)(iii)(B)) required that employees receive retraining when a periodic inspection reveals, or the employer has reason to believe, that there are deviations or inadequacies in the employee's knowledge or use of energy-control procedures. The final rule expands the requirement to require retraining when an employer's lockout/tags-plus program or procedures, as opposed to employees, have deficiencies. Requiring retraining when either employee knowledge or employer programs or procedures are deficient is necessary to adequately protect workers during servicing operations.

OSHA believes that the retraining requirement in paragraph (o)(6)(ii) implicitly requires employers to implement the corrective actions identified in incident investigations and program audits. In many cases, the appropriate corrective action will be retraining.

Paragraph (o)(6)(iii), as with the proposal (proposed § 1915.89(b)(7)(iii)(C)), requires the employer to ensure that retraining establishes employee knowledge and proficiency in the employer's lockout/tags-plus program and procedures, and in any new or revised procedures. This performance-based requirement gives employers flexibility to determine effective methods and means to attain employee efficiency. For example, employers could test employee proficiency, or have employees demonstrate safe practices, before they begin or resume servicing activities.

Also implicit in this provision is the requirement that employers provide retraining using methods and language that employees are able to understand. The Agency recognizes that workers in the shipyard employment industry have different backgrounds, languages, ethnicities, and literacy levels. The employer will need to tailor the training to the particular demographics of their employees to ensure that the retraining establishes employee knowledge.

Throughout paragraph (o), OSHA specifically states that employers must train or retrain employees so they know or understand the required content (see, for example, paragraph (o)(6)(iii)). This requirement means that employers must ensure that training is provided in ways that enable their employees to understand the information, know its meaning, and use that information to ensure their safety under hazardous-energy conditions. There are many ways employers can provide effective and understandable training to a diverse workforce. iWorkWise explained how fishing-vessel operators ensure that their Spanish-speaking employees understand training:

> It might be conducting the training in both English and Spanish, for instance, although there are a lot of other languages [besides] Spanish on fishing vessels. It might be, you know, watching them do it the first time, showing them how to do it physically. All of those things, I think, are used by every vessel, quite well. I mean, that is how they are able to do their job at all and show up when they are supposed to. So everything possible, I guess, is the answer, and I have seen it employed in a training program to get people to understand what they need to do (Ex. 168, p. 430).

Bath Iron Works commented on how it ensures training is understandable to all employees:

> On our end, for the most part, they are all English-speaking, but we also do a validation exam, make sure they understand the material, and then we go through the answers to make sure everybody understands that. * * * Sometimes we have had some folks who are illiterate, and we have done some one-on-one training with those folks, so they understand (Ex. 168, pp. 350–351).

Finally, paragraph (o)(7), like the proposal, requires the employer to keep a record that training has been accomplished and is current. OSHA revised this paragraph to require that the employer include at least the employee's name, date(s) of the training, and the subject of the training. The proposed rule only required that the record include the employee's name and date of training. OSHA believes that the record also must include the subject of the training to be a useful record. Employers are free to determine the form of the record. For example, some employers may retain training course sign-in sheets while other employers may maintain individual employee training records.

Paragraph (p)—Incident Investigation

In paragraph (p), OSHA added provisions requiring employers to investigate each incident that resulted in, or reasonably could have resulted in, the energization or startup, or the release of hazardous energy. SESAC recommended that a shipyard lockout/tags-plus standard require the employer to conduct incident investigations when accidents or near-misses occur (Docket SESAC 1993–3, Ex. 8, p. 7). SESAC also recommended that employers conduct such investigations to identify deficiencies in the lockout/tags-plus program, and then correct any problems or deficiencies in the program.

In the proposal, OSHA requested input from shipyard employers as to whether § 1915.89 should include an incident-investigation requirement. Northrop Grumman—Newport News, the U.S. Navy, and Puget Sound Shipbuilder's Association agreed that such a requirement would be an important, if not critical, component of a lockout/tags-plus program (Exs. 116.2; 132.2; 168 p. 392). Northrop Grumman stated:

> A best practices study on hazardous energy control in shipyards noted that most successful programs included a provision for incident investigation. This provision was determined to be one of several strengths typically found in Shipyard Employment hazardous energy programs, which are absent from the General Industry standard. The investigation should be documented, including a cause analysis and corrective actions (Ex. 116.2).

The U.S. Navy stated that it agrees "that [the requirement for] incident investigation[s] is an appropriate requirement to be included in the standard * * * [i]n order to maintain a level of quality and frankness necessary to assist in the continuation of a successful proactive program" (Ex. 132.2). In addition, Puget Sound Shipbuilder's Association testified: "The essential elements listed on this slide are the foundation for a new hazardous-energy control standard that will serve the employees in the shipyard industry well. * * * [Element] nine [addresses] incident investigations and regular inspections" (Ex. 168, pp. 390–392).

It is long-standing OSHA policy to encourage, and in some instances to require, incident reports, accident assessments, and other types of reports that document an investigation of an incident that could, or does, compromise safety. According to an OSHA Safety and Health Management System fact sheet entitled "Accident/incident Investigation":

> Near miss reporting and investigation allow you to identify and control hazards before they cause a more serious incident. Accident/incident investigations are a tool for uncovering hazards that either were missed earlier or have managed to slip out of the controls planned for them. It is useful only when done with the aim of discovering every contributing factor to the accident/incident to "foolproof" the condition and/or activity and prevent future occurrences. In

other words, your objective is to identify root causes, not to primarily set blame. (See *http://www.osha.gov/SLTC/etools/safetyhealth/mod4_factsheets_accinvest.html.*)

OSHA believes that requiring shipyard employers to implement incident investigations will result in a decrease in incidents and near-misses. Based on the Agency's expertise and existing policy, and the comments from SESAC and members of the regulated community addressing the importance of incident investigation and reports, OSHA added paragraph (p), Incident investigation, to this final standard.

Paragraph (p)(1) requires the employer to investigate each incident that resulted in, or could reasonably have resulted in, energization or startup, or the release of hazardous energy. OSHA believes that investigating "near misses" in addition to actual incidents is an important proactive measure to maintain an effective lockout/tags-plus program. Investigating near misses can prevent incidents and keep small or minor problems from becoming major problems. Further, successfully identifying and addressing root causes of incidents is the most effective way to prevent fatalities and injuries from occurring.

Paragraph (p)(2) requires that, within 24 hours of the incident, the employer initiate the investigation and notify each employee who was, or could reasonably have been, affected by the incident. Paragraph (p)(3) requires that the investigation be conducted by at least one employee who has knowledge of, and experience in, the employer's lockout/tags-plus program and procedures. This employee also must have knowledge of, and experience in, investigating and analyzing incidents involving the release of hazardous energy. OSHA understands that some employers use outside safety and health consultants to perform various services, such as inspections, program development, and incident investigations. Thus, paragraph (p)(3) permits employers to use additional individuals to participate in incident investigations. Such individuals may include co-workers, outside consultants, or other ship's forces or crafts. However, the responsibility for the incident investigation rests with the employer, regardless of whom the employer may designate to assist with the task.

Paragraph (p)(4) specifies that the employer prepare a written report of the investigation. This report must include the following seven items (paragraphs (p)(4)(i) through (vii)): the date and time of the incident; the date and time the incident investigation began; the location of the incident; a description of the incident; the factors that contributed to the incident; a copy of any lockout/tags-plus log that was current at the time of the incident; and any corrective actions that the employer must take as a result of the incident. OSHA believes that all of these items will assist the employer in identifying causes of the incident, as well as unsafe practices. In this regard, the U.S. Navy stated:

> The Navy has a robust program for formal investigations of energy control problems on board Navy vessels. * * * It is this intense focus on and formal resolution of smaller problems that results in the elimination of more serious problems. All safety programs need to include a formal investigation process which should include documented problem definition, cause analysis and corrective action determination (Ex. 132.2).

OSHA believes that incidents or near misses may occur as a result of procedural mistakes, lack of knowledge, or employee error. It is from examining incidents that the employer can determine which corrective actions to take so that such incidents do not recur.

Paragraph (p)(5) requires that the employer review the written incident report with each employee having job tasks related to the findings of the incident investigation. This review must include contract employees, when applicable. This review will provide employers with an opportunity to discuss and reinforce the importance of corrective actions and to identify any training or other deficiencies not included in the written report.

Paragraph (p)(6) requires that the investigation and report be completed, and any necessary corrective actions taken, within 30 days of the incident. OSHA believes that 30 days is ample time for employers to assess the incident and, in most cases, implement corrective measures. Otherwise, the employer runs the risk of a repeat incident. However, there will be some situations that cannot be corrected within 30 days. In those situations, paragraph (p)(7) requires the employer to prepare a written abatement plan that explains the circumstances of the delay, a proposed timeline for corrective actions to be implemented, and a summary of the interim steps that the employer will take to protect employees. Thus, when the employer cannot take corrective actions within 30 days of the incident, the employer must take positive steps to do so in a timely manner.

Paragraph (q)—Program Audits (Proposed § 1915.89(b)(6))

The standard requires that the employer perform periodic audits at least annually to ensure that energy-control procedures are working properly. OSHA explained in the preamble to the proposed standard that the audit (referred to as "inspection" in the proposal) must make four findings: (1) Whether the steps in the energy-control procedures are being followed; (2) whether the employees involved know their responsibilities under the procedures; (3) whether the procedures are adequate to provide the necessary protection; and (4) what changes, if any, are needed to correct identified deficiencies (72 FR 72452, 72494, Dec. 20, 2007).

OSHA proposed this section as "periodic inspection," but changed the title to "program audits" for this final standard since many commenters referred to the inspections as audits. OSHA proposed that periodic inspections of "each" energy-control procedure be conducted at least annually, to ensure that the procedures were being followed, and to correct any deficiencies. OSHA received several comments regarding the change from § 1910.147(c)(6) that required an inspection of "the" energy-control procedure (Exs. 105.1; 116.2; 120.1). American Seafoods Company commented:

> It is not clear why OSHA has added the language, "conduct a periodic inspection of *each* procedure." This is a change from the General Industry standard which requires a periodic inspection of "*the* energy control procedure" [1910.147(c)(6)]. How will a facility inspect *each* procedure? For instance, if a facility has 200 procedures, and not all of them are used every year, it is not reasonable for an employer to have to make someone perform each procedure just so they can inspect it. Indeed, it would be exceedingly onerous to [expect someone to perform] each procedure each year for a shipyard, ship repair facility, or vessel that has hundreds of procedures even if they were performed at least once (Ex. 105.1).

Similarly, Northrop Grumman–Newport News also stated:

> This section requires annual inspection of *each* energy control procedure and a review of certain information and responsibilities with *each* authorized employee. For instance, in our Facilities-based program alone we have approximately 10,000 energy control procedures (because very few pieces of equipment/systems have a single source of energy) and approximately 1,300 authorized employees.
>
> There are thousands of jobs on a single aircraft carrier each day that require isolation of hazardous energy. As indicated above, once the work is complete, the procedure (work permit and support expert based assessment) are obsolete. Performing an inspection of obsolete procedures annually makes no sense and the number of distinct procedures (work permits) are too great to

accomplish a full inspection even if the procedures were not obsolete. We recommend that this section be deleted and a section requiring an annual Hazardous Energy Control audit be added (Ex. 116.2).

OSHA acknowledges the validity of these concerns, and modified the final standard in two ways. First, final paragraph (q)(1) clarifies that the required audits apply to program and procedures currently in use. Thus, if an energy-control program was implemented at some point during the previous year, but the servicing has been completed and the program discontinued, the employer need not audit the discontinued program. Second, in final paragraph (q)(1), OSHA deleted the proposed requirement for auditing "each" energy-control program. The employer instead may inspect a representative sample of the equipment the procedure cover, and consult with the authorized employees who implement the procedure on that equipment. Accordingly, equipment that has the same type and magnitude of hazardous energy, and has the same or similar type of controls, may be grouped together and inspected by type of procedure (Ex. 36, Letter to Thomas J. Civic, Mar. 9, 2004). Moreover, as stated by OSHA in an interpretation letter regarding the general industry requirement for periodic inspections (Ex. 35, Letter to Lawrence P. Halprin, Sept. 19, 1995), a group of detailed individual procedures are considered a single procedure for the purposes of periodic inspection, provided all of the procedures have the same:

- Planned equipment use;
- Procedures for applying controls (*i.e.*, shut down, isolation, blocking, and securing equipment);
- Procedures for placing, removing and transferring lockout/tags-plus devices, and identifying who has responsibility for these procedures; and
- Requirements for testing the machinery, equipment, or system and verifying the effectiveness of lockout/tags-plus devices and other control measures.

In 1993, prior to the above-mentioned Agency interpretations, SESAC raised similar concerns about the large percentage of equipment that employers must inspect to determine whether the energy-control procedures are working properly and whether employees understand their responsibilities under the procedures (Docket SESAC 1993–3, Ex. 104X, pp. 164–169). OSHA believes the interpretations incorporated and discussed herein address SESAC's concerns, and the concerns of the commenters.

Under final paragraph (d) of this section, OSHA requires procedures to be developed for the control of hazardous energy during servicing of any machinery, equipment, or system. However, OSHA does not require employers to develop a procedure for every single machine, equipment, or system for each type or class of vessel. In the Note to paragraph (d)(1) of this section, OSHA clearly stated that employers must develop procedures only for types of machinery, equipment, or systems. Paragraph (d)(2) provides an exemption to the requirement for written procedures under specified conditions. The Agency recognizes the large number of servicing operations that occur on a large vessel such as an aircraft carrier, and, therefore, does not require in this final standard that employers have a procedure, or conduct an audit of every procedure, for every servicing operation.

A properly conducted program audit will determine whether an employer's lockout/tags-plus program and procedures are effective, and whether the employer is implementing the program and procedures properly. In addition, audits will ensure that employees implementing the program and procedures remain familiar with their responsibilities, whether they are affected employees, authorized employees, or employees working on the same vessel while servicing operations are being performed. The audit will also ensure that the employer identifies any deficiencies in the program and procedures, as well as in employee training.

Comments and testimony confirmed that employers already are performing annual audits of hazardous-energy control programs and procedures. Northrop Grumman–Newport News testified regarding audit procedures at its landside operations:

> [A]ll of our procedures that are formal shipyard procedures enter into what we call our quality control system, so each of those systems is spelled out. If there is an annual requirement for review, updating, and inspection, that is automatic, so, in other words, we will get a trigger from the quality system that says procedure Y1022 is now up for review, and that stimulates us then to go and even if we have forgotten, to go and perform that review and analysis of that procedure consistent with the requirement, our quality control system. So, yes, even though we have a large number of procedures, we check them out (Ex. 168, p. 324).

Foss Maritime testified that it also perform annual audits:

> At least annually. We try to do it twice a year. * * * It's something that I do twice a year walking our facility. For my walks, I would generate other questions. But the electricians and the pipefitters who are probably the ones who are involved in lockout/tags-plus are the ones I go to and let them audit the programs (Ex. 198, p. 32).

Based on these comments stating that periodic audits are accepted practice in some shipyards, and on OSHA's experience with periodic audits in other industries, OSHA is retaining the requirement that annual audits be conducted.

Final paragraph (q)(2)(i) (proposed paragraph (b)(6)(A)) requires that the audit be performed by an authorized employee other than the employee using the energy-control procedures being reviewed. As an alternative to paragraph (q)(2)(i), OSHA added final paragraph (q)(2)(ii) to the final standard, which allows employers to perform the required audit using other individuals knowledgeable about the employer's lockout/tags-plus program and procedures and the machinery, equipment, or systems being reviewed. OSHA specified a similar alternative in final paragraph (p)(3), which allows employers to employ outside consultants, such as safety and health professionals, to participate in incident investigations. OSHA concludes that having such an outside consultant is a reasonable alternative to having an employee conduct the audit, especially since the consultant may provide a fresh perspective on the review process. However, this individual must be knowledgeable about the employer's program and procedures, as well as knowledgeable about the machinery, equipment, or systems that are being serviced on vessels and in landside facilities. OSHA did not receive any comments on the requirements of paragraph (q)(2)(i) (proposed as § 1915.89(b)(6)(i)(A)), and is retaining these provisions, along with the new (q)(2)(ii), in this final standard.

In proposed paragraph (b)(6)(i)(B), OSHA required the inspection of energy-control procedures to include a review, conducted between the inspector and each authorized employee, of the authorized employee's responsibilities under the energy-control program. In proposed paragraph (b)(6)(i)(C), if the employer used a tags-plus system, the inspector's review of employee responsibilities would include affected employees. OSHA also proposed, for tags-plus systems, that the inspection include a review, with authorized and affected employees, of the limitations of tags. Northrop Grumman–Newport News stated:

> We recommend that the periodic inspection be modified to require 'a review

of a statistically significant sample of procedures annually by a person knowledgeable of the operation and energy control procedures.' We recommend that the review of responsibilities and other information with authorized employees be moved to a performance-based requirement in the training section to ensure employees are knowledgeable of their responsibilities (Exs. 116.1; 120.1).

After reviewing the record, OSHA decided not to include these proposed provisions in the final standard. However, similar requirements for authorized employees are provided in the training section of the final standard. OSHA believes that these training requirements cover the responsibilities of the authorized employees, as well as other crucial training elements. (See summary and explanation of § 1915.89(o)(4) above.)

In paragraph (q)(3), OSHA revised the specifications for the program audit. Although the proposed rule included a requirement to review the energy-control program procedures (proposed § 1915.89(b)(6)), it did not specify what records the employer needed to review as part of the audit. The final rule identifies what records the employer must examine as part of the audit.

Paragraph (q)(3)(i) requires that the auditor review the written lockout/tags-plus program and procedures. This requirement will ensure that the employer addresses all of the machinery, equipment, and systems and the specific procedures for energy control in the worksite, as well as confirm that the employer is in compliance with paragraph (b) of this section. Paragraphs (q)(3)(ii) and (iii) require the auditor to review the current lockout/tags-plus log and verify its accuracy. By reviewing the log, the auditor will determine if it is up to date, if all possible sources of hazardous energy supplied to machinery, equipment, or systems have been properly isolated, and if the lockout/tags-plus coordinator is properly approving and authorizing each lock or tagout application. Finally, under paragraph (q)(3)(iv), the auditor must review any incident reports that have been completed since the last audit. By reviewing the incident reports, the auditor will analyze information that could lead to further incidents. This review also will ensure that the employer implements any corrective actions identified in the incident report, and that the employer conducts any necessary retraining. Reviewing this information will allow the auditor to determine whether the corrective actions were appropriate and effective in decreasing the possibility of future near-misses. Paragraphs (q)(3)(v) and (vi), like proposed paragraphs (b)(6)(i)(B) and (C), require employees to ensure that the auditor reviews with authorized employees their responsibilities under the lockout systems being audited, and with affected and authorized employees their responsibilities under the tags-plus systems being audited. These requirements are essential to the auditor's understanding of whether the employer's lockout/tags-plus procedures are understood and being followed by the applicable employees.

Paragraph (q)(4) of the final rule requires the employer to prepare a written audit report that includes, among other things, audit findings and recommendations for corrective actions. The final rule expands the requirement in the proposed rule, which was limited to certifying the date of the inspection, the equipment inspected, the employees included in the inspection, and the person performing it. The proposed rule did not require that the certification include the inspection findings and recommendations for corrective action, which OSHA believes to be the heart of the audit. OSHA believes the final rule provides more useful information to employers and will assist them to maintain an effective lockout/tags-plus program. For example, if a more detailed audit report is available, employers can refer to it when investigating subsequent incidents or near misses. A detailed report also provides employers with information that will assist them to determine, during the next program audit, whether they have improved the effectiveness of their lockout/tags-plus program. Finally, requiring a detailed audit report also ensures that the employer uses a systematic approach in evaluating the lockout/tags-plus program.

Paragraphs (q)(4)(i) and (ii) require the employer to ensure that the auditors prepare, and deliver to the employer, a written audit report that includes the date of the audit and the identity of the individual(s) performing the audit. The auditors must prepare and deliver the report within 15 days after completing the audit. Paragraph (q)(4)(iii) requires that the written report contain the identity of the procedure, and the applicable machinery, equipment, or system, being audited. Paragraph (q)(4)(iv) requires the written audit report to contain the findings of the program audit and all recommendations for correcting deviations or deficiencies identified during the audit. Paragraph (q)(4)(v) specifies that the written audit report also must contain any incident-investigation reports prepared since the previous audit (see § 1915.89(p)). Finally, paragraph (q)(4)(vi) requires the report to contain a description of any corrective actions that the employer performed in response to the findings and recommendations of any incident reports prepared since the previous audit.

Paragraphs (q)(5) and (q)(6) require that the employer promptly communicate the audit report findings and recommendations to each employee having a job task that may be affected by the audit and, within 15 days following receipt of the audit report, correct any deviations or inadequacies in the lockout/tags-plus program. These two paragraphs are new in the final standard. OSHA believes that it is important for employers to promptly communicate the findings of the report to employees, and to have a set period of time in which to correct the deviations and deficiencies, thereby protecting workers from the release of hazardous energy. OSHA designed the program audits to provide feedback to employers on hazardous-energy control programs so that the employers will correct promptly any deviations or deficiencies found in the lockout/tags-plus program. These audits also serve to ensure that employers are implementing the procedures properly, and that all employees receive information about the status of the program and procedures. OSHA believes that program audits permit employers to monitor significant safety procedures, and ensure compliance with the requirements of this section.

Paragraph (r)—Recordkeeping

Paragraph (r), which is a new paragraph in the final standard, consolidates in a single location the records in this section that employers must retain, and the period of time they must retain these records. Table 3 to subpart F, "Retention of Records Required by § 1915.89," provides a summary of these recordkeeping requirements. OSHA discussed each of these records in the respective sections of the summary and explanation. In developing these recordkeeping requirements, OSHA balanced the need to review records relating to the employer's lockout/tags-plus program with the burden of retaining outdated records.

As required by final paragraphs (b) and (d), the employer must establish and implement a written lockout/tags-plus program and procedures. OSHA concluded that employers must maintain these documents until they are replaced by updated programs or procedures. Employers should have no

difficulty meeting this requirement as it does not impose a significant document maintenance burden. Rather, it ensures that documentation of the employer's lockout/tags-plus program, and the resulting safety to employees, continues uninterrupted, even if the program and/or procedures change. Paragraph (o)(7) requires the employer to maintain records that employees accomplished training on lockout/tags-plus, and that this training is current. The employer must maintain these records until replaced by updated records for each type of training. Paragraph (o)(1) requires that employees receive initial training at whatever level they are working (i.e., employee, affected employee, authorized employee, or coordinator), and paragraph (o)(6) requires retraining as necessary. Over the course of an employee's career, he/she may participate in numerous training sessions. OSHA concluded that employers need to document various types and levels of training that employees receive pursuant to the lockout/tags-plus standard to prevent any omission in training required for an employee. This requirement will also aid employers to determine when retraining is necessary. This requirement should not impose an undue burden on employees since the standard, at final paragraph (o)(7), requires only that the training record contain the employees' names, dates of training, and the subject of training received.

Paragraph (p)(4) requires the employer to prepare a written incident-investigation report. The employer must maintain this report at least until completing the next program audit. This requirement will aid auditors in determining whether the employer successfully adopted the corrective actions recommended in the investigation report. Furthermore, paragraph (q)(4)(v) specifically requires that audit reports include, among other information, incident-investigation reports generated since the previous audit. To comply with paragraph (q)(4)(v), the employer must retain all investigation reports prepared since the previous audit.

Finally, paragraph (q)(4) requires that the employer prepare a written audit report. OSHA concluded that employers must maintain this report for at least 12 months after being replaced by the next audit report. Since audits must be conducted at least once a year, the retention of audit reports for one year after being replaced by the next audit report provides the employer with at least two audit reports at any one time. Inspection of these reports will give the employer an indication of safety trends in the workplace, as well as information about components of the employer's lockout/tags-plus program that may need improvement.

Paragraph (s)—Appendices

This final standard includes a non-mandatory appendix that employers and employees can use to implement the requirements of this section. The appendix also provides other information on the control of hazardous energy. OSHA included this appendix in the proposal. In this final standard, OSHA updated the appendix to include changes to the final lockout/tags-plus provisions. None of the information in this appendix adds or detracts from any of the requirements of this section.

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

General

Lockout/Tags-Plus Procedure

Lockout/Tags-plus Procedure for

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

Purpose

This procedure establishes the minimum requirements for the lockout/tags-plus application of energy-isolating devices on vessels and vessel sections, and for landside facilities whenever servicing is done on machinery, equipment, or systems in shipyards. This procedure shall be used to ensure that all potentially hazardous-energy sources have been isolated and the machinery, equipment, or system to be serviced has been rendered inoperative through the use of lockout or tags-plus procedures before employees perform any servicing when the energization or start-up of the machinery, equipment, or system, or the release hazardous energy could cause injury.

Compliance with This Program

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

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

Procedures for Lockout/Tags-plus Systems

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

Method of notifying all affected employees.

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

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

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

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

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

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

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

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

Type(s) of hazardous energy—methods used to control them.

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

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

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

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

Procedures for Removal of Lockout/Tags-plus Systems

When servicing is complete and the machinery, equipment, or system is ready to return to normal operating condition, the following steps shall be taken:

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

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

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

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

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

Section 1915.90—Safety Color Code for Marking Physical Hazards

Section 1915.90 of the final rule, like the proposal, incorporates by reference 29 CFR 1910.144, the general industry standard on safety color-coding for marking physical hazards.

The provisions of § 1910.144, which already apply to shipyard employment, both onshore and on vessels, require that the color red shall be the basic color for the identification of dangerous conditions such as red paint used for containers of flammable liquids, red lights at barricades and temporary obstructions, and red danger signs. The general industry standard also specifies that red shall be the color used for emergency stop buttons, electric switches, and machine stop bars. In addition, the standard requires that yellow be used as the basic color for designating caution and marking physical hazards such as slip, trip, and fall hazards.

Some stakeholders raised questions about the application of the provision on vessels (Exs. 101.1; 105.1; 124; 126; 128; 130.1; 132.2). For instance, American Seafoods Company requested clarification about whether employers, specifically shipyard and ship-repair employers, would be required to color-code physical hazards on vessels undergoing repair and maintenance in shipyards (Ex. 105.1). Other stakeholders questioned whether shipyard employers would have to color-code physical hazards on vessels that they do not own before they begin work (Exs. 101.1; 124; 126; 128; 130.1). One stakeholder recommended that OSHA limit application of the provision to landside facilities and temporary systems placed onboard vessels during repair (Ex. 132.2).

As discussed in section I(D), "Hazards," of this preamble to the final rule, work on vessels involves many serious hazards and dangerous conditions. If these hazards are not marked in a uniform and readily apparent way that is recognizable to all workers, those workers may be at risk of serious harm. The OSH Act requires that employers provide employees with employment and a place of employment that is free from recognized hazards (29 U.S.C. 654). This means that shipyard employers must ensure that their employees are protected from physical hazards wherever they work, including onboard any vessel undergoing repair and maintenance. Therefore, whenever the potential exists for employees to be exposed to a physical hazard on shore or onboard any vessel, shipyards and repair facilities are required to color-code all physical hazards on vessels undergoing repair and maintenance.

This standard has been applicable to shipyard employment, including work on vessels, since OSHA adopted it pursuant to section 6(a) of the OSH Act. Therefore, OSHA does not believe that employers should have difficulty complying with it. In addition, the standard gives employers flexibility in determining what methods or material they use to color-code physical hazards. For example, employers would be free to color-code hazards using tape, paint, ties, or other similar methods.

American Seafoods Company indicated that OSHA should add the requirements in §§ 1910.144 and 1910.145 (discussed in § 1915.91 of this preamble) to part 1915, subpart F, because they think that it is "onerous" for employers to have to refer to both part 1915 and part 1910 to determine what standards are applicable to shipyard employment (Ex. 105.1). OSHA believes that simply stating that §§ 1910.144 and 1910.145 apply to shipyard employment addresses the stakeholder's concern. By specifically referencing §§ 1910.144 and 1910.145 in §§ 1915.90 and 1915.91, respectively, shipyard employers will instantly know that those general industry sections are applicable to them. It eliminates what the stakeholder calls an "onerous" step of having to examine whether any or all of the provisions in §§ 1910.144 and 1910.145 apply. Moreover, the ready availability of OSHA standards on the OSHA Web site makes it easy for employers to obtain copies of any standards that apply to shipyard employment, whether they are in part 1910 or part 1915.

Section 1915.91—Accident Prevention Signs and Tags

Section 1915.91 of the final rule, like the proposed rule, incorporates by reference the general industry standard on accident prevention signs and tags, 29 CFR 1910.145. Section 1910.145 requirements address the classification, design, and wording of accident prevention signs and tags. OSHA believes that incorporating the general industry standard is necessary to provide consistent protection whenever shipyard employees are exposed to potentially hazardous conditions. It also ensures that important warning and danger signs and tags are uniform in design and use, which OSHA believes will increase their effectiveness.

The provisions addressing accident prevention signs are already applicable to shipyard employment on vessels and on shore (§ 1910.145(a) through (e)). The general industry provisions also require that accident prevention tags be used when employees are exposed to potentially hazardous conditions, equipment, or operations that are "out of the ordinary, unexpected or not readily apparent" (§ 1910.145(f)). Tags are required to be uniform for message, legibility, positioning/affixing, and comprehensibility. However, as explained in the proposed rule, the general industry standard expressly excludes the application of accident prevention "tags" to maritime (§ 1910.145(f)(ii)). OSHA believes that applying the requirements on accident prevention tags to shipyard employment provides needed protection since part 1915 does not have comprehensive, uniform requirements for the application and use of such tags. The final rule ensures that all of § 1910.145 is applicable to shipyard employment.

To eliminate any confusion, the final rule both incorporates by reference § 1910.145, and removes the maritime exclusions from that section (for example, "marine regulations" (§ 1910.145(a)(1)) and "maritime" (§ 1910.145(f)(ii)). OSHA recognizes that the terms "maritime" and "marine" sometimes collectively refer to shipyard employment, marine terminals, and longshoring. Removing the maritime and marine references from these general industry sections does not make the general industry standard applicable to marine terminals and longshoring. In this regard, §§ 1910.16, 1917.1(a)(2), and

1918.1(b) exclude marine terminals (29 CFR part 1917) and longshoring (29 CFR part 1918) from coverage under § 1910.145 because § 1910.145 is not incorporated into §§ 1910.16, 1917.1(a)(2) or 1918.1(b) and, therefore, does not apply to marine terminals or longshoring.

OSHA believes that incorporating the general industry requirements should not pose problems for shipyard employers since accident-prevention tags are universally recognized. Moreover, the use of both accident-prevention signs and tags, specified in § 1910.145, is already applicable to shipyard employment.

Several commenters questioned whether the shipyard or repair facility is responsible for posting signs on vessels that are undergoing repairs or maintenance (Exs. 99; 101.1; 104.1; 107.1; 124; 126; 128; 130.1). Shipyard employers are responsible for posting accident prevention signs and tags to identify hazards on vessels on which their employees perform repair or maintenance work. This includes applying accident prevention signs and tags to protect workers from identified hazards in their work and at the workplace, regardless of who owns the vessel on which they may be working. Therefore, whenever there is a potential for employees to be exposed to a hazard, either on a vessel or shoreside, the shipyard employer must post accident prevention signs and tags to prevent potential injury, illness, or fatality.

Section 1915.92—Retention of DOT Markings, Placards, and Labels

In § 1915.92, OSHA is retaining, with minor editorial changes, the existing requirements in § 1915.100 on the retention of DOT markings, placards, and labels on hazardous materials the shipyard receives. This final standard includes minor editorial changes from the proposed rule.

Paragraphs (a) and (b) of this section require that employers not remove labels and markings on any hazardous materials or freight containers, rail freight cars, motor vehicles, or transportation vehicles that the U.S. Department of Transportation regulations require to be marked, until the hazardous materials are removed, and that employers clean any residue and purge any vapors to prevent potential hazards. These requirements apply regardless of how the shipyard receives the hazardous material packages (for example, single packages, in bulk).

Paragraph (c) requires that the markings, placards, and labels on the hazardous materials be maintained so that they are "readily visible." Paragraph (d) states that employers are considered in compliance with this section if the markings or labels on non-bulk packages that will not be reshipped are affixed in accordance with the Hazard Communication standard, § 1910.1200. Paragraph (e) specifies that the definition of "hazardous materials" and other undefined terms have the same definition as the U.S. Department of Transportation Hazardous Materials Regulations (49 CFR parts 171 through 180).

OSHA did not receive any comments on proposed § 1915.92. The Agency concludes that DOT markings, placards, and labels on hazardous materials need to be visible to workers for as long as a hazard is present so workers can protect themselves and others. Therefore, OSHA retained these provisions in the final standard with no change.

Section 1915.93—Vehicle Safety Equipment, Operation, and Maintenance

The purpose of this section is to address the hazards associated with the use of motor vehicles at worksites engaged in shipyard employment by setting forth requirements for motor vehicle safety equipment, and for the safe operation and maintenance of motor vehicles. Statistics provided in the proposal, collected from the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries database, reported that 27 shipyard employees were killed in transportation accidents over an 11-year period (1993–2003) (Ex. 69). These fatalities accounted for 17 percent of the deaths during that time. The BLS data also reveal that since 1998, an estimated 225 shipyard employees have suffered motor vehicle-related injuries serious enough to involve days away from work. In 2002 alone, 63 shipyard employees suffered injuries involving days away from work in transportation accidents (72 FR 72500–72501, Dec. 20, 2007). Due to the significant number of reported fatalities and injuries involving transportation accidents among shipyard employees, OSHA concluded that the motor vehicle safety provisions are necessary, and that the requirements set forth in § 1915.93 will reduce the number of motor vehicle-related fatalities and injuries.

Paragraph (a)—Application.

In proposed § 1915.95, OSHA defined the term "motor vehicle" to mean any motor-driven vehicle operated by an employee that is used to transport employees, materials, or property. The proposed definition of "motor vehicles" included passenger cars, light trucks, vans, motorcycles, all-terrain vehicles, powered industrial trucks, and other similar vehicles. During the hearing, two shipyard employers testified that they use Mules™, which are small utility vehicles comparable to large golf carts, for transporting employees, materials, or property in shipyards. Northrop Grumman Shipbuilding – Newport News stated:

> We have experimented with some things that we affectionately call mules that [I] think is a trade name. It's a little motorized kind of a small scooter with a little cargo box in the back, and we have a few of those, so those are some examples of how employees get around (Ex. 168, p. 296).

Bath Iron Works also provided information on these vehicles, stating: "We have recently introduced what they call the mule, the 4-wheel drive, caboose cab with seat belts and a little place to put material in the back to haul to job sites" (Ex. 168, p. 297). Based on these comments, the Agency added to the final rule the phrase "small utility vehicles" to the definition of "motor vehicle."

Proposed paragraph (a)(1) limited the scope of this section to any motor vehicle used to transport employees, materials, or property at shipyards; however, the purpose of this provision was to apply to all worksites engaged in shipyard employment. Thus, OSHA changed the scope of this section in the final rule for clarity to include any motor vehicle used to transport employees, materials, or property at worksites engaged in shipyard employment. Paragraph (a)(1) also makes clear that the requirements set forth in § 1915.93 do not apply to the operation of motor vehicles on public streets and highways. This provision was carried over from the proposal to the final rule with no change. OSHA did not receive any comments on this proposed provision.

OSHA believes that Federal, State, and local laws and regulations, such as safety belt and vehicle inspection laws, already provide adequate protection on public roads. Thus, this section is directed to conditions where those laws and regulations may not apply to motor vehicles used in shipyard employment (for example, on shipyard property when transporting employees between work areas or worksites, or when moving materials or property). Nonetheless, OSHA believes the rule's benefits will extend beyond motor vehicle operation at shipyard worksites by fostering good safety, driving, and vehicle-maintenance habits. For example, OSHA believes that an employee who is required by an employer to wear a safety belt while

riding in a motor vehicle on shipyard property is more likely to continue to wear it when the vehicle leaves the shipyard, even if the employee leaves the shipyard in a private motor vehicle. Likewise, a motor vehicle that is maintained in safe operating condition for use in shipyard employment will also be safe when it is used on public roads.

Paragraph (a)(2), which is carried over unchanged from the proposal, limits most of the requirements of this section to motor vehicles the employer provides. However, because some employers allow employees to use their own motor vehicles to transport themselves, other employees, and materials within the shipyard, paragraph (a)(2) specifies that three provisions in this section also apply to motor vehicles that employees provide. Those provisions are the requirements that each worker riding in a motor vehicle use safety belts (§ 1915.93(b)(2)), that motor vehicles have seats for each employee being transported (§ 1915.93(b)(4)), and that tools and materials transported by motor vehicles be firmly secured (§ 1915.93(c)(2)). OSHA did not receive any comments on proposed paragraph (a)(2).

OSHA concludes that these safety provisions are necessary to protect workers using or riding in motor vehicles during shipyard employment. The requirements ensure that employers are providing their workers with safe and serviceable motor vehicles. In addition, this section enhances the safety of workers using their own vehicles on the job by requiring employers to ensure safe driving practices while those employees are on shipyard property.

Paragraph (a)(3) specifies that the motor vehicle safety equipment requirements in paragraph (b)(1) through (b)(3) apply to the operation of powered industrial trucks (for example, forklifts) in shipyards. Employers must ensure that powered industrial trucks used in shipyard employment be equipped with safety belts (paragraph (b)(1)); that employees use safety belts while operating powered industrial trucks (paragraph (b)(2)); and that safety equipment is not removed from powered industrial trucks (paragraph (b)(3)). In addition, employers must replace safety equipment that is removed from any powered industrial truck (paragraph (b)(3)). OSHA did not receive any comments on proposed paragraph (a)(3).

The provisions in paragraph (b)(1) through (b)(3) supplement requirements in the general industry standard on powered industrial trucks (29 CFR 1910.178) that are applicable to shipyard employment through 29 CFR 1910.5(c)(2). Section 1910.178 does not require powered industrial trucks to be equipped with safety belts. Much of the general industry standard was promulgated pursuant to section 6(a) of the OSH Act (29 U.S.C. 655(a)), which permitted OSHA in the first two years after the effective date of the OSH Act (April 28, 1971) to adopt as OSHA standards any established Federal occupational safety and health standards or national consensus standards. The OSHA powered industrial truck standard was drawn from the ANSI standard on low-lift and high-lift trucks in effect at the time (ANSI B56.1–1969). The 1969 ANSI standard did not have a safety belt requirement, but when the ANSI standard was revised in 1993, provisions were added to it requiring that powered industrial trucks manufactured after 1992 be equipped with safety belts, and also requiring that operators use them. The current ANSI/ASME standard has the same requirements. Although the general industry standard has not been updated to include safety belt requirements, OSHA, when issuing its 5(a)(1) enforcement policy, said that the provisions in ANSI/ASME B56.1–1992 demonstrate "recognition of the hazard of powered industrial truck tipover and the need for the use of an operator restraint system" (Ex. 25, Memorandum dated October 9, 1996, to Regional Administrators from John Miles). Paragraph (a)(3) codifies OSHA's enforcement policy. OSHA believes that applying paragraphs (b)(1) through (b)(3) to powered industrial trucks used in shipyard employment supplements applicable general industry requirements with important protection for workers.

Paragraph (a)(3) indicates that the seating requirements in paragraph (b)(4) do not apply to powered industrial trucks since some powered industrial trucks are manufactured to operate in a standing position and are not equipped with seats. In addition, paragraph (m)(3) of § 1910.178 already requires that a safe place to ride be provided in situations in which riding is permitted.

Paragraph (a)(3) also makes clear that employers must continue to comply with the maintenance, inspection, operation, and training requirements for powered industrial trucks in § 1910.178; therefore, the motor vehicle operation and maintenance requirements in this section do not apply to powered industrial trucks. The requirements in § 1910.178 are more comprehensive and provide more specific protection to employees using powered industrial trucks than the more general motor vehicle operation and maintenance requirements described in § 1915.93 (see 29 CFR 1910.5(c)(1)).

Paragraph (b)—Motor Vehicle Safety Equipment

Paragraph (b) of the final rule requires employers to ensure that motor vehicles used in shipyard employment are equipped with motor vehicle safety equipment and that the safety equipment is used while motor vehicles are operated.

Paragraph (b)(1), which is identical to the proposed rule, requires that employers ensure that each motor vehicle acquired by the employer or put in service for the first time after the final rule becomes effective is equipped with a safety belt for each employee operating or riding in the vehicle. It is well documented that safety belts reduce the risk of injury and death; therefore, OSHA believes this requirement is necessary and appropriate (Exs. 12; 14, p. 61; 15, p. 6; 16; 17; 18; 21; 28). There have been injuries and fatalities in shipyard employment and in other industries resulting from not using safety belts while operating or riding in motor vehicles, including powered industrial trucks and other off-road vehicles (Ex. 19). Recognition of the hazards of operating motor vehicles without safety belts is also shown by the national consensus standards that require motor vehicles to be equipped with operator restraints, and that specify that operators and passengers use them (Ex. 38 at Ex. 3–13, SAE J386—1997, Operator Restraint Systems for Off-Road Work Machines, and Ex. 3–10, ANSI/ASME B56.1–2000, Safety Standard For Low Lift and High Lift Trucks). Requiring the use of safety belts makes this section consistent with those standards.

Paragraph (b)(1) limits the application of this requirement to motor vehicles acquired or put into initial service by the employer after the final rule becomes effective. Although OSHA believes that the vast majority of motor vehicles acquired or put into initial service after the effective date of the final rule will be new vehicles manufactured with safety belts, paragraph (b)(1) also requires that any used motor vehicle that an employer acquires and uses for the first time after the effective date also must have safety belts. Uniformly applying this section to all motor vehicles acquired or used for the first time after the effective date ensures that employees operating these vehicles will have full protection

regardless of which motor vehicle they operate or ride in.

Several stakeholders said they already require the use of safety belts in motor vehicles, including powered industrial trucks used in shipyard employment at their facilities. Northrop Grumman Shipbuilding – Newport News stated: "Seatbelts are required and worn when operating forklifts and other mobile equipment" (Exs. 116.2; 120.1). Todd Pacific Shipyards Corporation testified that it requires workers to use safety belts when operating forklifts and battery-powered carts at its facility (Ex. 198, pp. 53–54). Additionally, Trident Seafoods Corporation commented that workers who operate forklifts must wear seatbelts. Trident's enforcement policies are described as:

> We have a progressive system in place there that our shipyard competent person at our facility and manager, and any manager at that facility is encouraged to support, [and] that [is] if you see someone not wearing a seatbelt, we have a chit system where we write them up and put [the write-ups] in their files (Ex. 198 p. 135).

OSHA believes that the record supports including the safety belt requirement in the final rule, and that employers will not have any difficulty meeting these provisions. Therefore, the Agency believes the requirements set forth in paragraph (b)(1) are necessary and will prevent workers from being injured or killed if they are in a motor vehicle accident while working.

Paragraph (b)(1) includes an exception to the safety belt requirement for those motor vehicles not originally manufactured with them (for example, buses). This exception relieves employers of the burden of retrofitting those motor vehicles, already in service, that were not originally manufactured with safety belts. However, if safety belts have been removed from any motor vehicle manufactured with them, the employer must replace the safety belts or remove the motor vehicle from service.

Paragraph (b)(2) of the final rule is a companion to (b)(1). Identical to the proposed rule, it requires the employer to ensure that employees use safety belts at all times while operating or riding in a motor vehicle. As mentioned above, motor vehicle accidents are a significant cause of employee injury and death, and safety belts have been shown to reduce that risk. OSHA notes that the requirement in paragraph (b)(2) applies to all motor vehicles used at shipyards, including powered industrial trucks and motor vehicles that workers provide. Forklift trucks, for example, are particularly susceptible to tipovers if they are operated on uneven ground, sand, or railways; hit potholes; turn corners sharply; or strike objects with their mast. These conditions are often found in shipyards. In many forklift tipover accidents, operators have been injured or killed because they were thrown from the forklift, or were struck or crushed by the forklift when they tried to jump free. In 2001, BLS reported that, across private industry, 35 of 123 forklift fatalities (28 percent) involved tipovers or falling from a moving forklift. In contrast, in many cases when forklift operators were wearing safety belts, the injuries were more limited. In one tipping accident, an OSHA inspector noted that the operator was wearing a safety belt, and the injuries were limited to four fingers on one hand (Ex. 69).

In the preamble for the proposed rule, OSHA requested comment on concerns that some forklift operators have raised about using safety belts when operating the trucks near water (72 FR 72500–72501, Dec. 20, 2007). Northrop Grumman Shipbuilding–Newport News said it was not aware of such concerns, and requires the use of safety belts when operating forklifts (Exs. 116.2; 120.1). Similarly, other stakeholders who commented on this section said they require the use of safety belts when operating powered industrial trucks (Exs. 135; 198, pp. 53–54). Accordingly, OSHA is specifying in this final rule that the requirements in paragraph (b)(2) apply whenever powered industrial trucks are used in shipyard employment.

Paragraph (b)(2) also requires the employer to ensure that employees wear safety belts securely and tightly fastened at all times while operating or riding in motor vehicles. The proposed rule contained an identical requirement. OSHA believes this language is necessary because, if the safety belt is not properly fastened, it may not hold or restrain the employee within the motor vehicle compartment in the event of an accident or tipover.

As stated above, the safety belt requirement applies to both employer- and employee-provided motor vehicles used to transport employees, materials, or property on shipyard premises. The risk of injury exists regardless of whether employees operate or ride in employer- or employee-provided motor vehicles on shipyard property. Applying this provision to all motor vehicles used in shipyard employment will ensure that employees have full and uniform protection any time they are in a motor vehicle during shipyard employment. OSHA did not receive any comments opposing paragraph (b)(2).

Paragraph (b)(3), which is identical to the proposal, requires employers to ensure that motor vehicle safety equipment is not removed from employer-provided vehicles and, if such equipment is removed, the employer must replace it. For purposes of this paragraph, motor vehicle safety equipment is defined in § 1915.80(b) to include items such as safety belts, airbags, headlights, tail lights, emergency/hazard lights, windshield wipers, defogging or defrosting devices, brakes, mirrors, horns, windshields and other windows, and locks. This provision must be read in conjunction with paragraph (c)(1), discussed below, which requires that employers equip motor vehicles with safety equipment that is in serviceable and safe operating condition. OSHA did not receive any comments on proposed paragraph (b)(3).

Paragraph (b)(4) requires that motor vehicles used to transport employees have a firmly secured seat for each employee being transported. It also requires the employer to ensure that employees use the seat when they are being transported. OSHA is aware that some shipyards transport employees from one worksite to another in the back of pickup trucks that are not equipped with seats. For example, Northrop Grumman Shipbuilding–Newport News stated:

> Employees are permitted to ride seated in the bed of pickups, in addition [to] riding in passenger vehicle seats. We enforce a maximum speed limit of 15 mph in the shipyard. We prefer to continue this practice within our shipyard. There have been no accidents or injuries associated with this practice in the history of the shipyard (Exs. 116.2, 120.1).

However, other stakeholders recognized that transporting workers in open areas of motor vehicles without appropriate seating poses a risk of injury or death. For instance, Bath Iron Works testified: "We don't allow anybody riding in the back of pickups" (Ex. 168, p. 297). The Agency believes that the practice of allowing employees to ride in the back of pickup trucks places employees at risk of injury from falling out of or being thrown from the vehicle, even at low speeds. In 2001, for instance, a construction employee riding in the back of a pick-up while placing cones on a highway fell out and was killed even though the truck was traveling only 10 to 15 mph, which is the speed limit in many shipyards that have established speed limits.

OSHA believes that ensuring that employers use motor vehicles equipped with safe seating to transport workers in shipyards will protect them from possible injury or death. Thus,

employers need to ensure that motor vehicles used to move employees throughout the shipyard have seats for each employee transported, and to prohibit motor vehicles that do not have such seating from being used to transport employees. As mentioned earlier, OSHA is applying this provision to employee-provided motor vehicles, as well as employer-provided motor vehicles. This requirement will ensure that every vehicle transporting employees in shipyards provides the same protection to employees.

Paragraph (b)(4), as in the proposal, also requires that the seating be firmly secured. Portable seating that is not firmly attached to the motor vehicle would not be permitted as a means to comply with this provision. OSHA believes that employers should not have problems complying with this provision since several shipyard employers already use vans and automobiles that have firmly secured seats to transport employees (Exs. 168, p. 328; 198, pp. 17–18).

Paragraph (c)—Motor Vehicle Maintenance and Operation

Paragraph (c) covers requirements for the maintenance and operation of motor vehicles used in shipyard employment.

Paragraph (c)(1), which is identical to the proposal, requires employers to ensure that each vehicle is maintained in a "serviceable and safe operating condition." Safe operating condition refers to the condition of equipment that directly affects the safe operation of the vehicle. For example, motor vehicle safety equipment, which is defined in § 1915.80(b) to include items such as safety belts, airbags, headlights, tail lights, emergency/hazard lights, windshield wipers, defogging or defrosting devices, brakes, mirrors, horns, windshields and other windows, and locks must be in safe working order. The term "serviceable condition" is defined as the state or ability of a vehicle to operate as prescribed by the manufacturer. Accordingly, motor vehicles maintained and operated in accordance with manufacturers' instructions and recommendations are considered to be in compliance with this provision.

Paragraph (c)(1) also requires that motor vehicles be removed from service if they are not in a serviceable and safe operating condition. The motor vehicle may not be used for shipyard employment until the problem is resolved or the damage repaired. OSHA does not believe employers will have difficulty complying with this provision. In this regard, the Shipbuilders Council of America commented that motor vehicles used by shipbuilders "are frequently inspected by in-house Maintenance departments to ensure all functions of the vehicles are working properly" (Exs. 202.1; see also 116.2; 120.1).

OSHA believes that properly functioning and maintained safety equipment in motor vehicles is essential to protect all workers who may come in contact with the vehicle. A vehicle that is not maintained in a serviceable and safe operating condition presents a danger to operators, passengers, bicyclists, and pedestrians. Therefore, the requirements of paragraph (c)(1) will protect employees from injury or death in shipyard-employment workplaces.

Paragraph (c)(2) requires that tools or equipment being transported in a motor vehicle, whether employer- or employee-provided, must be secured to prevent unsafe movement of the tools or equipment that could endanger employees. This provision will help to reduce the risk of injury due to heavy or sharp tools or equipment sliding into or hitting operators or passengers. It will also prevent tools and materials from falling or being thrown from a motor vehicle and striking workers who may be in the area. No comments were received on this paragraph. OSHA has included paragraph (c)(2) into the final standard with no change from the proposal.

Paragraph (c)(3) addresses hazards associated with intermingling pedestrian, bicycle, and motor vehicle traffic in shipyard employment. When pedestrians, bicyclists, and motor vehicles share shipyard roadways, collisions may occur if motor vehicle operators do not see pedestrians or bicyclists in time to avoid hitting them. Depending on the size and configuration of the shipyard employment work areas or worksites, there may be a significant mixture of motor vehicle, bicycle, and pedestrian traffic. Narrow or unmarked roads between work areas and worksites are likely to increase the risk of collision.

Many employers provide bicycles or allow employees to use their own to get from one work location to another (Exs. 116.2; 120.1; 168, p. 296). As the use of bicycles has grown, so too have reports of collisions. For example, an employee riding a bicycle to perform regularly assigned work tasks in a Mississippi shipyard was killed when he collided with a motor vehicle (Ex. 11). With the intermingling of traffic in shipyards, OSHA believes it is important to ensure that employees riding bicycles and walking can be seen by motor vehicle operators so they will not be injured or killed.

Paragraph (c)(3), as proposed, required that employers implement measures to ensure that motor vehicle operators can see and avoid hitting pedestrians and bicyclists traveling in shipyards. The proposal identified examples of some measures that employers may implement to comply with the requirement. Proposed paragraphs (c)(3)(i) through (c)(3)(vi) identified the following examples that employers might use to protect pedestrians and bicyclists: Establishing dedicated travel lanes for motor vehicles, bicyclists, and pedestrians; installing crosswalks and traffic control devices such as stop signs or physical barriers; establishing speed limits and "no drive" times; providing reflective vests or similar gear to pedestrians and bicyclists; and ensuring that bicycles have equipment, such as reflectors and lights, to maximize visibility.

Many stakeholders said that they have already implemented a number of these measures. In addition, several stakeholders recommended that OSHA include additional measures in the final rule. Although the measures in proposed paragraph (c)(3) were not a complete listing of examples, some stakeholders believed that adding additional examples would give employers greater flexibility in protecting pedestrians and bicyclists. For example Electric Boat stated:

> Electric Boat agrees that pedestrian safety should be addressed in the final rule; however a performance-based regulation should be established due to the wide range of motor vehicles used in the facility and the site configuration. A combination of training, procedures, barriers, and signage should be allowed to meet the goal of pedestrian safety (Ex. 108.2).

The Shipbuilders Council of America commented:

> Shipyards are dynamic environments, and it is not uncommon for employees to be in roadways and vehicles to be in 'walkways.' SCA recommends some flexibility with shipyard specific operational controls, such as 'right of way' rules, to ensure the safety of employees (Ex. 114.1).

General Dynamics NASSCO added:

> Shipyards are dynamic environments, and it is not uncommon for employees to be in roadways and vehicles to be in walkways. Rather than requiring an unattainable standard, some flexibility is recommended with shipyard specific operational controls to augment engineering controls to ensure the safety of employees. NASSCO would offer the following language[:]
>
> Establishing dedicated travel lanes or "right of way" rules for motor vehicles, bicyclists, and pedestrians [Emphasis in original](Ex. 119.1).

In addition, ASA provided several additional examples of effective ways to protect pedestrians and bicyclists:

> Some of our facilities have crosswalks at high volume crossing points and walkways in some areas. However, due to the age of some facilities many buildings border roadways, and there is little or no room for separate pedestrian paths. Rigorous control of speed, use of mirrors at blind spots, operator training, and general awareness training are the primary means used to minimize the risk of pedestrian and vehicular collisions. These measures have proved effective over many years of experience (Ex. 204.1).

Further, Northrop Grumman Shipbuilding – Newport News and Bath Iron Works said that they have established speed limits for all motor vehicles, and "no drive" times to allow for the safe movement of pedestrians (Exs. 116.2; 120.1; 168, pp. 294–295). Northrop Grumman said: "We have a speed limit of 15 mph, reduced to 10 mph in certain areas of the shipyard" (Exs. 116.2; 120.1). They also testified:

> [A]t shift change, and at lunch, we have no drive periods that are 10 minutes around the beginning of the shift, lunch, and then the end of the shift that all vehicular traffic stops so as to allow pedestrians time * * * to transit, to come and go from the yard. Also, around lunchtime so if * * * they are moving throughout that yard to get a sandwich or something, they can do so and minimize the risk (Ex. 168, pp. 294–295).

OSHA agrees that implementation of the measures provided by the stakeholders will control the hazards associated with motor vehicles, bicyclists, and pedestrians sharing accessways in the shipyard. Therefore, the Agency included these measures in final paragraphs (c)(3). Specifically, paragraph (c)(3)(ii) adds mirrors at blind intersections to the examples of traffic-control devices. Establishing speed limits for motor vehicles and "no drive" times are included in paragraphs (c)(3)(iii) and (c)(3)(iv), respectively. That said, OSHA stresses that the list of measures in the final rule that employers may use to protect pedestrians and bicyclists is not exhaustive. Thus, new paragraph (c)(3)(vii) states that employers may also use other effective measures to protect pedestrians and bicyclists from being injured by motor vehicles, as long as the employer can demonstrate that those measures are as effective as the ones specified in paragraphs (c)(3)(i) through (vi).

In addition to these new measures, OSHA is including in the final rule all of the measures mentioned above that were proposed in paragraph (c)(3). OSHA believes employers should not have difficulty implementing these measures since employers already are using similar measures and have found them to be effective.

The International Safety Equipment Association recommended that OSHA require that high-visibility safety apparel comply with "ANSI/ISEA 107–2004, American National Standard for High Visibility Safety Apparel and Headwear" (Ex. 113.1). OSHA decided to retain a performance-based approach for the examples of safety measures included in paragraph (c)(3) of the final rule. Whether employers elect to use reflective vests or other apparel, they must ensure that motor vehicle operators are able to see and avoid pedestrians and bicyclists. This performance-based approach also means that employers may need to implement more than one type of safety measure to ensure that the required performance is met.

Section 1915.94—Servicing Multi-Piece and Single-Piece Rim Wheels

Section 1915.94 of the final rule, like the proposal, incorporates the general industry standard and non-mandatory appendices on servicing multi-piece and single-piece rim wheels, 29 CFR 1910.177. The standard applies to servicing multi-piece and single-piece rim wheels on large vehicles such as trucks, tractors, trailers, buses, and off-road machines, all of which are used in shipyard employment. The standard does not apply to servicing rim wheels on automobiles, or on pick-up trucks or vans using either automobile or "LT" (light truck) tires (see § 1910.177(a)(1)). Also, the standard establishes requirements for the following four major areas: (1) Training for all tire-servicing employees (§ 1910.177(c)); (2) the use of proper equipment such as clip-on chucks, restraining devices, or barriers to retain the wheel components in the event of an incident during the inflation of tires (§ 1910.177(d)); (3) the use of compatible components (§ 1910.177(e)); and (4) the use of safe operating procedures for servicing multi-piece and single-piece rim wheels (§§ 1910.177(f) and (g)).

The general industry standard exempted shipyard employment. However, OSHA understands that shipyards use many large motor vehicles, and was concerned that workers could be injured or killed if shipyards were servicing the tires on those vehicles. Northrop Grumman Shipbuilding – Newport News commented that it services multi-piece and single-piece rim wheels, and added that it already follows the requirements set forth in the general industry standard (Exs. 116.2; 120.1). Northrop Grumman's practice supports what OSHA noted in the preamble to the proposed provision: shipyards that service the tires on their vehicles are likely to be aware of and follow the safety provisions in § 1910.177. As such, OSHA believes that applying the general industry standard to shipyards should not pose a problem for shipyard employers.

To avoid confusion, OSHA also amended § 1910.177 to remove the shipyard-employment exemption.

Deletions

OSHA proposed to not include in revised subpart F the following provisions that are currently applicable to shipyard employment. The hazards and working conditions these provisions address are not present in the shipyard industry.

Section 1910.141(f)—OSHA proposed not to retain the existing requirement to provide facilities to dry work clothing (for example, protective clothing) before it is worn again. Information from site visits and industry meetings indicates that the provision may not be necessary because shipyards almost exclusively provide disposable protective clothing. OSHA requested comments or information about whether this provision was still needed in the shipyard industry. No comments were received on this provision; therefore, it will be deleted from 29 CFR part 1910.

Section 1910.141(h)—OSHA proposed not to retain the existing requirements addressing food handling. OSHA believes that existing State and local health codes provide adequate protection for the hazards this section intended to address. OSHA requested comments as to whether this provision was still needed. No comments were received on this provision; therefore, it will be deleted from 29 CFR 1910.

Section 1915.97(a)—OSHA proposed not to retain the existing requirement on controls and personal protective equipment (PPE). This provision was adopted 30 years ago, prior to promulgation of standards addressing specific hazards and the PPE requirements in subpart I of part 1915. Those standards identify and require the controls and PPE this section addresses. No comments were received on this provision; therefore, it will be deleted from 29 CFR part 1915.

Section 1915.97(e)—OSHA proposed to delete the existing prohibition that minors under 18 years of age not be employed in shipbreaking or related employments. This prohibition is the only OSHA rule that regulates the working activities allowed for youth employees and is duplicative of OSHA's

sister agency in the Department of Labor, the Employment Standards Administration (ESA) order 15 of the Part 570 subpart E, which prohibits minors from working in all occupations in wrecking, demolition, and shipbreaking operations. These operations are defined as "all work, including clean-up and salvage work, performed at the site of the total or partial razing, demolishing, or dismantling of a building, bridge, steeple, tower, chimney, other structure, ship or other vessel" (§ 570.66).

In addition to regulations set by ESA, States also have numerous rules regulating work conditions for youth employees. OSHA asked for comments on the provisions of this section as to the extent to which youth employees are working in the shipyard industries, what occupations they work in, data on work-related injuries and illnesses occurring to youth employees, and whether the § 1915.97(e) prohibition was needed to protect youth employees. No comments were received on this provision. However, after further reexamination by the Agency, OSHA believes it worthwhile to retain this provision to ensure that the regulations set by ESA are widely understood and followed. Therefore, the provision in § 1915.97(e) will be retained in the final standard with no change.

IV. Final Economic Analysis and Regulatory Flexibility Act Analysis

A. Introduction

The OSH Act requires OSHA to demonstrate the technological and economic feasibility of its rules. Executive Order (EO) 12866 and the Regulatory Flexibility Act (RFA), as amended in 1996 (5 U.S.C. 601 *et seq.*), require Federal agencies to analyze the costs, benefits, and other consequences and impacts, including small business impacts, of their rules. Consistent with these requirements, OSHA prepared a Final Economic Analysis (FEA) and RFA analysis for the final rule.

OSHA determined that this rule is not an economically "significant regulatory action" under EO 12866 or the Unfunded Mandates Reform Act of 1995 (UMRA) (2 U.S.C. 1532(a)), or a "major rule" under the Congressional Review Act (CRA) (5 U.S.C. 804(2)). Although some stakeholders said the final rule would "exceed by far the $100 million threshold" that triggers additional scrutiny under the EO and UMRA (Ex. 168.1), OSHA's analysis estimates that the final rule imposes far less than $100 million in annual costs on the economy and does not meet any other criteria specified for a significant regulatory action or major rule under the EO, UMRA, or CRA.

The purpose of this analysis is to identify the establishments and industries that the final rule affects; evaluate its costs, benefits, and economic impacts; and assess the technological and economic feasibility of the rule for the affected industries. In accordance with the RFA, this analysis identifies and estimates the impacts of the rule on small businesses, using the Small Business Administration's (SBA's) industry-specific definitions of small businesses, plus an alternate definition of small businesses developed by OSHA. Also, OSHA assessed the impacts of the rule on very small businesses (those with fewer than 20 employees). Based on this analysis, OSHA determined that the final rule will not have a significant economic impact on a substantial number of small entities.

This final rule updates current requirements to reflect advances in industry practices and technology, consolidates and streamlines some existing safety and health requirements into single sections, and provides protection from hazards not addressed by existing standards, including requirements regarding cardiopulmonary resuscitation (CPR) training for first aid providers, the control of hazardous energy, servicing single- and multi-piece rim wheels, and motor-vehicle safety. The costs and benefits of the final rule are driven by the new requirements. OSHA believes the new provisions will reduce the risk of injury and death, and increase the survivability of employees if a serious accident or injury occurs. OSHA believes that the benefits of the final rule will have a positive impact on affected employers and employees, and increase awareness of employee safety and health in the workplace.

The justification for imposing appropriate occupational safety and health standards, and for adopting these changes into the standard for general working conditions in shipyard employment in particular, is that, without these requirements, fatality and injury risks to employees would remain unacceptably high. Workplace risks and resulting injuries and costs would be too high from a moral- and social-preference perspective. In addition, risks would be too high in terms of imposing large net costs (both pecuniary and non-pecuniary) on society, producing an inefficient allocation of resources, and reducing overall social welfare. By passing the Occupational Safety and Health Act, Congress demonstrated that it believes that workplace risks are too high and that government intervention is needed to achieve a morally and socially optimal level of workplace safety and health.

Market failure is a term used by economists to describe when the allocation of goods and services by a market is not efficient, in the sense that it is possible for at least one person to be made better off without making anyone else worse off (termed "Pareto efficiency"). One common cause of market failure is that the person responsible for a decision does not bear the full costs or consequences of that decision. When this situation occurs, the person responsible for the decision will not fully consider all of the costs involved, and, as a result, may arrive at an inappropriate decision. In the case of occupational injuries, the employer has the primary decision-making responsibility, and does not bear the full costs of occupational injuries. As a result, employers tend to allocate fewer resources to occupational safety and health than would be efficient if all costs of occupational injuries and illnesses were considered.

Who bears the costs of an employee injury or illness, which include loss of income, medical care costs, the non-monetary burdens the injury or illness imposes, and other outcomes? Some of these costs, particularly medical costs and a portion of income loss, are paid for through workers' compensation. While some employers self insure, and pay the workers' compensation costs directly, the overwhelming majority of employers purchase (and are required to purchase) workers' compensation insurance. Thus, in most cases, employers do not directly pay for workers' compensation to the injured worker. The remainder of the costs of the injury or illness is normally borne by the employee, though some of the costs may be borne by the government in the form of welfare. In almost all states, workers' compensation is an exclusive remedy, meaning that an employee may not sue his employer for a work-related injury.

In principle, both employees and insurers could contract with employers for payment in advance for the risks incurred. Insurers charge premiums for their insurance. Workers could, in theory, demand increased pay for increased risk. In this situation, there is not an externality, which is defined as damage to an outside party who is not party to a market agreement. There are, however, several informational and institutional problems that prevent an ideal set of payments for risks incurred.

The first requirement for reasonable evaluation of risk in transfers of risk

between parties is that the risk be known. Further, for the estimate of risk to affect the behavior of employers, it is necessary that employees and insurers be able to differentiate the risk among different employers, not just be able to assess the risk across all employers in an industry. When accidents are relatively rare, simply looking at the past record will not provide much useful information concerning relative risk among employers. The employers themselves may be equally uncertain about the risks associated with their practices.

Even if such information on past performance were available, there is no guarantee that future performance will be identical to past performance. Different management, or even the same management with different objectives, financial performance, or schedule, may act differently than they have in the past. Further, once the risk has been transferred by contract to employees and insurers, the employer has reduced incentives to maintain a low level of risk. This phenomenon is a constant problem in insurance, where it is known as a moral hazard—the tendency of the insured to act with less care as a result of having insurance. In addition, workers' compensation insurance uses, and in most states is required by law to use, a class rating system. Class rating bases the premium on the risk experiences for all persons with similar occupations to those the firm employs. This information is sometimes combined with the actual experience of the firm in the past three years. For very small firms, this means that, in practice, the individual firm's record has no impact on their insurance premium. Even quite large firms pay, through insurance premium increases, less than the full costs of accidents. Further, the use of class rating makes it difficult for insurers to make use of information from monitoring and inspection of safety practices, even if they had such information.

Employees also have problems obtaining and using this information. First, employees may simply be unacquainted with safe. Second, information on safety is commonly not available before taking a job. Third, wages are sometimes determined by industry contracts, with no room for added risk premiums for individual employers. Finally, there are significant costs in many cases to leaving a job, which means that even if the employee realizes a job is less safe than some other available jobs, the employee may be reluctant to leave the job.

In summary, the market failure in workplace safety is that employers commonly transfer the costs of job safety to other parties, which, in combination of informational and institutional constraints, prevents the costs of the transfer from actually reflecting the risk to the individual employer; instead, employers pay to transfer the risk at a cost closer to the average costs for the occupation rather than their own costs reflecting their own risks. As a result, employers do not pay the full costs if they have above-average risks or poor safety practices. Under these circumstances, the need for regulation is established by the significant risk present in shipyard employment.

Net Benefits and Cost Effectiveness of the Final General Working Conditions in Shipyards Standard

Annualized Costs	
Sanitation	$748,709
Medical Services and First Aid	$418,349
Lockout/Tags-plus	$3,004,397
Vehicle Safety	$13,887
Total Annual Costs	$4,185,342
Annual Benefits	
Number of Injuries Prevented	348.4
Number of Fatalities Prevented	1.2
Monetized Benefits (assuming $67,000 per injury $8.7 million per fatality prevented)	$33.8 million
OSHA standards that are updated and consistent with voluntary standards	Unquantified
Net Benefits (benefits minus costs)	$29.6 million

Cost Effectiveness: Compliance with the standard would result in the prevention of 1 fatality and 81 injuries per $2 million spent, or alternatively, $7.06 in benefits per dollar of cost.

Provisions in the Standard Without Major Cost Impacts

There are several provisions in the final rule that the Agency estimates will not impose additional compliance costs on employers. Table 4 identifies these provisions and the reasons supporting OSHA's determination. These determinations were presented as part of the PEA, and OSHA solicited comment on the issues. No objections were raised except where noted.

TABLE 4—REVISIONS AND NEW REQUIREMENTS WITH NO MAJOR COST IMPACTS

Subpart F revisions and new requirements	OSHA analysis
§ 1915.81 Housekeeping § 1915.81(a)(2)(i) and (ii) (a)(2) The employer must eliminate slippery conditions, such as snow and ice, on walkways and working surfaces as necessary. If it is not practicable for the employer to remove slippery conditions, the employer either must: (i) Restrict employees to designated walkways and working surfaces where the employer has eliminated slippery conditions; or (ii) Provide slip-resistant footwear in accordance with 29 CFR part 1915, subpart I.	The revisions to the existing housekeeping requirements (§ 1915.91, § 1910.22, § 1910.141) simply consolidate, streamline, and clarify existing provisions. They do not impose new obligations or costs. To the extent that the employer must provide and pay for protective footgear for wet processes, the rulemaking on PPE payment already has figured those costs.
§ 1915.82 Lighting § 1915.82(a)(1), (a)(2), and (a)(3) (a)(1) The employer must ensure that each work area and walkway is adequately lighted whenever an employee is present. (a)(2) For landside areas, the employer must provide illumination that meets the levels set forth in Table F–1. (a)(3) For vessels and vessel sections, the employer must provide illumination that meets the levels set forth in Table F–1 or meet ANSI/IESNA RP–7–01 (incorporated by reference, see 1915.5).	The standard adopts and adapts the illumination intensities in Table F–1 from the Hazardous Waste Operations (§ 1910.120) and construction (§ 1926.56) standards, as well as national consensus standards that have been in effect for more than 40 years. The lighting levels in Table F–1 are minimum requirements, and OSHA believes that lighting levels in shipyards already meets or exceeds these levels. The final rule differs in paragraph (a)(3) from the proposal by allowing employers to either meet the illumination levels in Table F–1 or ANSI/IESNA RP–7–01 for vessels and vessel sections. Therefore, with the flexibility OSHA provided to employers, the Agency estimates the rule should not impose new costs.
§ 1915.82(b)(1) The employer must ensure that temporary lights with bulbs that are not "completely" recessed are equipped with guards to prevent accidental contact with the bulb.	The provision is similar to existing § 1915.92(b)(1), which requires guarding if bulbs in temporary lights are not "deeply" recessed. OSHA assumes that shipyards already equip lights with guards when the bulb is not fully recessed; therefore, the rule should not impose new costs.
§ 1915.82(b)(2) Temporary lights must be equipped with electric cords designed with sufficient capacity to carry the electric load.	The standard is similar to the existing requirement to use "heavy duty" electric cords with temporary lights (§ 1915.92(b)(2)). The rule simply provides employers with greater flexibility in meeting the existing requirement. Thus, the standard should not impose new costs.
§ 1915.82(b)(7) Splices on temporary lights must have insulation with a capacity that "exceeds" that of the original insulation of the cord.	The existing provision requires that splices on temporary lights have insulation that is "equal" to that of the cable (§ 1915.92(b)(2)). Although OSHA is requiring that the insulation capacity "exceed" that of the original insulation of the cord, in this final rule, there should be no new costs associated with this change.
§ 1915.82(c)(1) In any dark area that does not have permanent or temporary lights, where lights are not working, or where lights are not readily accessible, the employer shall provide portable or emergency lights and ensure that employees do not enter those areas without such lights.	The existing provision prohibits employees from entering dark spaces without a portable light (§ 1915.92(e)). Due to comments received and testimony heard, OSHA modified the final provision to allow employers to provide portable or emergency lights in any dark area that doesn't have permanent or temporary lighting. OSHA believes that employers already provide, at a minimum, portable lights to employees in such instances. In addition, allowing emergency lights, such as a generator linked with a lighting system, affords employers the option to determine which type of backup lighting is best. Therefore, the standard should not impose new costs.
§ 1915.82(c)(2) When the only means of illumination on a vessel or vessel section are from lighting sources that are not part of the vessel or vessel section, the employer must provide portable or emergency lights for the safe movement of each employee. If natural sunlight provides sufficient illumination, portable or emergency lights are not required.	The standard clarifies the existing requirement to provide portable lighting and adds the use of emergency lights for "safe movement of employees" to ensure that work areas have adequate lighting. OSHA estimates that employers provide work areas with portable or emergency lighting while employees are working or moving in areas where there is no onboard lighting source. Therefore, the rule should not impose new costs.
§ 1915.83 Utilities § 1915.83(a) The employer must ensure that the vessel's steam piping system, including hoses, is designed to safely handle the working pressure prior to supplying steam from an outside source.	The provision deletes the existing requirement to have the pressure check performed by a "responsible vessel's representative" (§ 1915.93(a)(1)). Instead, the employer may determine this information from a responsible vessel's representative, a contractor, or any other person who is qualified by training, knowledge, or experience to make such determination. Thus, the rule does not impose additional costs, but rather provides employers with greater flexibility in meeting the existing requirement.
§ 1915.83(a)(2)(iv) The employer must ensure that each pressure gauge and relief valve is legible and located so it is visible and readily accessible.	The provision adds to existing § 1915.93(a)(1) a requirement that pressure gauges and relief valves be easily readable (e.g., writing is large enough to read). Since OSHA estimates that employers currently use gauges and valves that are legible, this requirement should add no new costs.
§ 1915.83(b)(4) The employer must ensure that each steam hose or temporary steam piping system, including metal fittings and couplings that pass through a "walking or working area," is shielded to protect employees from contact.	The standard expands coverage of existing § 1915.93(a)(4) from "normal work areas" to include areas where employees may walk or pass through to get to work areas. OSHA estimates that shipyard employers shield hoses and piping wherever employees may be present; therefore, the rule should not impose new costs.

TABLE 4—REVISIONS AND NEW REQUIREMENTS WITH NO MAJOR COST IMPACTS—Continued

Subpart F revisions and new requirements	OSHA analysis
§ 1915.83(c)(3) When a vessel is supplied with electric shore power, the employer must ensure that vessel circuits to be energized are in a safe condition prior to energizing them. This information must be determined by a "responsible vessel's representative," a contractor, or any other person who is qualified by training, knowledge, or experience.	The provision deletes the existing requirement to have circuits checked by a "responsible vessel's representative" (§ 1915.93(b)(1)(ii)). The rule does not impose new costs, but rather provides employers with greater flexibility in meeting the existing requirement.
§ 1915.83(d) The employer must ensure that heat lamps, including the face, are equipped with surround-type guards to prevent contact with the lamp and bulb.	The standard expands the existing § 1915.93(c) to include all heat lamps, not just infrared electric lamps, and requires that the lamp face also be guarded to prevent contact. Existing § 1915. 93(c) also provides an exception for the lamp face. OSHA believes that all heat lamps currently in use in shipyards have guarding that completely surrounds the lamp, including the face; therefore, the rule should not impose new costs.
§ 1915.84 Working alone § 1915.84(a)(1) and (a)(2), and (b) (a)Whenever an employee is working alone, such as in a confined space or isolated location, the employer must account for each employee: (1) Throughout each workshift at regular intervals appropriate to the job assignment to ensure the employee's safety and health; and (2) At the end of the job assignment or at the end of the workshift, whichever occurs first. (b) The employer must account for each employee by sight or verbal communication.	The standard adds a requirement to account for employees employees, either by sight or verbal communication, at regular intervals appropriate to the job assignment and at the end of each job assignment or workshift if they are working alone, such as in confined space or isolated location. This provision expands on the current requirement (§ 1915.94) to frequently check on these employees. OSHA estimates that shipyard employers already account for employees who work alone. Therefore, the rule should not impose new costs.
§ 1915.85 Vessel radar and communication systems § 1915.85(b) The employer must secure each vessel's radar and communication system so it is incapable of energizing or emitting radiation before any employee begins work: (1) On or in the vicinity of the system; (2) On or in the vicinity of a system equipped with a dummy load; or (3) Aloft, such as on a mast or king post.	The standard expands existing § 1915.95(a), which cover workers repairing the radar or radio systems. OSHA believes that the revision should not impose new costs since employers already are required to have procedures in place for protecting workers, other than radar or radio repair technicians.
§ 1915.86 Lifeboats § 1915.86(b) The employer must not permit any employee to be in a lifeboat while it is being hoisted or lowered, except when necessary to conduct operational tests or drills over water, or in the event of an emergency.	The standard expands the existing prohibition (§ 1915.96(b)) against employees riding in lifeboats being hoisted into final stowed position by prohibiting employees from riding in lifeboats while being hoisted or lowered, unless it is deemed necessary to conduct operational tests or drills over water, or in the event of an emergency. OSHA believes that expanding this work practice requirement to a more flexible provision should not impose any additional costs to employers.
§ 1915.87 Medical services and first aid § 1915.87(d)(1) In the absence of an on-site infirmary or clinic that maintains first aid supplies, the employer must provide and maintain adequate first aid supplies that are readily accessible to each worksite.	The standard combines existing § 1910.151(b) and § 1915.98(a) and clarifies that first aid supplies must be provided and maintained, and be readily accessible to each worksite when needed. The standard also revises existing § 1915.98(b), which contains a list of items that first aid kits must contain. The standard replaces that list with factors that employers must consider in determining the content, amount, and location of first aid kits and supplies they must provide. The standard provides employers with greater flexibility in meeting the requirement; therefore, the standard should not impose additional costs.
§ 1915.87(e) Where the potential exists for an employee to be splashed with a substance that may result in an acute or serious injury, the employer must provide facilities for quick-drenching or flushing the eyes and body. The employer must ensure that such a facility is located for immediate emergency use within close proximity to operations where such substances are being used.	The standard expands existing § 1910.151(c), which requires quick drenching or flushing facilities where employees may be injured by "corrosive materials." The standard requires such facilities when employees may be exposed to receiving an acute or serious injury, as defined in the standard. The standard should not impose additional costs since employers already are required to provide quick drench/flushing facilities in the work area for immediate use.
§ 1915.87(f)(1) The employer must provide an adequate number of basket stretchers, or the equivalent, readily accessible to where work is being performed on a vessel or vessel section. The employer is not required to provide basket stretchers or the equivalent where emergency response services have basket stretchers or the equivalent that meet the requirements of this paragraph.	1915.87(f)(1) modifies existing § 1915.98(d), which requires that a minimum of 2 stretchers be located at any shipyard work location. The final provision gives employers more flexibility by allowing basket stretchers, or the equivalent, provided by emergency-response services to meet the "adequate number" requirement for work performed on vessels and vessel sections. OSHA estimates that the standard should not impose additional costs because the existing standard already requires employers to provide a minimum of 2 stretchers at any shipyard work location. In addition, the standard gives employers greater flexibility in meeting the "adequate number" requirement because it allows them to rely on any readily accessible emergency-response services (i.e., offsite rescue) that have basket stretchers.

TABLE 4—REVISIONS AND NEW REQUIREMENTS WITH NO MAJOR COST IMPACTS—Continued

Subpart F revisions and new requirements	OSHA analysis
§1915.87(f)(2)(i) The employer must ensure that each stretcher is equipped with permanent lifting bridles that enable the basket stretcher to be attached to hoisting gear that are capable of lifting at least 5,000 pounds.	The standard adds to existing §1915.98(d) specifications for lifting bridles. OSHA estimates that shipyards already have stretchers that meet the specifications; therefore, the standard should not impose new costs.
§1915.88 Sanitation	
§1915.88(b)(3) The employer must dispense drinking water from a fountain, a covered container with single-use drinking cups stored in a sanitary receptacle, or single-use bottles. The employer must prohibit the use of shared drinking cups, dippers, and water bottles.	The standard expands existing §1910.141(b)(1)(iii) to also allow employers to provide potable water in single-use bottles. The standard should not impose additional costs; rather, it provides employers with greater flexibility in meeting the existing requirement.
§1915.88(d)(3) The employer must provide portable toilets, pursuant to paragraph (d)(2)(i) of this section, only when the employer demonstrates that it is not feasible to provide sewered toilets, or when there is a temporary increase in the number of employees.	The standard does not change the number of sewered toilet facilities shipyard employers must provide. The standard allows, but does not require, employers to provide portable toilets to supplement the required number of sewered toilets. Therefore, the standard should not impose new costs.
§1915.88(g) When an employer provides protective clothing to prevent employee exposure to hazardous or toxic substances, the employer must provide changing rooms that provide privacy for each sex; and storage facilities for street clothes, as well as separate storage facilities for protective clothing.	The standard expands existing §1910.141(e), which requires changing rooms whenever another OSHA standard requires that the employer provide protective clothing, to require that employers provide change rooms whenever they provide protective clothing. OSHA estimates the standard should not impose any costs because shipyards already have changing rooms.
§1915.88(h) The employer must ensure that food, beverages, and tobacco products are not consumed or stored in any area where employees may be exposed to hazardous or toxic substances.	The standard expands the existing prohibitions (§1910.141(g) and §1915.97(c)) on eating and drinking to include prohibitions on eating, drinking, and smoking in areas where hazardous or toxic substances may be present. "Hazardous and toxic substances" is defined in the final rule as any corrosive substance, or any environmental contaminant that may expose employees to injury, illness, or disease. OSHA estimates that prohibiting these activities in such areas should not impose additional costs on employers.
§1915.88(j)(1) To the extent reasonably practicable, the employer must clean and maintain the workplace in a manner that prevents vermin infestation. §1915.88(j)(2) Where vermin are detected, the employer shall implement and maintain an effective control program.	The standard expands the existing §1910.141(a)(5) to cover outdoor shipyard areas. OSHA estimates that employers currently control vermin in all shipyard areas to ensure that vermin do not get into enclosed spaces; therefore, the standard should not impose new costs.
§1915.90 safety color code for marking physical hazards	The standard simply incorporates by reference a general industry standard (§1910.144) that already is applicable to shipyards; therefore, the standard does not impose new costs.
§1915.91 Accident prevention signs and tags All new and replacement danger, caution, and safety instruction signs shall meet design and wording specifications. Injury/illness prevention tags shall be used where employees are exposed to hazardous conditions, equipment, operations that are unexpected, out of the ordinary or not readily apparent and remain in place until the hazard is eliminated or the hazardous operation is completed. Tags shall meet general criteria requirements.	The standard simply incorporates by reference the existing general industry standard (§1910.145) on signs and tags that is already applicable to shipyards; therefore, the standard does not impose new costs.
§1915.92 Retention of DOT markings, placards, and labels	OSHA is retaining the existing §1915.100 requirements, with minor editorial changes, on the retention of DOT markings, placards, and labels on hazardous materials the shipyard receives. Therefore, this section should not impose any new costs.
§1915.93 Motor vehicle safety equipment, operation, and maintenance	The standard adds a new safety belt requirement; however, the requirement should not impose costs on existing facilities because it applies only prospectively.
§1915.93(b)(1) The employer must ensure that each motor vehicle acquired or initially used after 180 days after the final rule is published is equipped with a safety belt for each employee operating or riding in a motor vehicle. This requirement does not apply to any motor vehicle that was not equipped with safety belts at the time of manufacture.	(The economic analysis includes costs for §1915.93(b)(3), which requires employers to replace safety equipment (e.g., safety belts) that have been removed from employer-provided vehicles.)
§1915.93(b)(4) The employer must ensure that each motor vehicle used to transport an employee has firmly secured seats for each employee being transported and that all employees being transported are using such seats.	The standard adds a requirement that all employees being transported in a vehicle be seated in firmly secured seats. This will require some employers to change their methods of transporting workers which may involve costs to the employer. OSHA does not believe that this will be a significant cost and therefore has not included the costs that may be associated with this requirement in this analysis.
§1915.93(c)(1) The employer must ensure that each motor vehicle is maintained in a serviceable and safe operating condition and removed from service if it is not in such condition.	The standard adds a new requirement; however, OSHA estimates that shipyard employers already maintain motor vehicles that employers provide. Therefore, the standard should not impose new costs.
§1915.93(c)(2) The employer must ensure that before a motor vehicle is operated, any tools and materials being transported are secured if their movement may create a hazard for employees.	The standard adds a new requirement. OSHA estimates that tools and materials are secured if their movement could pose a hazard for employees; therefore, the standard should not impose new costs.

TABLE 4—REVISIONS AND NEW REQUIREMENTS WITH NO MAJOR COST IMPACTS—Continued

Subpart F revisions and new requirements	OSHA analysis
§ 1915.93(c)(3) The employer must implement measures to ensure that motor vehicle operators are able to see and avoid injuring pedestrians and bicyclists at shipyards.	The standard adds a new requirement. OSHA estimates that shipyard employers already have implemented bike and pedestrian safety measures as a good practice in shipyards; therefore, the standard should not impose new costs.
§ 1915.94 Servicing multi-piece and single-piece rim wheels The employer shall furnish a restraining device for inflating tires on multi-piece and single-piece rim wheels. The requirements applicable to shipyard employment under this section are identical to the requirements set forth at 29 CFR 1910.177.	The standard adds general industry requirements on servicing rim wheels, including requirements to furnish tire servicing equipment (§ 1910.177(d)). OSHA estimates that shipyards that currently service rim wheels on large vehicles already have servicing equipment; therefore, the standard should not impose additional costs. (However, this FEA includes costs for training employees to service rim wheels.)

Source: OSHA Office of Regulatory Analysis.

Some stakeholders said that several of the requirements discussed above would impose significant costs. For example, Doug Dixon, of Pacific Fisherman Shipyard and Electric, LLC, said the revisions to the current lighting requirements would increase costs (Ex. 131.1). The lighting requirements have been in existence since OSHA adopted them pursuant to Section 6(a) of the OSH Act, and OSHA believes that all affected employers are in compliance with them. The clarifications and updates to those lighting requirements that OSHA incorporated in the final rule do not substantially change the existing requirements; therefore, OSHA believes that they will not impose major costs. Some requirements may result in minor costs to some establishments; for example, the final rule has a provision requiring that temporary lights have insulation capacity that exceeds that of the original insulation of the cord while the current provision requires that the insulation capacity is "equal" to that of the cable. In this analysis, OSHA took explicit costs only for provisions that could impose sizable costs on establishments and evaluated explicit benefits for provisions that would result in a measurable reduction in injuries or fatalities. It is not always possible, nor is it necessary in terms of establishing feasibility, to account for extremely small changes in costs or benefits.

Northrop Grumman—Newport News said that the sanitation provisions would require a 25 percent increase in the number of toilets they provide, at a cost of $7.5 million for the Newport News, VA, shipyard alone (Ex. 120.1). However, Northrop Grumman did not provide any information explaining how they derived the costs; therefore, OSHA cannot ascertain the basis for the costs or analyze whether they are representative of affected establishments.

Provisions in the Standard With Major Cost Impacts

Section 1915.8 Medical Services and First Aid

The final rule requires that employers ensure that there are an adequate number of qualified employees at each work location during each workshift to render first aid, including cardiopulmonary resuscitation (CPR). The Agency estimates that some shipyards will need to train additional first aid providers for this purpose. Commercial vessels have long-standing first aid standards established by the U.S. Coast Guard (USCG), and OSHA believes that employees on commercial vessels—even those that are not USCG inspected and certified—are currently complying with the OSHA standard. However, the Agency estimated that some commercial vessels would need additional employees trained to administer first aid, including CPR. Employees properly trained to administer first aid and CPR could reduce the number of deaths that occur in the workplace.

Section 1910.88 Sanitation

Paragraph (e)(1) requires that employers provide handwashing facilities adjacent to each toilet facility. Paragraph (e)(2) requires that employers ensure that each handwashing facility is equipped with either hot and cold or lukewarm running water and soap, or with waterless skin cleansing agents that are capable of disinfecting the skin or neutralizing the contaminants to which the employee may be exposed. The Agency estimates that employers in the shipbuilding, ship repair, and shipbreaking industry (hereafter referred to as shipyards) already have handwashing facilities at sewered toilets, but not at all portable toilets. To comply with this provision, OSHA assumed that employers will provide waterless skin cleansing agents at portable toilet facilities as the simplest and least expensive way to comply with this requirement. This provision applies only to shipyards and will not impose any additional requirements on commercial vessels, which OSHA concludes have adequate sanitation facilities onboard.

Section 1915.89 Control of Hazardous Energy (Lockout/Tags-Plus).

The final rule adds requirements for the control of hazardous energy in servicing operations in shipyard employment, including servicing operations in landside facilities, as well as on vessels and vessel sections. The lockout/tags-plus requirements comprise the major portion of the costs of the final rule.

Section 1915.89(b) Lockout/Tags-Plus Program

The standard requires that employers establish a program to protect employees from energization or startup, or release of hazardous energy, during the servicing of machinery, equipment, and systems in shipyard employment. This program would have to include: (1) Procedures for lockout/tags-plus systems, including a lockout/tags-plus coordination process (§ 1915.89(b)–(c)); (2) procedures for protecting employees involved in servicing (§ 1915.89(d)–(m)); (3) specification for locks and tags-plus hardware (§ 1915.89(n)); (4) employee training (§ 1915.89(o)); (5) incident investigations (§ 1915.89(p)); and (6) program audits (§ 1915.89(q)). Only the time and costs to actually develop the program (the written lockout/tags-plus procedures) and the lockout/tags-plus coordination process are considered in this section.

The final lockout/tags-plus rule adds a requirement that employers establish and implement lockout/tags-plus coordination (1) when employees on vessels and in vessel sections are servicing multiple machinery, equipment, or systems at the same time; and (2) when employees on vessels, in

vessel sections, and at landside facilities are performing multiple servicing operations on the same machinery, equipment, or system at the same time.

The lockout/tags-plus coordination process requires that employers have a lockout/tags-plus coordinator and a lockout/tags-plus log. The coordinator is responsible for overseeing and approving the application of each lockout/tags-plus system, verification of isolation of hazardous energy before servicing is started, and removal of each lockout/tags-plus system. The coordinator will also maintain and administer the lockout/tags-plus log.

The lockout/tags-plus log must contain the following information on each lockout/tags-plus system: (1) Location of machinery, equipment, or system to be serviced; (2) type of machinery, equipment, or system to be serviced; (3) name of the authorized employee applying lockout/tags-plus system; (4) date the lockout/tags-plus system is applied; (5) name of the authorized employee removing the lockout/tags-plus system; and (6) date the lockout/tags-plus system is removed.

Section 1915.89 (c)–(m) Procedures for Securing Energy Sources

The final rule requires that, before any servicing is performed, all energy sources are identified and isolated, and the machinery, equipment, or system is rendered inoperative (§ 1915.89(c)(1)). It also requires that employers implement measures to prevent hazards by following certain procedures for shutting down equipment, isolating power sources, verifying deenergization, and applying lockout or tags-plus devices (§ 1915.89(d)–(m)).

The final rule requires that, when energy-isolating devices are capable of being locked, the employer must use a lock to prevent energization or startup, or the release of hazardous energy, before beginning servicing, unless the employer can demonstrate that the utilization of a tags-plus system will provide full employee protection (§ 1915.89(c)(2)). When energy-isolating devices are not capable of being locked, the final rule requires that the employer apply a tags-plus system to prevent energization or startup, or the release of hazardous energy, before starting servicing (§ 1915.89(c)(3)). The tags-plus system shall consist of at least one energy-isolating device with a tag affixed to it; and at least one additional safety measure that will provide the equivalent safety available from the use of a lock (§ 1915.89(c)(4)). Additional safety measures include, but are not limited to, the removal of an isolating circuit element, the blocking of a controlling switch, the opening of an extra disconnecting device, the removal or wiring in place of a valve handle (§ 1915.80(b)(1)).

These provisions include as costs the time necessary to implement the lockout/tags-plus procedures, apply locks or tags-plus systems, implement additional safety measures, and notify affected employees of the lockout/tags-plus application. These costs do not include the time to find the circuit, as OSHA considers this a part of existing duties.

Section 1915.89(n) Specifications for Locks and Tags-Plus Materials and Hardware

The rule requires employers to provide locks and tags-plus system hardware used for isolating, securing, or blocking any machinery, equipment, or system that is to be serviced. The final rule addresses the specific characteristics of these devices with regard to durability, color, shape, and size uniformity throughout the establishment. Also, the rule states that locks and tags-plus devices must be singularly identified, must be the only devices used for controlling energy, and must not be used for other purposes. OSHA attributed to this paragraph the costs for the time to choose and purchase the appropriate locks and tags-plus materials and hardware and the costs of that material and hardware.

Section 1915.89(o) Information and Training

The final rule requires employers to provide training to ensure that the purpose and function of the lockout/tags-plus program are understood by employees, and that the knowledge and skills required for the safe application, usage, and removal of lockout/tags-plus systems are acquired by employees. The rule requires training for employees who are, or may be, in an area where the lockout/tags-plus systems are being used so they know the (1) Purpose and function of the employer's lockout/tags-plus program and procedures; (2) unique identity and standardization of locks and tags used in the lockout/tags-plus system; (3) three basic components of the tags-plus system; (4) prohibition against removing or tampering with any lockout/tags-plus system; and (5) prohibition against reenergizing or restarting any machinery, equipment, or system that is being serviced under a lockout/tags-plus system.

Affected employees also must be trained in the following: (1) The use of the employer's lockout/tags-plus program and procedures; (2) the prohibition against affected employees applying or removing any lockout/tags-plus system; and (3) the prohibition against them bypassing, ignoring, or defeating a lockout/tags-plus system.

In addition to the training requirements for general employees and affected employees, authorized employees must be trained so they know: (1) The steps necessary for the safe application, use, and removal of lockout/tags-plus systems; (2) the types and magnitudes of energy sources at the worksite; (3) the means and methods for isolating and controlling hazardous energy; (4) the means for determining exposure status of employees in a servicing group for which the authorized employee is in charge; (5) the requirement that tags be legible and understandable; (6) the requirement that tags and their means of attachment be made of materials that will withstand environmental conditions; (7) the requirements that tags be securely attached so they cannot be accidentally removed; (8) the knowledge that tags are simply warning devices, and alone do not provide a physical barrier against energization; and (9) that tags must be used in conjunction with energy-isolating devices and measures.

Finally, lockout/tags-plus coordinators, in addition to receiving the general employee, affected employee, and authorized employee training, must be trained in the following: (1) How to identify and isolate any machinery, equipment, or system that is being serviced; and (2) how to accurately document lockout/tags-plus systems and maintain the lockout/tags-plus log.

In addition to the required initial training, the final rule requires employers to provide retraining when: (1) There is a change in the employee's job that presents new hazards or requires a greater degree of knowledge about the lockout/tags-plus program or procedures; (2) there is a change in machinery, equipment, or systems that presents a new hazard; (3) there is a change in the employer's lockout/tags-plus program or procedures; (4) it is necessary to maintain the employee's proficiency; and (5) an incident investigation or program audit reveals deficiencies in the lockout/tags-plus program or procedures or in the employee's knowledge of it.

The rule also requires employers to maintain records that employee training has been accomplished and is being kept up to date. The training records would have to contain each employee's name, dates of the training, and subject of training. OSHA attributed to this

paragraph all costs associated with training.

Section 1915.89(p) Incident Investigations

The final rule requires employers to promptly investigate each incident that resulted in, or could have resulted in, energization or startup, or the release of hazardous energy. The incident investigation must be conducted by at least one employee who has knowledge and experience in the employer's lockout/tags-plus program and procedures, as well as in investigating and analyzing incidents involving the release of hazardous energy.

The rule requires that a written incident report be prepared that includes: (1) The date and time of the incident; (2) date and time the investigation began; (3) incident location; (4) description of the incident; (5) factors contributing to the incident; (6) a copy of the current lockout/tags-plus log; and (7) corrective actions needed. The incident investigation, the written report, and corrective actions must be completed with 30 days following the incident. If corrective actions cannot be implemented within 30 days, the employer must prepare a written abatement plan that includes an explanation for the delay, an abatement timetable, and a summary of interim steps the employer is taking to protect employees from hazardous energy while servicing machinery, equipment, or systems.

Section 1915.89(q) Program Audits

The final rule requires that employers conduct a program audit of the current lockout/tags-plus program and procedures at least annually to ensure that the procedures and the requirements of the rule are being followed, and to correct any deficiencies. The program audit must be performed by an authorized employee other than the one(s) using the energy-control procedure being reviewed, or other persons knowledgeable about the employer's lockout/tags-plus program and procedures and the machinery, equipment, or systems being reviewed. The program audit shall include a review of the lockout/tags-plus program and procedures, the current lockout/tags-plus log, and the incident reports since the last audit; and verification of the accuracy of the lockout/tags-plus log.

The final rule requires that the written audit report be delivered to the employer within 15 days after completion of the audit and include: (1) The audit date; (2) the persons performing the audit; (3) the procedure and machinery, equipment, or system being audited; (4) the audit findings and recommendations; (5) previous incident investigation report; and (6) description of corrective actions taken in response to incident investigation finding. Finally, the final rule also requires that the employer promptly communicate audit findings and recommendations to each employee whose jobs tasks may be affected. OSHA assumed that all employers would incur the costs necessary to implement this provision.

Section 1915.93 Motor Vehicle Safety Equipment, Operation, and Maintenance

The final rule requires employers to ensure that motor vehicle safety equipment is not removed from any employer-provided vehicle. The employer would have to replace safety equipment that is removed. The Agency believes that employers engaged in shipyard employment are generally in compliance with the rule as it applies to safety equipment on new motor vehicles, and that motor vehicle equipment is not being used onboard commercial vessels. The Agency estimated that employers may sometimes remove safety equipment from older vehicles. Thus, employers would need to reinstall this safety equipment.

Section 1915.94 Servicing Multi-Piece and Single-Piece Rim Wheels

The standard incorporates by reference the requirement set forth in 29 CFR 1910.177. This section applies to the servicing of multi-piece and single-piece rim wheels used on large vehicles such as trucks, tractors, trailers, buses, and off-road machines, and requires that employers train employees who will perform the servicing. It does not apply to servicing rim wheels used on automobiles, or on pickup trucks and vans using automobile tires or trucks tires designated "LT." The Agency believes that servicing rim wheels in shipyards is similar to such servicing in general industry. OSHA estimates that the costs associated with this servicing are limited to training time for initial training and additional training as necessary.

B. Industrial Profile

OSHA's final rule affects those establishments within OSHA's authority that are engaged in shipyard employment operations onboard vessels, on vessel sections, and at landside operations, regardless of geographic location. This category of establishments includes employers engaged in shipyard-employment operations onboard commercial vessels not inspected by the U.S. Coast Guard (USCG).

Some stakeholders commented that OSHA's preliminary economic analysis (PEA) underestimated the number of vessels the rule would affect. For example, Gerry Mulligan of Prowler LLC and Ocean Prowler LLC said:

> OSHA's [preliminary] estimate of a total of 639 establishments effected by the rule significantly underestimates the economic impacts of the rule. * * * [T]his rule will impact the more than 2500 uninspected vessels working in Washington and Alaska on which the ship's crews performs repairs. * * * Clearly the rule affects many more entities than just shipyards, most of which do not seem to be addressed in the economic impact statements (Ex. 100.1; see also Ex. 123).

Based on stakeholder comments and other information in the record, OSHA added to the FEA industries with commercial vessels not inspected by the USCG. The final rule applies to the extent that these establishments are performing shipyard-employment operations, such as servicing machinery, equipment, or systems, onboard vessels. The PEA did not include these industries; however, OSHA determined that these employers are within OSHA's authority and perform shipyard-employment operations. Thus, the FEA is including these industries in the analysis.

Affected Establishments and Employees

This section describes OSHA's method for estimating the number of affected establishments and employees engaged in shipyard employment, which includes shipbuilding, ship repair and shipbreaking establishments (NAICS 336611), and establishments in industries involving commercial vessels, including commercial fishing (NAICS 11411), fish processing onboard vessels (included in NAICS 311712), tug and towing boats (included in NAICS 488330), coastal and Great Lakes passenger transportation (NAICS 483114), and inland water passenger transportation (NAICS 483212).

The Agency derived estimates of the number of affected establishments and employees primarily from 2006 Small Business Administration (SBA) data on establishments, employees, and annual payroll, and from 2007 U.S. Bureau of the Census (Census Bureau) data on value of shipments (revenues). The Agency used the SBA data because they contain a detailed breakdown by establishment and employment size classes. The PEA used Census Bureau data, but inadequate detail on size class for transportation industries and a lack

of available 2007 Economic Census data for some industries led OSHA to update and expand estimates in the FEA using 2006 SBA data, which provided adequate size class detail and which are the most current data available.

OSHA assumed that the final rule would affect all establishments engaged in shipbuilding, ship repair, and shipbreaking, and those establishments engaged in shipyard-employment operations in commercial fishing establishments, on processing vessels in the fish-processing and -packaging industry, in establishments with tug and towing boats (other than seagoing tugs and towboats), and in establishments with some very small non-seagoing passenger vessels (those vessels carrying fewer than 6 passengers). The Agency estimated that 90 percent of tow and tugboat establishments employ non-seagoing vessels and non-Great Lakes barges. The Agency also estimated that 33 percent of passenger vessels operating on the Great Lakes and inland waterways carry fewer than 6 passengers for hire; thus, they are not USCG-inspected.

The final rule does not affect establishments with USCG-inspected vessels, including freight vessels, nautical-school vessels, offshore-supply vessels, ferries and other passenger vessels, sailing-school vessels, seagoing barges, seagoing motor vessels, small passenger vessels, steam vessels, tank vessels, fish-processing vessels (more than 5,000 gross tons), fish-tender vessels (more than 500 gross tons), Great Lakes barges, and oil-spill response vessels.

For the purposes of illustrating a clear industrial profile, OSHA used the following employment size classes: 1–19, 20–99, 100–199, 200–499, 500–999, and 1,000 and more employees (Table 5). In NAICS 336611, which includes shipbuilding, ship repair, and shipbreaking, OSHA estimated that all establishments with 100 or more employees are shipyards; that about 73 percent of establishments with 20–99 employees are contractors who work at shipyards or off-site establishments that perform shipyard employment operations; and that all very small establishments with fewer than 20 employees are contractors or off-site establishments.

Table 5

Industrial Profile for the Final Rule

Industry Code	Industry Name	Size Class	Firms	Establishments	Employees	Production Employees	Annual ($1,000) Payroll	Revenues
NAICS 336611	Shipyards	1,000 & Up	18	40	65,921	47,463	$2,964,390	$12,583,832
		500-999	15	25	5,261	3,788	$253,892	$1,077,771
		200-499	28	32	7,328	5,276	$332,492	$1,411,428
		100-199	45	51	4,310	3,103	$197,341	$837,712
		20-99	29	31	1,303	938	$55,781	$891,085
	Contractor/Off-Site	20-99	81	85	1,957	1,409	$154,133	$354,512
		1-19	371	371	2,041	1,470	$101,775	$432,035
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	3	7	5,000	4,200	$84,581	$1,542,511
		500-999	2	3	1,000	840	$16,916	$308,502
		200-499	1	1	300	252	$5,075	$92,551
		100-199	7	8	800	672	$13,533	$246,802
		20-99	21	25	667	560	$31,856	$580,966
		1-19	1,076	1,076	1,394	1,171	$73,055	$1,332,313
NAICS 311712	Fish Processing Vessels	1,000 & Up	6	22	9,964	8,370	$206,449	$2,037,287
		500-999	2	6	996	837	$20,645	$203,729
		200-499	8	11	2,246	1,887	$46,545	$459,316
		100-199	14	17	1,667	1,400	$34,533	$340,762
		20-99	46	46	2,039	1,713	$49,946	$492,877
		1-19	96	98	558	469	$25,796	$254,565
NAICS 488330	Tug & Towing Services	1,000 & Up	7	45	5,097	4,282	$138,658	$539,013
		500-999	7	27	4,051	3,403	$91,256	$354,751
		200-499	6	8	1,539	1,293	$16,597	$64,518
		100-199	11	13	1,270	1,066	$70,810	$275,261
		20-99	74	88	2,901	2,437	$151,936	$590,626
		1-19	465	468	1,464	1,230	$97,392	$378,597
NAICS 483	Passenger Vessels	20-99	17	20	595	500	$23,556	$76,394
		1-19	101	101	374	314	$15,273	$54,837
		TOTAL	2,558	2,725	132,044	100,342	$5,274,214	$27,814,572

Source: Office of Regulatory Analysis

Comment in the record questioned OSHA's estimated affected establishments saying "[t]he U.S. Coast Guard lists 79,565 commercial fishing vessels and acknowledges that number is not complete" (Ex. 199, p. 257) and questioned whether OSHA's estimate of 2,090 commercial vessels establishments underestimated the industry being regulated. OSHA develops an industrial profile on an establishment basis and, in some cases, one establishment in a commercial vessel industry will have more than one vessel, which means there is not a one-to-one translation from USCG-reported vessels and Census Bureau-reported establishments. There are also approximately 65,000 nonemployer establishments (those with no employees and taxable revenue) in the commercial fishing industry according to data from the Census Bureau's Economic Census. Establishments with

no employees do not fall within OSHA jurisdiction and therefore are not included in the profile of affected industries.

For this analysis, OSHA assumes that most small and all very small establishments in NAICS 336611 are contractors working at shipyards, and are not shipyards. These contract employers, in most cases, will not incur the full cost of compliance due to either their adherence to the host employer's programs or the type of work they perform at shipyards. For example, if a contractor provides electrical services to shipyards, the contractor likely would have its employees follow the host employer's program for the control of hazardous energy, and may not incur the full cost to develop a program. Moreover, to the extent that these contractors also perform services for companies in general industry, they already may have implemented a lockout/tagout program and incurred some startup costs. In the PEA, the Agency estimated that contractors primarily exist in two size classifications: 1–19 employees and 20–99 employees. OSHA did not receive any comments indicating that its estimate of the number of contractors and off-site employers was inaccurate, or that some of these establishments should be considered shipyards. The record also does not indicate that contractors and off-site employers will incur greater costs to develop and implement a lockout/tags-plus program than was estimated in the PEA.

The estimates presented in Table 5 are derived from 2006 SBA data. Shipyards and off-site shipyards are classified as NAICS 336611, commercial fishing as NAICS 11411, fish-processing onboard vessels as part of NAICS 311712, tug and towing vessels as part of NAICS 488330, and passenger vessels as NAICS 483114 and NAICS 483212. Complete firm and establishment data were largely available from SBA, but OSHA had to make some estimates for shipyards; establishments with fish-processing factories aboard ships; and establishments with tug and towing boats. OSHA estimates that there are 200 floating fish factories currently in operation. The Agency assumes that those factories are distributed across employment size classes in a manner identical to the establishment size distribution in the industry (NAICS 311712) as a whole. Allen Rainsberger, of the Puget Sound Shipbuilder's Association, commented that OSHA's preliminary estimate of 2,500 employees working on fish processing vessels was not accurate. Quoting OSHA, he wrote:

"OSHA estimates there are about 200 fish processing vessels operating in * * * US territorial waters. * * * OSHA estimates that each vessel employs about 100–120 processing employees * * * for a total of 2,500 employees." There is an error in this equation as 200 × 100 = 20,000 employees. In the North Pacific there are about 85–90 vessels that process fish, with crews anywhere from 10 to 200 employees each (Ex. 124).

By estimating employment and size class distribution based on the characteristics of the fish processing industry as a whole, the Agency eliminated this error. OSHA made similar assumptions for tug and towboat industries, distributing the 722 tug and towing boat establishments reported in the 2007 Economic Census across employment-size classes using the same ratios reported for the industry under which they were classified in the 2006 SBA data.

The firm estimates for shipyards presented in Table 6 are derived by using a firm-to-establishment ratio from 1997 SBA data. To maintain consistency in the data from the preliminary to the final analysis, OSHA used the estimation method employed in the PEA with updated data for establishments from the 2006 SBA. In the PEA, OSHA applied a "firms-per-establishment" ratio (developed using 1997 SBA data) to the Census Bureau establishment estimates to develop the estimated number of firms. This process is illustrated in Table 6. For example, 2002 SBA data reported that there are 27 firms in NAICS 336611 with 500 or more employees. However, Census Bureau data report that there are only 21 establishments with 500 or more employees for the same year. OSHA used a ratio of firms-to-establishments to reconcile the two data sets.

Table 6

Derivation of Firms Using 2006 SBA Data and 1997 SBA Percentages

Industry Code	Industry Name	Size Class	1997 SBA Firms	1997 SBA Estab's	Firms Per Establishment	2006 SBA Estab's	2006 Firm Estimates	2006 SBA Employees	Employees Per Establishments
NAICS 336611	Shipyards	1,000 & Up	9	20	0.45	40	18	65,921	1,648
		500-999	29	49	0.59	25	15	5,261	210
		200-499	24	27	0.89	32	28	7,328	229
		100-199	46	52	0.88	51	45	4,310	85
		20-99	42	44	0.95	31	29	1,303	42
	Contractor/Off-Site	20-99	107	113	0.95	85	81	3,602	42
		0-19	412	412	1.00	371	371	2,041	6
		TOTAL	669	717		635	587	89,766	

Source: Office of Regulatory Analysis

Table 7 presents the total number of affected establishments and employees. In this table, OSHA used a 32.5 percent turnover rate estimated by the Bureau of Labor Statistics (BLS, 2006) to estimate the number of new employees and new production employees affected by the final rule in any given year. Production employees were estimated to be 84 percent of total employees, based on Census Bureau data. Since the large firms in these industries employ most of the employees, the Agency assumed that most large firms (using the alternate definition of 200 or more employees) have full-time safety and health professionals; thus, they have in-house expertise to help the establishment to comply with the final rule. OSHA did not receive any comments indicating that large firms do not have full-time safety and health professionals, or that OSHA was incorrect in reaching this conclusion.

Table 7
Affected Establishments and Employees

Industry Code	Industry Name	Size Class	Establishments	Employees	Production Employees	New Employees	New Production Employees
NAICS 336611	Shipyards	1,000 & Up	40	65,921	47,463	21,424	11,391
		500-999	25	5,261	3,788	1,710	909
		200-499	32	7,328	5,276	2,382	1,266
		100-199	51	4,310	3,103	1,401	745
		20-99	31	1,303	938	424	225
	Contractor/Off-Site	20-99	85	1,957	1,409	636	338
		1-19	371	2,041	1,470	663	353
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	7	5,000	4,200	2,150	1,806
		500-999	3	1,000	840	430	361
		200-499	1	300	252	129	108
		100-199	8	800	672	344	289
		20-99	25	667	560	287	241
		1-19	1,076	1,394	1,171	599	504
NAICS 311712	Fish Processing Vessels	1,000 & Up	22	9,964	8,370	3,238	2,720
		500-999	6	996	837	324	272
		200-499	11	2,246	1,887	730	613
		100-199	17	1,667	1,400	542	455
		20-99	46	2,039	1,713	663	557
		1-19	98	558	469	181	152
NAICS 488330	Tug & Towing Services	1,000 & Up	45	5,097	4,282	1,657	1,392
		500-999	27	4,051	3,403	1,317	1,106
		200-499	8	1,539	1,293	500	420
		100-199	13	1,270	1,066	413	347
		20-99	88	2,901	2,437	943	792
		1-19	468	1,464	1,230	476	400
NAICS 483	Passenger Vessels	20-99	20	595	500	193	162
		1-19	101	374	314	122	102
		TOTAL	2,725	132,044	100,342	43,876	28,026

Source: Office of Regulatory Analysis

Employment

OSHA used SBA data to estimate total employment in the affected industries. SBA reported employment for most, but not all, size classes and industries. When SBA data did not disclose employment, the Agency estimated employment by assuming firm employment averaged to the midpoint of each size class, and multiplying that estimated employment per firm by the SBA-reported number of firms for each size class. For example, if there were 2 firms in the 30–34 employees size class, the Agency assumed an average of 32 employees at each firm, for a total of 64 employees in the 30–34 employees size class. When employment estimated in this manner exceeded the reported total industry employment, OSHA reduced assumed average employment to the lowest value in a given size class.

OSHA acknowledges that not every employee in the affected industries will be affected by this rule. Many employees in affected industries do not perform shipyard-employment operations, and, therefore, the industries in which they are employed will incur compliance costs for only a fraction of these employees. However, to develop a complete representation of the affected industries, the Agency presents the total employment in the affected industries in this profile, and addresses the scope of affected employees in the Costs of Compliance section of this FEA.

In 2006, employment in NAICS 336611 was estimated at 88,121. About 75 percent of these employees work in the largest shipyards—those with 1,000 or more employees. Another 6 percent work in shipyards with 500–999 employees. Establishments with fewer than 200 employees account for only 20 percent of total employment, and shipyard contractors account for less than one-half (about 45 percent) of the 20 percent.

Among the 9,161 commercial fishing employees and 17,470 fish-processing employees, 55 percent and 57 percent of these employees, respectively, work for employers with 1,000 or more employees, while 11 percent and 6 percent, respectively, work for employers with 500–999 employees. Establishments with fewer than 200 employees account for 31 percent of commercial fishing employees, and 24 percent of employees are involved in fish-processing onboard commercial vessels.

The total employment for passenger vessel industries is 13,280, but many of these employees work onboard USCG-inspected vessels; therefore, they are not affected by this rule. OSHA estimates that 969 employees working on passenger vessels will be affected by this rule, all of whom work at establishments with fewer than 100 employees. Thirty-one percent of employees working aboard tug or towing boats work for employers with 1,000 or more employees, with an additional 25 percent working for employers having between 500–999 employees. Establishments with fewer than 200 employees account for 44

percent of employment in the tug and towboat industry.

Payroll

Based on the 2006 SBA data, annual payroll for all industries affected by this final rule was about $5.3 billion. Of this amount, commercial fishing had an annual payroll of $225 million, or an average of $24,562 per employee. Fish processing vessels had an annual payroll of $384 million or an average of $21,975 per employee. The affected commercial passenger transportation industries had an annual payroll of $38.8 million, or an average of $40,090 per employee. The payroll for shipyards was an average of $46,071 per employee for a total payroll of $4.1 billion. Tug and towboat industries had annual payroll expenses of $567 million, or an average of $34,715 per employee.

Overall, the payroll of the affected industries averaged $39,943 per employee. For a full year, this is equivalent to an hourly wage of $19.20. The payroll per employee did not show any consistent pattern across employment size classes.

Wages

Taking the ratio of total payroll (from SBA) to total employment, OSHA calculated an average annual salary of $39,943 per employee for all affected industries combined. The average annual salary estimate includes both production and non-production employees.

The average employee in the shipyard industry earned $46,071. The average salary for water-transportation employees, which includes tug and towing services and passenger vessels, was $40,090, while the average tug and towing-boat employee earned $34,715. The average salary for commercial fishing and fish processing was $35,550. These estimates of average salaries include both production and non-production employees.

OSHA compared the $39,943 annual salary estimate, which was based on payroll data, with a salary estimate based on weekly earnings reported by BLS (*Employment, Hours, and Earnings from the Current Employment Survey*, 2006). In 2006, BLS reported weekly earnings of $862.46 for a production or non-supervisory water-transportation employee, and $800.61 for an employee working in the shipyard industry. The annual salaries for employees in these two industries, calculated from BLS, reported weekly earnings of $44,848 and $41,632 (fringe benefits not included), respectively. The salary estimates based on the BLS data differ from the salary estimates based on payroll data. The Agency chose to rely on the BLS data for this analysis because it includes breakdowns of different employment categories and wage and salary information for industries such as commercial fishing. OSHA estimated, for the PEA, that the supervisors' wage rate is 25 percent higher than the average wage rate for production employees. OSHA did not receive any objections.

The wage estimates for employees in the affected industries include base rate, cost-of-living allowances, guaranteed pay, hazardous-duty pay, incentive pay (including commissions and production bonuses), on-call pay, and tips. The estimates exclude back pay, jury-duty pay, overtime pay, severance pay, shift differentials, non-production bonuses, and tuition reimbursements (BLS, 2000). To produce a total wage that realistically reflects total compensation for employees in affected industries, OSHA adjusted the average base wage to include fringe benefits. The BLS reports total employee compensation, based on survey data for aggregate worker categories (BLS, 2002). In this analysis, OSHA used an average fringe benefits rate of 38 percent based on data from the BLS *Employer Costs for Employee Compensation* survey.

C. Technological Feasibility

The OSH Act mandates that OSHA, when promulgating standards for protecting workers, consider the feasibility of the new workplace rules. Court decisions have subsequently clarified "feasibility" in economic and technological terms. Consistent with the legal framework established by the OSH Act and court decisions, OSHA assessed the technological feasibility of the final rule. The rule addresses various workplace hazards in shipyard employment, including control of hazardous energy and motor vehicle safety. The final rule does not require technology that is not already in use in many affected establishments. For example, OSHA received comments stating that many employers engaged in shipyard employment already have implemented effective programs for the control of hazardous energy (Exs. 108.1; 114.1; 116.1; 121.1; 123; 132.2; 168, pp.70, 192, 322–24). Similarly, several stakeholders offered examples of practices they currently use to protect workers, including pedestrians, from motor-vehicle accidents at their worksites (Exs. 116.1; 119.1; 121.1; 168, pp. 71–73, 247–48). Many of the requirements involve implementing work-practice controls that can be communicated to employees through training, which some stakeholders said they currently provide (Exs. 116.1; 120.1). In addition, some stakeholders said they already provide CPR training for their on-site first aid providers (Exs. 116.1; 120.1; 168, pp. 87–89, 259, 260, 299). Based on current industry practice and OSHA's findings, the Agency determined that the rule is technologically feasible.

D. Benefits

E.O. 12866 requires that Federal agencies assess both the costs and benefits of any regulation and make a "reasoned determination that the benefits * * * justify its costs" (E.O. 12866, Section 1(b)(6)). Agencies are to base regulatory decisions on "the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of, the intended regulation" (E.O. 12866 Section 1(b)(7)).

This chapter reviews the population at risk of occupational injury, illness, or death in affected establishments and industries, and assesses the potential benefits associated with the final rule. OSHA believes that compliance with the rule will yield substantial benefits in terms of lives saved, injuries avoided, and accident-related cost savings. In assessing the benefits of the final rule, OSHA focused on the rule's primary and substantial new requirements: (1) CPR training for first aid providers; (2) the control of hazardous energy during servicing operations (lockout/tags-plus); (3) motor vehicle safety, including pedestrian safety at shipyards; and (4) servicing multi-piece and single-piece rim wheels. Although the final rule also includes other provisions, they primarily update, consolidate, and clarify existing requirements. Although OSHA believes that all provisions in the final rule will help to increase safety and health in shipyard employment, the Agency is only estimating quantitative benefits for the new provisions listed above (refer to the Non-quantified Benefits section below for a further discussion of the non-monetized benefits). OSHA believes that compliance with these new provisions will decrease the number of injuries and fatalities which, in turn, will reduce expenditures for medical care, rehabilitation, death benefits, lost-work time, and repairs to damaged facilities and equipment.

To assess the benefits, the Agency used OSHA and BLS data to conduct a historical analysis of the frequency of fatalities and injuries among employees engaged in shipyard employment landside and onboard commercial vessels. These data were used to calculate the frequency of accidents

caused by improperly controlling hazardous energy during maintenance operations, and while operating motor vehicles. The Agency did not identify any injuries or fatalities relating to servicing rim wheels, and did not receive any reports of such injuries or fatalities from industry in the docket. The following sections estimate the number of fatalities and injuries OSHA expects the rule to prevent, and describes the methodology used to develop these estimates.

Fatality Benefits

OSHA's analysis of the number of fatalities estimated to be averted by the final rule proceeds in two steps: (1) Determine the number of fatalities currently occurring and the types and causes of these fatalities; and (2) determine the rule's effectiveness in averting various types of fatalities (assuming full compliance). Only those fatalities that would have been prevented through compliance with the new provisions noted above were estimated in this benefits analysis.

In 1995, OSHA analyzed fatalities in shipbuilding and repair (SIC 3731) that occurred from 1974 to 1995. OSHA concluded that, of the total number of fatalities (314), electrocutions accounted for 8.6 percent (or 27). More recently, OSHA reviewed 248 abstracts of fatal accidents from the OSHA Integrated Management Information System (IMIS) database from 1987 to 2002, to determine if any shipyard-employment accidents were the result of, or caused by, hazardous energy, motor vehicles, lack of medical services and first aid, and servicing rim wheels. Review of these 248 fatal accidents led OSHA to conclude that 38 (15.3 percent) were related to hazards the final rule addresses. Included in the 38 deaths were 10 fatalities that resulted from heart attacks for which the abstract did not note a history of cardiovascular disease. Of the 38 fatalities, 13 (34 percent) were deaths that the final rule could have prevented. Of the 10 heart-attack deaths, OSHA believes that 2 deaths (20 percent) could have been averted by the final rule. While OSHA's analysis of heart-attack deaths focused on those deaths that were work related, the Agency notes that the requirements for CPR-trained first aid providers may also reduce mortality due to non-work-related heart attacks that occur in the work environment. As a result, OSHA believes that the benefits of this provision may be greatly underestimated.

To determine an annual estimate of the number of fatalities in shipyard employment that the final rule would prevent, OSHA used 11 years (1992–2002) of BLS Census of Fatal Occupational Injury (CFOI) data. That data showed, on average, 14.6 worker deaths occurred in SIC 3731 (shipbuilding and repair industry, which includes shipbreaking) per year. OSHA multiplied that average by 15.3 percent (the percentage of IMIS deaths related to hazards covered by the rule) to reach a total of 2.2 deaths per year related to hazards covered by the rule. Then, OSHA multiplied the 2.2 deaths by 39.5 percent (percentage of IMIS fatalities estimated to be prevented by the rule) to reach 0.9 deaths in shipyards (SIC 3731/NAICS 336611) that could be prevented by the rule (avoidable deaths).

To determine the annual estimate of the number of fatalities aboard covered commercial vessels that the rule would prevent, OSHA used 17 years (2002–2008) of BLS CFOI data. That data showed, on average, 47 worker deaths per year in the commercial vessels industries, a majority of those deaths being in the commercial fishing industry. OSHA multiplied that average by 0.9 percent, which was the percentage of IMIS deaths related to hazards covered by the rule, multiplied by the ratio of fish-processing vessels to total fish processing establishments. This calculation accounted for, and removed from the estimate, those fatalities that occurred at land-based fish-processing facilities. Based on this calculation, OSHA reached an estimate of 0.4 deaths per year onboard commercial vessels that were related to hazards covered by the final rule. OSHA estimated that 66 percent of the deaths related to hazards covered by the rule could have been prevented for a total of 0.3 avoidable deaths per year onboard commercial vessels. OSHA estimates that, in total, 1.2 deaths (0.9 deaths in shipyards plus 0.3 onboard commercial vessels covered by the rule) per year could be prevented by the final rule (see Table 8).

Table 8

Estimated Fatality Benefits Attributed to the Final Rule

	Average
CFOI Fatalities in Shipyards (Annual Average from 1992-2008)	14.6
Percent of IMIS Fatalities in Shipyards Related to Hazards Covered by the Final Rule	15.3%
Number of CFOI Fatalities in Shipyards Related to Hazards Covered by the Final Rule	2.2
Percentage of Avoidable Deaths in Shipyards from IMIS Data	39.5%
Avoidable Fatalities in Shipyards (Annually)	0.9
CFOI Fatalities Onboard Commercial Vessels (Annual Average from 1992-2008)	46
Percent of IMIS Fatalities Onboard Commercial Vessels Related Hazards Covered by the Final Rule	0.9%
Number of CFOI Fatalities Onboard Commercial Vessels Related to Hazards Covered by the Final Rule	0.4
Percentage of Avoidable Deaths Onboard Commercial Vessels from IMIS Data	66.0%
Avoidable Fatalities Onboard Commercial Vessels (Annually)	0.3
Total Avoidable Fatalities (Annually)	1.2
Source: Office of Regulatory Analysis	

Injury Benefits

The numbers and characteristics of injuries in SIC 3731 (NAICS 336611), SIC 0910 (NAICS 11411), SIC 2092 (NAICS 311712), SIC 4499 (NAICS 488330), and SIC 4489 (NAICS 483114 and NAICS 483212) are outlined in the BLS *Annual Survey of Occupational Injuries and Illnesses*. This survey is based on employer injury and illness reports (OSHA Form 200 or 300) collected by state agencies and BLS

from roughly 250,000 private establishments. The survey compiles demographic information, data on employee occupation, length-of-service statistics, employee hours worked, the employer's principal products or services, selected injury or illness characteristics, and the severity of the accident (in terms of lost workdays). Thus, data from the BLS injury and illness survey can be used to develop a profile of the risks facing employee groups, such as those engaged in shipyard-employment activities. Unfortunately, this BLS database does not characterize injuries that do not involve days away from work in a way that would permit OSHA to determine causality. OSHA notes that, in most sectors, the number of injuries and illnesses that do not involve days away from work equals or exceeds the number of cases involving days away from work.

According to BLS data from 1992 to 2001, in SIC 3731 there were an average of 6,088 injuries per year involving days away from work. BLS publishes certain broad categories of injuries and illnesses by source for all SICs, and now for NAICS.

To estimate the number of injuries due to the absence or inadequacy of procedures for the control of hazardous energy, OSHA multiplied the number of total cases involving days away from work by the percentage of cases estimated to be caused by the absence or inadequacy of protection against hazardous energy. In the general industry lockout/tagout standard, OSHA determined that 2 percent of all injuries were related to hazardous energy (OSHA, 1989). OSHA multiplied the product by 39.5 percent (the percentage of IMIS fatalities estimated to be prevented by the final rule). The results are presented in Table 9. OSHA then used the 2 percent figure to estimate the non-lost workday injuries resulting from the lockout/tagout activities. This product was also multiplied by 39.5 percent (the percentage of IMIS fatalities estimated to be prevented by the final rule). This calculation results in 48.1 lost workday and 89.1 non-lost workday lockout/tagout injury cases.

According to the BLS data from 1992–2001, there were an average of 1,800 injuries per year in the fish-processing industry involving days away from work. Based on IMIS accident reports, the Agency estimated that 28 percent of injuries in the fish-processing industry were related to inadequacy or absence of controls to protect employees from hazardous energy. These injuries were generally serious (often amputations). OSHA estimated lost workdays related to hazardous-energy injuries for the fish-processing industry by multiplying the injury cases involving days away from work by the percent of injuries related to lockout/tagout (28 percent). OSHA concluded that injuries onboard floating fish-processing factories were occurring in the same proportion to injuries at land-based fish-processing factories. To estimate the number of hazardous-energy injuries onboard fish-processing vessels, OSHA multiplied the number of hazardous energy injury cases involving days away by 36 percent (the ratio of fish-processing vessels (200) to total fish-processing establishments (552)). The Agency concluded that the final rule would prevent all of those injuries, resulting in an estimated 184.3 avoidable lockout/tags-plus injury cases per year involving days away from work.

The injuries related to motor vehicle operation and maintenance were calculated by applying the 15.3 percent (the percentage of IMIS deaths related to the rule used in the fatality estimates) to the BLS estimates for motor vehicle-related injuries (lost workday and non-lost workday estimates), and then multiplying this product by 39.5 percent (the percentage of IMIS fatalities estimated to be prevented by the rule); this calculation results in 9.5 lost workday and 17.4 non-lost workday injuries related to motor vehicles. This injury category includes injuries while operating or riding in motor vehicles, as well as being struck by motor vehicles in the workplace. This estimate, combined with the hazardous-energy injury reductions, totals of 348.4 avoidable injury cases (which includes both cases involving days away from work and non-lost workday cases) that the final rule would prevent (see Table 9). The available data did not allow OSHA to identify injuries related to the absence, or inadequate training, of CPR providers, nor injuries that occurred while servicing rim wheels.

Table 9	
Estimated Injury Benefits Attributed to the Final Rule	
BLS Injury Data	**Average**
Cases Involving Days Away From Work (CIDAFW) in Shipyards	6,088
Non-Lost Workday Injuries (NLWD) in Shipyards	11,291
Total Cases (CIDAFW + NLWDI)	17,379
Cases Involving Days Away From Work (CIDAFW) in Fish Processing	1,800
Non-Lost Workday Injuries (NLWD) in Fish Processing	2,506
Total Cases (CIDAFW + NLWDI)	4,306
Estimated Injury Benefits by Injury Source	
Number of CIDAFW Lockout/Tagout Injuries in Shipyards	121.8
Avoided CIDAFW (LO/TO) in Shipyards	48.1
Number of NLWD Lockout/Tagout Injuries in Shipyards	225.8
Avoided NLWD Cases (LO/TO) in Shipyards	89.1
Number of CIDAFW Lockout/Tagout Injuries in Fish Processing	508.7
Avoided CIDAFW (LO/TO) on Fish Processing Vessels	184.3
Number of Vehicle Injury Cases (from BLS)	157.4
Avoided Vehicle Injury Cases	9.5
NLWD Vehicle Injury Cases	287.2
Avoided NLWD Vehicle Injury Cases	17.4
Total Avoided CIDAFW Injuries	241.9
Total Avoided NLWD Injuries	106.5
Total Avoided Cases	**348.4**
Source: Office of Regulatory Analysis	

Monetized Benefits

For informational purposes, the Agency monetized both avoidable fatalities and injuries based on willingness-to-pay (WTP) values of $8.7 million per death and $67,000 per injury. In estimating the value of preventing a fatality, OSHA followed the approach established by the U.S. Environmental Protection Agency (EPA). EPA's *Guidelines for Preparing Economic Analyses* provides a detailed review of the methods for estimating mortality risk values, and summarizes the values obtained in the literature (EPA, 2000). Synthesizing the results from 26 relevant studies, EPA arrived at a mean value of a statistical life (VSL) of $4.8 million (in 1990 dollars). EPA recommends this central estimate, updated for inflation (the value is $8.7 million in 2010 dollars), for application in regulatory analyses. This VSL estimate also is within the range of the substantial majority of such estimates in the literature ($1 million to $10 million per statistical life), as discussed in OMB Circular A–4 (OMB, 2003). Applying a VSL of $8.7 million to the estimated number of prevented fatalities, OSHA estimates that the dollar value of the prevented deaths resulting from compliance with the final rule will be $10.4 million annually.

OSHA also reviewed the available research literature regarding the dollar value of preventing an injury. Kip Viscusi and Joseph Aldy conducted a critical review of 39 studies estimating the value of a statistical injury (Viscusi and Aldy, 2003, Ex. 9). In their published article, Viscusi and Aldy reviewed the available WTP literature to identify a suitable range of estimates. Using WTP to value non-fatal injuries is the approach OMB recommends in OMB Circular A–4.

Viscusi and Aldy found that most studies resulted in estimates in the range of $20,000 to $70,000 per injury, although several studies resulted in even higher estimates. This range of values is partly explained by the fact that some studies used an overall injury rate, and others used only injuries resulting in lost workdays. The injuries that would be prevented by this final rule often involve hospitalization and, therefore, are likely to be more severe than the majority of injuries involving days away from work.

Thus, it is reasonable to believe that the value of a statistical injury for this rulemaking will be in the upper part of the reported range of estimates. Nevertheless, OSHA used an estimate of $67,000 in 2010 dollars to assess monetized benefits for this analysis. Thus, with 348.4 injuries (injuries involving days away from work and non-lost workday injuries) a year potentially prevented by the final rule, OSHA estimates that the dollar value of prevented injuries through compliance with the rule will total $23.4 million annually.

The total monetized benefits for prevented deaths and injuries are estimated to be $33.8 million in total monetized benefits.

Non-Quantified Benefits

OSHA believes that non-quantified benefits also are likely to result from the final rule; therefore, the 1.2 prevented fatalities and 348.4 avoided injuries each year should be considered

minimum estimates. For example, the provisions for accounting for employees at the end of the workshift, lifeboat safety, housekeeping, rim-wheel repair, lighting, and utilities are expected to result in safer working conditions that will reduce fatalities and injuries. The revision of the sanitation and vermin-control standard also are expected to result in fewer heat-, hydration-, and sanitation-related deaths and illnesses. However, these cases are difficult to quantify as they are commonly unreported or not recognized as work-related cases.

The provisions for improved first aid and medical treatment, along with the requirement to account for working-alone employees at the end of the job assignment or workshift (whichever occurs first), are expected to result in benefits due to improved survivability from an injury, and fewer medical complications resulting from delayed or ineffective treatment. Also, OSHA believes that employers and employees will benefit from the reorganization and plain-language features of the final rule, which will make it easier for employers to comply with the rule and, thus, improve safety and health in general working conditions in shipyard employment.

Appendix

In estimating the preventable fatalities under the final rule, the Agency reviewed accident abstracts from OSHA's IMIS database from the years 1992–2008 (16 years). The table of accidents (by accident numbers) below gives a brief description of the accidents and provides OSHA's determination on the provisions that could have prevented the accident. The table does not include examples of the 20 percent of heart-attack deaths that are estimated to be preventable if the requirements of this rule are followed.

Accident number	Brief description	OSHA's findings
014337851	While attempting to repair a hoist, the employee did not check the brake to ensure that it was locked in. He had removed all but one bolt when the drum and gear started freewheeling. The paw and spring broke off. The two large gears on the opposite side jammed and the motor shaft started turning. The hub flew off the shaft and stuck the employee in the chest, killing him.	Control of Hazardous Energy.
101350262	Employees were working in an aerial lift basket on an elevator platform (hanger deck level) with the boom extended to the underside of the flight deck. The employees had finished their work and were lowering themselves to hanger deck level, when the elevator unexpectedly ascended towards the flight deck. Both employees were crushed under the lip of the flight deck, while in the basket.	Control of Hazardous Energy.
200840650	Employees were working on a steering mechanism belonging to a tow boat. The electricity was turned off and secured, but the residual energy belonging to the hydraulics was not. A component of this steering mechanism shifted without warning killing one employee.	Control of Hazardous Energy.
170611206	Employee was electrocuted while working alone on a transformer. He seemed to be manually cleaning the ceramic terminals and checking them for cracks. The oil switch to the mound was purportedly in the open position; however, the panel lights indicated that the circuit breaking controlling electric power to the mound was closed. No signs, tags, or locks had been used.	Control of Hazardous Energy.
014534143	While an electrician was working on a switchboard, which was de-energized and tagged, a ship's crew member inadvertently energized the circuit. He was electrocuted.	Control of Hazardous Energy.
014509350	Employees, conducting valve repair operations on a steam piping system, were burned when scalded by stored steam.	Control of Hazardous Energy.
302101134	Employees came in contact with 4160 volts coming from a secondary switch which had not been locked open to de-energize the high voltage going to the load side of panel ZZ4020 and ZZ4025.	Control of Hazardous Energy.
014436075	Accidental energization occurred when an employee was standing in the conveyor when one of the ship's crew turned the conveyor on. The ship's crewman was unaware of the other employees' presence. There was no lockout procedure in effect.	Control of Hazardous Energy.
200552248	A pickup truck with automatic transmission began to roll back and apparently the victim tried to reach through the driver's side window to put the truck gear in park when he fell and the front driver's side tire rolled over him.	Motor Vehicle Safety.
201580073	The driver of a straddle lift truck struck and killed an employee who had been walking on the pier.	Motor Vehicle Safety.
000603621	An employee was riding a bicycle while performing regularly assigned tasks when he was hit by a bus.	Motor Vehicle Safety.
200550820	While standing near the right rear tire, employee was operating a battery charger and pushing the loader's button when he apparently contacted a control that caused the machine to suddenly move forward. He was run over by the large rear tire and was killed.	Control of Hazardous Energy.
000648550	While an employee was hammering wood wedges in the seal where the floor meets the wall, a bobcat operator backed over him pinning him between the bobcat and the dry dock wall. The employee later died at the hospital after this accident.	Motor Vehicle Safety.

Source: Occupational Safety and Health Administration Integrated Management Information System Database.

E. Costs of Compliance

This chapter presents OSHA's estimate of the rule's costs of compliance for affected establishments and industries. OSHA based the costs on the profile of affected employers and workers presented in the Industrial Profile section of this FEA, on estimates based on data provided by the "General Industry Lockout/Tagout Regulatory Impact Analysis" (OSHA, 1989), and on the "Supporting Statement for the Information Collection Requirements in the Control of Hazardous Energy

(Lockout/Tagout) rule"[13] (29 CFR 1910.147, OMB Control Number 1218–0150 (June 2004)).

This chapter is organized into three sections. The first section reviews the methodology and describes the type of costs. The second section presents OSHA's baseline data and analytical assumptions used to estimate costs. The final section summarizes the costs of compliance by establishment and provision.

Methodology

To estimate the compliance costs that the final rule would impose on employers, it was necessary to assess the extent to which current industry practice already meets the rule's requirements. Based on that assessment, the Agency identified five areas in the final rule that would generate new costs: sanitation, medical services and first aid, control of hazardous energy, motor-vehicle safety, and servicing multi-piece and single-piece rim wheels. For the purposes of this FEA, OSHA assumed that affected firms will seek to minimize their compliance costs and, thus, calculated the least-cost option to comply with the provisions of the rule. All cost estimates assume employers will fully comply with the final rule. Costs are reported as annualized costs, with capital or one-time costs based on a 7 percent discount rate (as recommended by OMB) for costs in future years. All one-time costs are assumed to have a 10-year life.

This cost analysis does not account for any changes in production methods, investment effects, or macroeconomic effects of the rule. Taking into account all of these effects could increase or decrease the cost estimate presented, although the macroeconomic effects of any rule with costs as low as these are likely to be minimal. OSHA believes that this approach, determining the benefits and costs of the final rule for industry as it is today, is the most reliable and least speculative way of presenting them.

Baseline Data and Analytical Assumptions

This section presents the technical specifications, unit costs, and analytical assumptions underlying OSHA's cost analysis. For those provisions in the final rule that simply update, consolidate, or clarify existing requirements, OSHA assumes that no new costs will be imposed. The Agency did not receive any comments indicating that the provisions that update, consolidate, or clarify existing requirements would impose new costs.

The Agency solicited comment in the record on whether these provisions imposed new additional costs, and received comments that the sanitation standard would require a 25 percent increase in toilets at a cost of $7.5 million for the Newport News, VA, shipyard (James Thornton, Northrop Grumman, Ex. 120.1), and that the lighting requirements and housekeeping requirements would increase costs without increasing safety (Doug Dixon, Pacific Fisherman Shipyard and Electric, LLC, Ex. 131.1). The Agency considered these comments and concluded that firms would not incur costs to comply with these provisions if they were currently complying with the existing shipyard standards.

Section 1915.87 Medical Services and First Aid

Paragraph (c)(1) requires employers to ensure that there is an adequate number of employees trained as first aid providers at each worksite during each work shift to render first aid, including CPR. The Agency estimates that 2 percent of employees will serve as first aid providers, and that 50 percent of those employees will need to be trained or retrained to provide adequate care. According to American Red Cross data, the cost per person for first aid (including CPR) training ranges from $35 to $80 plus 4 hours of employee time to receive the training (ARC, 2010). The Agency is using the median cost of $55 for this analysis. The per-employee time cost to receive this training is 4 hours multiplied by the employee's hourly wage rate of $26.51 for shipyard employees; $28.61 for tug and towing-boat and passenger-vessel employees; $31.62 for fish-processing vessel employees; and $16.30 for commercial fishing employees. The total training cost is $55 times the number of employees needing training.

First aid equipment and first aid and CPR training on certain uninspected commercial fishing vessels are regulated by the USCG (46 CFR 28.210). The Agency was unable to obtain data to adequately estimate the number of commercial fishing vessels subject to USCG first aid and CPR requirements. Therefore, OSHA estimated costs as if they would apply to all commercial fishing vessels. This approach likely will overstate costs for first aid training including CPR training in the commercial fishing industry. Due to the presence of USCG first aid training regulations, OSHA believes that commercial vessels already have an adequate number of first aid providers onboard. The Agency estimated the total cost related to this provision at $418,349. Table 10 outlines the total annual costs for first aid training including CPR training.

[13] The purpose of the Supporting Statement is to analyze and describe burden hours and cost associated with provisions of this standard that contain paperwork requirements. The Supporting Statement does not provide information or guidance on how to comply with, or how to enforce, these provisions.

Table 10
Annual CPR Training for First Aid Providers

Industry Code	Industry Name	Size Class	Estab.	EE's Per Estab.	Needing Training	Training Cost	Employee Time Cost	Training Cost	Annual Cost
		1,000 & Up	40	1,648	16	$55	$69,902	$36,257	$106,159
NAICS 336611	Shipyards	500-999	25	210	2	$55	$5,579	$2,894	$8,472
		200-499	32	229	2	$55	$15,541	$4,030	$19,572
		100-199	51	85	1	$55	$9,141	$2,371	$11,511
		20-99	31	42	1	$55	$2,764	$1,695	$4,460
	Contractor/Off-Site	20-99	85	23	1	$55	$9,032	$2,342	$11,374
		1-19	371	6	1	$55	$39,341	$10,203	$49,543
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	7	714	7	$55	$3,260	$2,750	$6,010
		500-999	3	333	3	$55	$652	$550	$1,202
		200-499	1	300	3	$55	$196	$165	$361
		100-199	8	100	1	$55	$522	$440	$962
		20-99	25	27	1	$55	$1,630	$1,375	$3,005
		1-19	1,076	1	1	$55	$35,073	$29,590	$64,663
NAICS 311712	Fish Processing Vessels	1,000 & Up	22	451	5	$55	$12,601	$5,480	$18,081
		500-999	6	162	2	$55	$1,260	$548	$1,808
		200-499	11	207	2	$55	$2,841	$1,236	$4,076
		100-199	17	100	1	$55	$2,108	$917	$3,024
		20-99	46	44	1	$55	$5,865	$2,551	$8,416
		1-19	98	6	1	$55	$6,186	$2,690	$8,876
NAICS 488330	Tug & Towing Services	1,000 & Up	45	112	1	$55	$5,833	$2,803	$8,636
		500-999	27	152	2	$55	$4,636	$2,228	$6,864
		200-499	8	190	2	$55	$1,762	$847	$2,608
		100-199	13	98	1	$55	$1,453	$698	$2,151
		20-99	88	33	1	$55	$10,106	$4,857	$14,963
		1-19	468	3	1	$55	$26,794	$12,879	$39,673
NAICS 483	Passenger Vessels	20-99	20	30	1	$55	$2,266	$1,089	$3,355
		1-19	101	4	1	$55	$5,759	$2,768	$8,527
		TOTAL	2,725	5,309	59				$418,349

Source: Office of Regulatory Analysis

Section 1915.88 Sanitation

Paragraph (e)(1) requires that employers provide handwashing facilities at, or adjacent to, each toilet facility. Paragraph (e)(2)(i) requires employers to ensure that each handwashing facility is equipped with either hot and cold or lukewarm running water and soap, or, when it is impracticable to provide running water, with waterless skin cleansing agents that are capable of disinfecting the skin and neutralizing the contaminants to which the employee may be exposed.

For shipbuilding and repair establishments, OSHA concluded that they already have handwashing facilities at sewered toilets, but not at all portable toilets. Thus, they would incur costs for providing additional handwashing facilities. The Agency also concluded that commercial vessels have adequate toilet and handwashing facilities onboard vessels. As such, commercial vessel employers would not have to provide portable toilet facilities or additional handwashing facilities to meet employee health and personal needs.

To comply with the requirement to provide handwashing facilities at portable toilets, OSHA calculated the least-cost option, which is to supply each portable toilet with waterless skin cleansing agents. OSHA assumes that employers in the shipyard industry already are providing lockable, unisex portable toilets, especially when work is being performed onboard vessels. OSHA estimates that about one-third of employees at each shipyard establishment might need to use portable toilets. OSHA also estimates that employers will provide portable toilets using the same formula they would use in determining the adequate number of sewered toilets (Table F–2 in § 1915.88(d)(2)).

OSHA estimates that waterless cleaning agents for each portable toilet will be refilled each time the toilet is serviced, which OSHA assumes will be at least weekly. Further, the Agency estimates that each bottle of cleanser costs $5 and that the annual cost of cleanser for each portable toilet is $260 ($5 per bottle times 52 weeks). This is the annual unit cost. The total annual cost to comply is the unit cost multiplied by the total number of portable toilets that employers on each size class will provide, multiplied by the number of establishments in that size class. Table 11 outlines the costs associated with this requirement which are estimated to be $748,709. Note that for this analysis, the Agency assumed for the baseline that establishments in the shipyard industry currently do not provide handwashing products at portable toilets. To the extent that employers are providing such services or products, the final cost estimates may be lower. Moreover, if an establishment operates on only a seasonal basis or is shutdown at any time during the year, the costs also may be lower. OSHA did not receive any comments indicating that the costs the Agency estimated for providing waterless cleansing agents were understated.

Table 11
Annual Costs for Waterless Cleaning Agents

Industry Code	Industry Name	Size Class	Estab.	Production Employes	EE's Per Estab.	33% of Ee's Using Portables	Portables Per Estab.	Unit Cost	Total Cost
NAICS 336611	Shipyards	1,000 & Up	40	47,463	1,648	544	57	$260	$592,800
		500-999	25	3,788	210	69	9	$260	$58,500
		200-499	32	5,276	229	76	5	$260	$41,600
	Contractor/Off-Site	100-199	51	3,103	85	28	3	$260	$39,780
		20-99	31	938	42	14	2	$260	$16,029
		Total	179	60,569					$748,709
Source: Office of Regulatory Analysis									

Section 1915.89 Control of Hazardous Energy (Lockout/Tags-plus)

These provisions apply to the servicing of machinery, equipment, and systems, including servicing machinery, equipment, and systems onboard vessels and vessel sections. This also applies to the extent that other sections in subpart F and part 1915 either involve servicing operations or require the use of lockout/tags-plus applications. There are several areas in which employers will incur costs, which are discussed below.

The standard requires that employers establish a program to protect employees from energization, startup, or release of hazardous energy during the servicing of machinery, equipment and systems in shipyard employment. This program would have to include: (1) Procedures for lockout/tags-plus systems, including a lockout/tags-plus coordination process; (2) procedures for protecting employees involved in servicing; (3) specification for locks and tags-plus hardware; (4) employee training; (5) incident investigations; and (6) program audits.

In estimating the costs for complying with various lockout/tags-plus applications, OSHA used the following parameters:

- Affected employers were categorized as large (500 employees or more), medium (100–499 employees), small (20–99 employees); and very small (fewer than 20 employees);
- Employment categories and wages used were:
  - Supervisors ($32.98 per hour for shipyard establishments, $44.13 per hour for water transportation, $33.53 per hour for fish-processing vessels, $20.37 per hour for commercial fishing)—to develop the lockout/tags-plus program and procedures, coordinate lockout/tags-plus applications, and perform training and retraining;
  - Authorized employees ($23.72 per hour for shipyard establishments, $46.46 per hour for water transportation, $31.78 per hour for fish-processing vessels, $16.30 for commercial fishing)—to perform operations involving locking, tagging, and isolation of hazardous energy sources; to perform servicing; and to conduct incident investigations and program audits; and
  - Affected employees ($19.51 per hour for shipbuilding and repair establishments, $30.58 per hour for water transportation, $18.09 per hour for fish-processing vessels, and $16.30 per hour for commercial fishing)—to adapt their work routine because of lockout/tags-plus applications.
- Lockout/Tags-plus Program Costs:
  - Time to develop and maintain lockout/tags-plus program and procedures by employer size;
    - Large—the Agency concluded, based on comment in the record, that all large employers already have a written lockout/tags-plus program and will not incur costs related to the development of a program. However, OSHA estimates that large employers will require 20 hours initially to update their programs to comply with the final rule, and 20 hours each year thereafter to update the program;
    - Medium—40 hours initially to develop a lockout/tags-plus program, and 12 hours annually thereafter to update the program;
    - Small—12 hours initially, and 4 hours thereafter; and
    - Very Small—2 hours initially, and 30 minutes thereafter.

Based on the supervisor's wage rate, the Agency estimated the annualized costs to develop the lockout/tags-plus program and procedures at $91,890, as shown in Table 12, with recurring annual costs of $275,116 shown in Table 12a. The Agency concluded that employers will have to update their lockout/tags-plus programs and procedures at least annually due to the changes at the workplace or in machinery, equipment, or systems being serviced. OSHA received no comment in the docket indicating that the estimated number of hours required to develop and maintain a lockout/tags-plus program were understated.

In addition to the costs for shipyard establishments, many other establishments or contractors engaged in shipyard-employment operations also would have to develop lockout/tags-plus programs. In the PEA, the Agency estimated that there are four types of these establishments: (1) Establishments that do not perform the type of activities requiring them to develop and implement a lockout/tags-plus program (10%); (2) establishments using a shipyard's program (15%); (3) establishments developing their own program (50%); and (4) establishments developing a joint program with a shipyard (25%). While the final rule requires contractors working for a host employer to follow that host employer's lockout/tags-plus program, OSHA maintained some costs for contractors and other establishments because the Agency believes that they will spend some time on program development, familiarization, or implementation.

Table 12

Lockout/Tags-plus Program Costs by Establishment Size

Industry Code	Industry Name	Size Class	Affected Estab.	Supevisor's Wage	Time (Hours)	Unit Cost Per Establishment	Unit Cost Annualized	Annualized Cost
NAICS 336611	Shipyards	1,000 & Up	40	$32.98	20	$659.60	$93.91	$3,757
		500-999	25	$32.98	20	$659.60	$93.91	$2,348
		200-499	32	$32.98	80	$2,638.42	$375.65	$12,021
		100-249	51	$32.98	40	$1,319.21	$187.83	$9,579
		20-99	31	$32.98	12	$395.76	$56.35	$1,737
	Contractor/Off-Site	20-99*	85	$32.98	12	$395.76	$56.35	$4,799
		1-19*	371	$32.98	2	$65.96	$9.39	$3,484
NAICS 11411	Commercial Fishing	1,000 & Up	7	$20.37	20	$407.45	$58.01	$406
		500-999	3	$20.37	20	$407.45	$58.01	$174
		200-499	1	$20.37	80	$1,629.78	$232.04	$232
		100-199	8	$20.37	40	$814.89	$116.02	$928
		20-99	25	$20.37	12	$244.47	$34.81	$870
		0-19	1,076	$20.37	2	$40.74	$5.80	$6,242
NAICS 311712	Fish Processing Vessels	1,000 & Up	22	$33.53	20	$670.60	$95.48	$2,110
		500-999	6	$33.53	20	$670.60	$95.48	$588
		200-499	11	$33.53	80	$2,682.42	$381.92	$4,151
		100-199	17	$33.53	40	$1,341.21	$190.96	$3,183
		20-99	46	$33.53	12	$402.36	$57.29	$2,657
		0-19	98	$33.53	2	$67.06	$9.55	$934
NAICS 488330	Tug & Towing Services	1,000 & Up	45	$44.13	20	$882.51	$125.65	$5,701
		500-999	27	$44.13	20	$882.51	$125.65	$3,360
		200-499	8	$44.13	80	$3,530.04	$502.60	$4,072
		100-199	13	$44.13	40	$1,765.02	$251.30	$3,258
		20-99	88	$44.13	12	$529.51	$75.39	$6,658
		0-19	468	$44.13	2	$88.25	$12.56	$5,884
NAICS 483	Passenger Vessels	20-99	20	$44.13	12	$529.51	$75.39	$1,493
		0-19	101	$44.13	2	$88.25	$12.56	$1,265
		Total	2,725					$91,890

* These establishments will follow the program established by the shipyard but may incur costs related to development, familiarization, or implementation

Source: Office of Regulatory Analysis, OSHA

Table 12a
Recurring Annual Costs for Lockout/Tags-plus Program Updates

Industry Code	Industry Name	Size Class	Affected Estab.	Supevisor's Wage	Time (Hours)	Cost Per Establishment	Annual Cost
NAICS 336611	Shipyards	1,000 & Up	40	$32.98	20	$659.60	$26,384
		500-999	25	$32.98	20	$659.60	$16,490
		200-499	32	$32.98	20	$659.60	$21,107
		100-249	51	$32.98	12	$395.76	$20,184
		20-99	31	$32.98	4	$131.92	$4,066
	Contractor/Off-Site	20-99*	85	$32.98	4	$131.92	$11,236
		1-19*	371	$32.98	0.5	$16.49	$6,118
NAICS 11411	Commercial Fishing	1,000 & Up	7	$20.37	20	$407.45	$2,852
		500-999	3	$20.37	20	$407.45	$1,222
		200-499	1	$20.37	20	$407.45	$407
		100-199	8	$20.37	12	$244.47	$1,956
		20-99	25	$20.37	4	$81.49	$2,037
		0-19	1076	$20.37	0.5	$10.19	$10,960
NAICS 311712	Fish Processing Vessels	1,000 & Up	22	$33.53	20	$670.60	$14,821
		500-999	6	$33.53	20	$670.60	$4,131
		200-499	11	$33.53	20	$670.60	$7,289
		100-199	17	$33.53	12	$402.36	$6,706
		20-99	46	$33.53	4	$134.12	$6,220
		0-19	98	$33.53	0.5	$16.77	$1,640
NAICS 488330	Tug & Towing Services	1,000 & Up	45	$44.13	20	$882.51	$40,042
		500-999	27	$44.13	20	$882.51	$23,596
		200-499	8	$44.13	20	$882.51	$7,150
		100-199	13	$44.13	12	$529.51	$6,864
		20-99	88	$44.13	4	$176.50	$15,588
		0-19	468	$44.13	0.5	$22.06	$10,332
NAICS 483	Passenger Vessels	20-99	20	$44.13	4	$176.50	$3,495
		0-19	101	$44.13	0.5	$22.06	$2,221
		Total	2,725				$275,116

* These establishments will follow the program established by the shipyard but may incur costs related to development, familiarization, or implementation

Source: Office of Regulatory Analysis, OSHA

Numerous stakeholders asserted that OSHA understated the costs associated with developing and implementing a lockout/tags-plus program. Cynthia Brown of the American Shipbuilding Association (ASA) said that ASA conservatively estimated that the lockout/tagout provisions would cost "well over $200 million." She also said that the first-year costs for the Newport News shipyard to implement the lockout/tagout requirements were $85 million, with recurring annual costs of $79 million (Ex. 204.1). John H. James, Jr., Executive Director of Logistics, Maintenance, and Industrial Operations for the Navy, said that it would cost each shipyard over $30 million to implement a lockout/tagout program (Ex. 132.2). Stacy Ballow, of ASA, testified at the hearing in Washington, DC, regarding the cost of the proposed hazardous-energy requirements:

> [T]he proposed [lockout/tagout] rule will result in a cost to the American taxpayers well over $200 million. This figure is based on an estimated cost of approximately [$]100 million for the six ASA member shipyards in addition to the Navy's [$]120 million cost estimate for its four nuclear shipyards. The largest contributor to this estimate is the proposal's required individual employee involvement in group lockout/tagout (Ex. 168, p. 238).

James Thornton, Director of Environmental Health and Safety for Northrop Grumman (Ex. 120.1), concurred that the proposed group lockout/tagout provisions would pose the greatest costs, which he estimated would be at least $19 million annually for the Newport News shipyard. None of these commenters provided the Agency with specific or background information on their cost models. Thus, OSHA cannot fully address their cost concerns. The record for this rule includes evidence that individual shipyards have successfully implemented lockout/tags-plus programs similar to the general industry lockout/tagout standard. This indicates that it is feasible and not overly burdensome for shipyards to comply with a hazardous energy control program.

The rule requires that employers follow certain procedures to: shutdown machinery, equipment or systems; deenergize machinery, equipment or systems; isolate and secure power sources; verify isolation; and apply locks or tags-plus systems. The costs for this subsection include: (1) The time to implement the required procedures; (2) the time to apply lockout/tags-plus applications to power sources or energy-

isolating devices; (3) the time to implement additional safety measures; (4) the time to apply tags to the energy-isolating device; and (5) the time to complete the required lockout/tags-plus log.

The power sources considered in this analysis include electrical (primary), air, hydraulic, and steam (primary); electrical (secondary); air, hydraulic, and steam (secondary); and all non-vessel sources (for example, electrical panel boxes in buildings and in off-site establishments) to which locks or tags-plus systems are applied. The unit costs are presented in Table 13, and are based on the following estimates:

• Large shipyards and commercial vessels industries (those with 500 or more employees) are already employing some form of energy control when performing work on electrical systems or equipment. OSHA estimates that those shipyards and commercial-vessel industries will not incur any additional costs associated with applying a lockout or tags-plus system. This estimate is consistent with evidence presented in the rulemaking record.

• OSHA estimates that medium, small, and very small shipyards and commercial-vessel industries (those with fewer than 500 employees) do not currently employ any form of lockout or tags-plus system when performing electrical work other than as required by 29 CFR 1915, subpart J (Ship's Machinery and Piping Systems), and subpart L (Electrical Machinery). Additional costs will include the time to go to the system, tag it, and attach a clip. Also included is the cost of the required hardware. The labor-time estimate includes the time to notify the affected employees of the application and removal of lockout or tags-plus devices.

○ OSHA estimates that the cost of the tag is $1.00 [14] and the cost of a tie is $0.03. Tags can be used an estimated 7 times, so that the cost per use is $0.14. There may be some additional hardware costs, but the unit cost per use is very low, and additional hardware costs will not affect the feasibility of compliance with the final rule. The labor cost is 2 minutes of time at an authorized employee's wage rate. The total unit cost of securing a primary electric power source is $1.07 for shipyards, $0.53 for commercial fishing, $1.20 for fish-processing vessels, and $1.69 for water transportation. The unit cost for securing hydraulic or air-powered power sources is estimated at $24.69 for shipyards, $12.77 for commercial fishing, $32.74 for fish-processing vessels, and $47.42 for water transportation. OSHA estimates that 1 hour of authorized employee time is needed to secure air and hydraulic power sources.

• The Agency is retaining the estimates from the PEA of the cost to provide full employee protection which includes implementing an additional safety measures to reduce the likelihood of inadvertent energization so that a tags-plus system provides the equivalent safety available from the use of a lock. OSHA estimated 6 lockouts or tags-plus systems applied per authorized employee per year to secure backup electrical systems, and 1 lockout or tags-plus system applied per year per authorized employee to secure air or hydraulic secondary systems, except for contract employees and off-site employees, who will perform 20 such lockout or tags-plus activities per year of backup electrical systems. Current regulations do not cover back-up power systems, nor are they generally isolated and/or locked or tagged under current practice. OSHA believes that all establishments will incur costs to comply with this requirement, and that the same procedure will be used for securing back-up systems as for primary systems with the same type of power. The additional costs to comply with this requirement will include the time to go to the system and implement the additional safety measure which OSHA estimates will take 2 minutes for electrical back-up power sources and 1 hour for air and hydraulic power sources. Estimates of the number of secondary or multiple-source lockouts or tags-plus applications are presented in Table 14.

• OSHA estimated that small and very small contractors and off-site establishments in the shipyards industry will install, on average, one lockout or tags-plus system per week, that medium shipyards will install five lockout or tags-plus systems per day, and that commercial vessels will install five lockout or tags-plus systems per year.

• OSHA estimated that half of the activities that require lockout or tags-plus systems are already covered under 29 CFR 1915, subparts L and J, and that subpart F will only require lockout or tags-plus systems to be applied in half of the cases estimated above.

• The Agency also estimates that one out of every twenty lockout or tags-plus applications will be installed on air or hydraulic systems, and that the rest of the applications will be on electrical systems.

OSHA estimated that 10 percent of production workers would be considered authorized employees. The Agency presented this estimate in the PEA, and did not receive any comments in the record indicating that the estimate of authorized employees was understated. The number of affected employees was estimated in the PEA to be 20 percent of production workers. Comment in the record from Cynthia Brown of the ASA (Ex. 204.1) expressed concern that estimates of affected employees may not be capturing all employees affected by lockout/tags-plus applications. Ms. Brown reported that an estimate of affected employees used in a project to assess the costs of implementing lockout/tags-plus for Northrop Grumman Shipbuilding–Newport News may have excluded personnel in trades other than primary trades and, therefore, underestimated costs. OSHA concludes that personnel, other than those servicing machinery, equipment, or systems, may be affected by lockout/tags-plus applications by their proximity to those machines, equipment, or systems, but believes that employers can reduce the number of affected employees by removing nonessential personnel from the area where servicing in lockout/tags-plus is being performed. The Agency also believes that all employees currently receive an introduction to lockout/tags-plus procedures during the general workplace orientation which provides adequate training for employees affected only by their proximity to work being performed on electrical equipment or systems. OSHA estimated the total costs of securing energy sources to be $513,406.

[14] This estimate is taken from the General Industry Regulatory Impact and Regulatory Flexibility Analysis of 29 CFR 1910.147 "Control of Hazardous Energy Sources (Lockout/Tagout)" standard. In reviewing the cost of a tag, the Agency found that tags average from $0.88 to $1.24 each. Thus, the estimate of $1.00 per tag seems reasonable.

Table 13
Annual Costs of Securing Energy Sources by Establishment Size

Industry Code	Industry Name	Size Class	Establishments	Number of electrical systems	Number of hydraulic systems	Cost of securing electrical	Cost of securing hydraulic	Total Annual Cost
NAICS 336611	Shipyards	1,000 & Up	40	32,992	5,499	$35,301	$135,760	$171,062
		500-999	25	2,633	439	$2,817	$10,835	$13,652
		200-499	32	22,816	1,651	$24,413	$40,769	$65,183
		100-199	51	34,315	2,071	$36,717	$51,131	$87,848
		20-99	31	1,234	145	$1,321	$3,582	$4,902
	Contractor/Off-Site	20-99	85	2,333	243	$2,497	$6,002	$8,498
		1-19	371	5,918	437	$6,333	$10,788	$17,120
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	7	2,502	417	$1,335	$5,326	$6,661
		500-999	3	500	83	$267	$1,065	$1,332
		200-499	1	152	26	$81	$326	$407
		100-199	8	416	71	$222	$903	$1,125
		20-99	25	384	68	$205	$870	$1,075
		1-19	1,076	2,850	654	$1,521	$8,355	$9,876
NAICS 311712	Fish Processing Vessels	1,000 & Up	22	4,987	831	$5,981	$27,210	$33,191
		500-999	6	499	83	$598	$2,721	$3,319
		200-499	11	1,146	193	$1,374	$6,313	$7,687
		100-199	17	867	147	$1,040	$4,824	$5,865
		20-99	46	1,113	193	$1,335	$6,328	$7,663
		1-19	98	475	95	$570	$3,125	$3,695
NAICS 488330	Tug & Towing Services	1,000 & Up	45	272	45	$460	$2,152	$2,611
		500-999	27	160	27	$271	$1,268	$1,539
		200-499	8	65	12	$109	$576	$686
		100-199	13	104	19	$175	$922	$1,097
		20-99	88	707	132	$1,193	$6,282	$7,475
		1-19	468	3,746	702	$6,327	$33,313	$39,640
NAICS 483	Passenger Vessels	20-99	20	158	30	$268	$1,408	$1,676
		1-19	101	805	151	$1,360	$7,160	$8,520
		Total	2,725			$134,091	$379,316	$513,406

Source: Office of Regulatory Analysis, OSHA

Table 14

Multiple or Secondary Energy Sources Secured Per Year by Establishment Size

Industry Code	Industry Name	Size Class	Authorized Employees	Occurrences Per Employee	Instances Per Year
NAICS 336611	Shipyards	1,000 & Up	5,499	7	38,490
		500-999	439	7	3,072
		200-499	611	7	4,279
		100-199	360	7	2,517
		20-99	109	7	761
	Contractor/Off-Site	20-99	163	27	2,846
		0-19	170	27	8,612
NAICS 11411	Commercial Fishing	1,000 & Up	417	7	2,919
		500-999	83	7	584
		200-499	25	7	175
		100-199	67	7	467
		20-99	56	7	389
		0-19	116	7	814
NAICS 311712	Fish Processing Vessels	1,000 & Up	831	7	5,818
		500-999	83	7	582
		200-499	187	7	1,312
		100-199	139	7	973
		20-99	170	7	1,191
		0-19	47	7	326
NAICS 488330	Tug & Towing Services	1,000 & Up	45	7	318
		500-999	27	7	187
		200-499	8	7	57
		100-199	13	7	91
		20-99	88	7	618
		0-19	468	7	3,278
NAICS 483	Passenger Vessels	20-99	20	7	139
		0-19	101	7	705
		Total	10,222		81,517

Source: Office of Regulatory Analysis

The final rule requires a lockout/tags-plus coordinator to complete a lockout/tags-plus log that contains the location and type of machinery, equipment, or system to be serviced, the name of the authorized employee who is applying the lockout/tags-plus system, the date the system is applied, the name of the authorized employee removing the lock or tags-plus system, and the date the system is removed. The Agency estimated that it would take 5 minutes of the lockout/tags-plus coordinator's time (at the authorized employee's wage rate) to complete the lockout/tags-plus log per lockout/tags-plus application. The number of lockout/tags-plus activities per year is based on the estimates presented above. Table 15 outlines the total costs related to creating the lockout/tags-plus log which OSHA estimates to be $264,763.

Table 15
Costs of Creating the Lockout/Tags-plus Log by Establishment Size

Industry Code	Industry Name	Size Class	Establishments	Systems Secured Per Year	Unit Cost	Total Cost
NAICS 336611	Shipyards	1,000 & Up	40	26,000	$1.98	$51,402
		500-999	25	3,072	$1.98	$6,073
		200-499	32	24,467	$1.98	$48,372
		100-199	51	36,386	$1.98	$71,934
		20-99	31	1,379	$1.98	$2,727
	Contractor/Off-Site	20-99	85	2,576	$1.98	$5,094
		1-19	371	6,355	$1.98	$12,564
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	7	2,919	$1.36	$3,965
		500-999	3	584	$1.36	$793
		200-499	1	178	$1.36	$241
		100-199	8	487	$1.36	$662
		20-99	25	452	$1.36	$614
		1-19	1,076	3,504	$1.36	$4,759
NAICS 311712	Fish Processing Vessels	1,000 & Up	22	5,818	$2.65	$15,407
		500-999	6	582	$2.65	$1,541
		200-499	11	1,339	$2.65	$3,546
		100-199	17	1,015	$2.65	$2,688
		20-99	46	1,307	$2.65	$3,460
		1-19	98	570	$2.65	$1,510
NAICS 488330	Tug & Towing Services	1,000 & Up	45	318	$3.87	$1,230
		500-999	27	187	$3.87	$725
		200-499	8	77	$3.87	$298
		100-199	13	123	$3.87	$477
		20-99	88	839	$3.87	$3,249
		1-19	468	4,449	$3.87	$17,226
NAICS 483	Passenger Vessels	20-99	20	188	$3.68	$692
		1-19	101	956	$3.68	$3,516
		TOTAL	2,725			$264,763

Source: Office of Regulatory Analysis, OSHA

Lockout/Tags-Plus Material and Hardware § 1915.89(n)

OSHA anticipates that clips, tags, ties, and any other necessary equipment will be procured and maintained by a supervisor ($32.98 per hour for shipyards, $44.13 per hour for water transportation, $33.53 per hour for fish-processing vessels, $20.37 per hour for commercial fishing). The Agency estimates that an initial procurement of this equipment will occur per establishment, and that it will take longer initially due to time needed for employers to research the unique characteristics of the devices outlined in the rule. The Agency concluded that less time is needed to reorder these items. These costs are outlined in Table 16. For example, the initial cost for a large shipyard is $263.84 ($32.98 times 8 hours). When this cost is annualized, the unit cost is $37.57. The Agency estimates that employers would spend some time annually to reorder protective materials and hardware. For large establishments (having more than 1,000 employees), OSHA estimates that, annually, establishments will spend 4 hours each of a supervisor's time to reorder materials and hardware. The estimated times required for selection, purchase, and distribution of lockout and tags-plus equipment in different sized establishments are:

- Large—8 hours initially, and 4 hours annually thereafter;
- Medium—5 hours initially, and 2 hours annually thereafter; and
- Small—3 hours initially, and 1 hour annually thereafter.

The cost of the materials themselves are accounted for as part of the unit cost of performing a lockout or tags-plus application and are not considered in this section.

Off-Site Establishments

OSHA estimates that off-site establishments will incur much smaller costs of procuring equipment than shipyards. In particular, OSHA estimates that it will take 20 minutes for a supervisor initially to select the lock and chain, and five minutes annually to reorder these items. Based on the estimated wage rate for a supervisor, off-site establishments will incur unit costs of $1.55 (initially), and unit costs of $2.64 thereafter. The Agency estimated these costs as if employers are not currently performing this function, thus assigning a baseline of zero. Final costs may be lower if employers already are ordering and storing this equipment.

OSHA estimated the total costs associated with procuring lockout/tags-plus hardware and materials to be $135,503.

Table 16

Lockout/Tags-plus Materials and Hardware by Establishment Size

Industry Code	Industry Name	Size Class	Affected ablishments	Unit Cost	1st Year Costs	Recurring Costs	Total Annualized Costs
NAICS 336611	Shipyards	1,000 & Up	40	$37.57	$1,503	$5,277	$6,779
		500-999	25	$37.57	$939	$3,298	$4,237
		200-499	32	$37.57	$1,202	$4,221	$5,424
		100-199	51	$23.48	$1,197	$3,364	$4,561
		20-99	31	$14.09	$434	$1,017	$1,451
	Contractor/Off-Site	20-99	85	$1.55	$132	$225	$357
		1-19	371	$1.55	$575	$979	$1,554
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	7	$23.20	$162	$570	$733
		500-999	3	$23.20	$70	$244	$314
		200-499	1	$23.20	$23	$81	$105
		100-199	8	$14.50	$116	$326	$442
		20-99	25	$8.70	$218	$509	$727
		1-19	1,076	$8.70	$9,363	$21,921	$31,284
NAICS 311712	Fish Processing Vessels	1,000 & Up	22	$38.19	$844	$2,964	$3,808
		500-999	6	$38.19	$235	$826	$1,061
		200-499	11	$38.19	$415	$1,458	$1,873
		100-199	17	$23.87	$398	$1,118	$1,516
		20-99	46	$14.32	$664	$1,555	$2,219
		1-19	98	$14.32	$1,401	$3,280	$4,681
NAICS 488330	Tug & Towing Services	1,000 & Up	45	$50.26	$2,280	$8,008	$10,289
		500-999	27	$50.26	$1,344	$4,719	$6,063
		200-499	8	$50.26	$407	$1,430	$1,837
		100-199	13	$31.41	$407	$1,144	$1,551
		20-99	88	$18.85	$1,665	$3,897	$5,561
		1-19	468	$18.85	$8,826	$20,664	$29,491
NAICS 483	Passenger Vessels	20-99	20	$18.85	$373	$874	$1,247
		1-19	101	$18.85	$1,897	$4,441	$6,338
		Total	2,725		$37,091	$98,412	$135,503

Source: Office of Regulatory Analysis

Incident Investigations § 1915.89(p)

The final rule requires employers to investigate each incident that resulted in, or could reasonably have resulted in, energization or startup, or the release of hazardous energy. The employee conducting the investigation is required to complete a written report of the findings from the investigation that includes the date and time of the incident, and when the incident investigation began; the location, description, and factors that contributed to the event; a copy of any lockout/tags-plus log that was current at the time of the incident; and any corrective actions that need to be taken as a result of the incident. OSHA estimates that incident investigations will be required in one percent of all lockout/tags-plus events, which are estimated based on figures presented in the Cost of Compliance section above. It is estimated that the incident investigation and written report will take five workdays (40 hours) of authorized employee time to complete. These costs, which are estimated to be $1,056,202, are presented in Table 17.

Table 17
Incident Investigations Costs

Industry Code	Industry Name	Size Class	Authorized Employees	Total Systems Secured	Total Reportable Incidents	Authorized Employee Wage	Total Cost
NAICS 336611	Shipyards	1,000 & Up	5,499	26,000	260	$23.72	$246,730
		500-999	439	16,250	163	$23.72	$154,206
		200-499	611	20,800	208	$23.72	$197,384
		100-199	360	34,229	342	$23.72	$324,816
		20-99	109	727	7	$23.72	$6,898
	Contractor/Off-Site	20-99	163	1,597	16	$23.72	$15,155
		1-19	170	5,334	53	$23.72	$50,615
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	417	18	0.2	$16.30	$114
		500-999	83	8	0.1	$16.30	$49
		200-499	25	3	0.03	$16.30	$16
		100-199	67	20	0.2	$16.30	$130
		20-99	56	63	1	$16.30	$407
		1-19	116	2,690	27	$16.30	$17,536
NAICS 311712	Fish Processing Vessels	1,000 & Up	831	55	1	$31.78	$702
		500-999	83	15	0.2	$31.78	$196
		200-499	187	27	0.3	$31.78	$345
		100-199	139	42	0.4	$31.78	$530
		20-99	170	116	1	$31.78	$1,474
		1-19	47	245	2	$31.78	$3,109
NAICS 488330	Tug & Towing Services	1,000 & Up	425	113	1	$46.46	$2,108
		500-999	338	67	1	$46.46	$1,242
		200-499	128	20	0.2	$46.46	$376
		100-199	106	32	0.3	$46.46	$602
		20-99	242	221	2	$46.46	$4,103
		1-19	122	1,171	12	$46.46	$21,759
NAICS 483	Passenger Vessels	20-99	50	50	0.5	$46.46	$920
		1-19	31	252	3	$46.46	$4,677
		Total		110,162	1,102		$1,056,202

Source: Office of Regulatory Analysis, OSHA

Program Audits § 1915.89(q)(1)

The rule requires employers to conduct an audit of the lockout/tags-plus program and procedures at least annually to ensure that the procedures and the requirements of this standard are being followed, and to correct any deficiencies. OSHA estimates that the audit itself will take 30 minutes each of a supervisor's and authorized employee's time. An additional 20 minutes of supervisor time is needed to prepare the certification record. Also, each inspection will consist of follow-up training of an estimated five authorized employees and five affected employees for 15 minutes each performed by the supervisor. OSHA presented these estimates in the PEA and did not receive any comments in the record indicating that the estimated time requirements for program audits (referred to as periodic inspections in the proposal) were understated.

For off-site establishments and shipyard contractors, OSHA believes that the costs of program audits will be minimal, as most of these activities will be incorporated into routine supervision. However, because of the paperwork involved, OSHA estimates that twenty additional minutes of supervisor time will be required annually for each establishment. Table 18 presents the total annual cost of $254,191 relating to program audits.

Table 18
Program Audits Costs

Industry Code	Industry Name	Size Class	Affected Estab.	Inspections/Yr	Unit Cost	Total Cost
NAICS 336611	Shipyards	1,000 & Up	40	40	$101.52	$4,061
		500-999	25	25	$101.52	$2,538
		200-499	32	32	$101.52	$3,249
		100-199	51	51	$101.52	$5,178
		20-99	31	31	$101.52	$3,129
	Contractor/Off-Site	20-99	85	85	$10.88	$927
		1-19	371	371	$10.88	$4,038
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	7	7	$70.90	$496
		500-999	3	3	$70.90	$213
		200-499	1	1	$70.90	$71
		100-199	8	8	$70.90	$567
		20-99	25	25	$70.90	$1,772
		1-19	1,076	1,076	$70.90	$76,283
NAICS 311712	Fish Processing Vessels	1,000 & Up	22	22	$114.44	$2,529
		500-999	6	6	$114.44	$705
		200-499	11	11	$114.44	$1,244
		100-199	17	17	$114.44	$1,907
		20-99	46	46	$114.44	$5,307
		1-19	98	98	$114.44	$11,195
NAICS 488330	Tug & Towing Services	1,000 & Up	45	45	$167.19	$7,586
		500-999	27	27	$167.19	$4,470
		200-499	8	8	$167.19	$1,355
		100-199	13	13	$167.19	$2,167
		20-99	88	88	$167.19	$14,766
		1-19	468	468	$167.19	$78,298
NAICS 483	Passenger Vessels	20-99	20	20	$167.19	$3,310
		1-19	101	101	$167.19	$16,828
		Total	2,725			$254,191
Source: Office of Regulatory Analysis, OSHA						

Information and Training § 1915.89(o)

OSHA estimates that employers will incur training costs under the rule. The rule requires that employers train authorized employees, affected employees, and employees who will serve as the lockout/tags-plus coordinator.

Training Authorized Employees

Under the rule, the number of authorized employees who must be trained (Table 19) is estimated as those who engage in lockout/tags-plus applications. The unit-cost estimate for training authorized employees consists of one hour of preparation time plus two hours of delivery time for a supervisor, and two hours per employee to attend the training, except for very small employers who OSHA estimates will only require one hour of authorized employee time to complete the training. This time estimate also includes the time needed to develop the training record, estimated at three minutes of administrative time per employee. The Agency estimates that each training class will have 10 employees. The cost of training is then annualized. Using a turnover rate of 32.5 percent for the shipyard industry and fish-processing vessels, and 43 percent for water transportation and commercial fishing, 3 shipyard and fish-processing vessel employees and 4 water-transportation and commercial fishing employees must be trained each year for every class of 10 that was initially trained. Thus, the cost for retraining these employees annually is the total cost of the class divided by 10, then multiplied by the number of employees being trained (3 or 4). Two hours of supervisory time cost is added to get the recurring unit cost. An estimate of the number of off-site authorized employees who need training also is included. OSHA estimates the total cost to train authorized employees to be $147,275.

Table 19

Annualized Information and Training Costs by Establishment - Authorized Employees

Industry Code	Industry Name	Size Class	Authorized Employees	Training Sessions	Annualized Unit Cost	1st Year Cost	Recurring Cost	Total Annualized Costs
NAICS 336611	Shipyards	1,000 & Up	5,499	550	$81.77	$44,960	$20,267	$65,227
		500-999	439	44	$81.77	$3,588	$1,617	$5,206
		200-499	611	61	$81.77	$4,998	$2,253	$7,251
		100-199	360	36	$81.77	$2,940	$1,325	$4,265
		20-99	109	11	$81.77	$889	$401	$1,290
	Contractor/Off-Site	20-99	163	16	$81.77	$1,335	$602	$1,936
		1-19	170	17	$43.29	$737	$627	$1,365
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	417	42	$55.23	$2,303	$1,315	$3,619
		500-999	83	8	$55.23	$461	$263	$724
		200-499	25	3	$55.23	$138	$79	$217
		100-199	67	7	$55.23	$369	$210	$579
		20-99	56	6	$55.23	$307	$175	$483
		1-19	116	12	$55.23	$642	$285	$927
NAICS 311712	Fish Processing Vessels	1,000 & Up	831	83	$104.96	$8,723	$3,528	$12,251
		500-999	83	8	$104.96	$872	$353	$1,225
		200-499	187	19	$104.96	$1,967	$795	$2,762
		100-199	139	14	$104.96	$1,459	$590	$2,049
		20-99	170	17	$104.96	$1,785	$722	$2,507
		1-19	47	5	$104.96	$488	$150	$638
NAICS 488330	Tug & Towing Services	1,000 & Up	425	43	$151.32	$6,434	$3,312	$9,746
		500-999	338	34	$151.32	$5,113	$2,633	$7,746
		200-499	128	13	$151.32	$1,943	$1,000	$2,943
		100-199	106	11	$151.32	$1,603	$825	$2,428
		20-99	242	24	$151.32	$3,662	$1,885	$5,548
		1-19	122	12	$151.32	$1,848	$707	$2,555
NAICS 483	Passenger Vessels	20-99	50	5	$151.32	$751	$386	$1,137
		1-19	31	3	$151.32	$472	$181	$653
		Total	11,014			$100,787	$46,488	$147,275

Source: Office of Regulatory Analysis, OSHA

Training Affected Employees

The number of affected employees in Table 20 represents a proportion of total employees that are impacted by lockout/tags-plus. In the PEA, this number was estimated to be twice the number of authorized employees. The Agency received no comment suggesting this number was incorrect. OSHA estimates that training consists of thirty minutes of preparation time plus one hour of delivery time for a supervisor, and one hour per affected employee to attend the training; and that each training class will have 10 employees. The cost is then annualized and estimated on a per-employee basis. An additional three minutes of secretarial time per employee is included to prepare and maintain the training record. Using a turnover rate of 32.5 percent for the shipyard industry and fish-processing vessels, and 43 percent for water transportation and commercial fishing, three or four employees must be re-trained each year for every class of ten that was initially trained. Thus, the cost for re-training these employees is the total cost per class divided by 10, then multiplied by the number of employees being trained (3 or 4). The supervisory time cost is added to get the recurring unit cost. An estimate of the number of off-site affected employees working in shipyards that need training is also included. The total cost associated with training affected employees is $117,756.

Table 20

Annualized Information and Training Costs by Establishment - Affected Employees

Industry Code	Industry Name	Size Class	Affected Employees	Training Sessions	Annualized Unit Cost	1st Year Cost	Recurring Cost	Total Annualized Cost
NAICS 336611	Shipyards	1,000 & Up	14,057	1,406	$34.94	$49,119	$7,878	$56,997
		500-999	2,146	215	$34.94	$7,497	$1,203	$8,700
		200-499	1,374	137	$34.94	$4,802	$770	$5,573
		100-199	1,375	138	$34.94	$4,806	$771	$5,577
		20-99	660	66	$34.94	$2,308	$370	$2,678
	Contractor/Off-Site	20-99	463	46	$34.94	$1,617	$259	$1,876
		1-19	438	44	$34.94	$1,530	$245	$1,775
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	834	83	$27.67	$2,308	$420	$2,728
		500-999	167	17	$27.67	$462	$84	$546
		200-499	50	5	$27.67	$138	$25	$164
		100-199	133	13	$27.67	$369	$67	$437
		20-99	111	11	$27.67	$308	$56	$364
		1-19	233	23	$27.67	$644	$117	$761
NAICS 311712	Fish Processing Vessels	1,000 & Up	1,662	166	$33.06	$5,495	$924	$6,419
		500-999	166	17	$33.06	$550	$92	$642
		200-499	375	37	$33.06	$1,239	$208	$1,447
		100-199	278	28	$33.06	$919	$154	$1,074
		20-99	340	34	$33.06	$1,125	$189	$1,314
		1-19	93	9	$33.06	$308	$52	$359
NAICS 488330	Tug & Towing Services	1,000 & Up	850	85	$53.13	$4,518	$885	$5,402
		500-999	676	68	$53.13	$3,591	$703	$4,294
		200-499	257	26	$53.13	$1,364	$267	$1,632
		100-199	212	21	$53.13	$1,125	$220	$1,346
		20-99	484	48	$53.13	$2,572	$504	$3,075
		1-19	244	24	$53.13	$1,298	$254	$1,552
NAICS 483	Passenger Vessels	20-99	99	10	$53.13	$527	$103	$630
		1-19	62	6	$53.13	$331	$65	$396
		Total	27,841			$100,870	$16,887	$117,756

Source: Office of Regulatory Analysis, OSHA

Training Lockout/Tags-Plus Coordinators

The number of lockout/tags-plus coordinators who will need to be trained as a result of this final rule, and the costs that will be incurred due to that training, are presented in Table 21. OSHA estimates that half of those employees trained as authorized employees will also be trained as lockout/tags-plus coordinators. The Agency estimates that it will take two hours of supervisor time to prepare the training, four hours to deliver the training, and four hours of authorized employee time to receive the training. It is estimated that 10 employees will attend each session. The cost is then annualized and estimated on a per-employee basis. An additional three minutes of secretarial time per trained employee is included to prepare and maintain the training record. Using a turnover rate of 32.5 percent for the shipyard industry and fish-processing vessels, and 43 percent for water transportation and commercial fishing, three or four employees must be re-trained each year for every class of ten that was initially trained. Thus, the cost for re-training these employees is the total cost per class divided by 10, then multiplied by the number of employees being trained (3 or 4). The supervisory time cost is added to get the recurring unit cost. OSHA estimates the total cost to train the lockout/tags-plus coordinator to be $148,294.

Table 21

Annualized Information and Training Costs by Establishment - Lockout/Tags-plus Coordinator

Industry Code	Industry Name	Size Class	Lockout/Tag Coordinator	Training Sessions	Annualized Unit Cost	1st Year Cost	Recurring Cost	Total Annualized Costs
NAICS 336611	Shipyards	1,000 & Up	2749	275	$163.41	$44,926	$20,267	$65,193
		500-999	219	22	$163.41	$3,585	$1,617	$5,203
		200-499	306	31	$163.41	$4,994	$2,253	$7,247
		100-199	180	18	$163.41	$2,937	$1,325	$4,262
		20-99	54	5	$163.41	$888	$401	$1,289
	Contractor/Off-Site	20-99	82	8	$163.41	$1,334	$602	$1,935
		1-19	85	9	$163.41	$1,391	$627	$2,018
NAICS 11411	Commercial Fishing Vessels	1,000 & Up	209	21	$110.34	$2,301	$1,315	$3,616
		500-999	42	4	$110.34	$460	$263	$723
		200-499	13	1	$110.34	$138	$79	$217
		100-199	33	3	$110.34	$368	$210	$579
		20-99	28	3	$110.34	$307	$175	$482
		1-19	58	6	$110.34	$641	$367	$1,008
NAICS 311712	Fish Processing Vessels	1,000 & Up	416	42	$209.78	$8,717	$3,528	$12,245
		500-999	42	4	$209.78	$872	$353	$1,225
		200-499	94	9	$209.78	$1,965	$795	$2,761
		100-199	70	7	$209.78	$1,458	$590	$2,048
		20-99	85	9	$209.78	$1,784	$722	$2,506
		1-19	23	2	$209.78	$488	$198	$686
NAICS 488330	Tug & Towing Services	1,000 & Up	213	21	$302.47	$6,430	$3,312	$9,742
		500-999	169	17	$302.47	$5,110	$2,633	$7,743
		200-499	64	6	$302.47	$1,942	$1,000	$2,942
		100-199	53	5	$302.47	$1,602	$825	$2,427
		20-99	121	12	$302.47	$3,660	$1,885	$5,546
		1-19	61	6	$302.47	$1,847	$951	$2,798
NAICS 483	Passenger Vessels	20-99	25	2	$302.47	$750	$386	$1,137
		1-19	16	2	$302.47	$472	$243	$715
		Total	5507	551		$101,369	$46,924	$148,294

Source: Office of Regulatory Analysis, OSHA

Section 1915.93 Motor-Vehicle Safety Equipment, Operation, and Maintenance

The motor-vehicle safety provisions apply to vehicles used to transport employees, materials, or property at worksites engaged in shipyard employment. OSHA estimates that employers in the shipyard industry will incur costs in complying with the requirement to reinstall safety equipment that has been removed from motor vehicles. This provision only applies to employer-provided vehicles. OSHA believes that shipyards are generally in compliance with the requirement that new motor vehicles must be equipped with seat belts, and the Agency did not receive any comments indicating that this is not the case. The final rule requires that safety equipment not be removed from motor vehicles; however, if safety equipment is removed, it must be re-installed. OSHA estimates that it will take an hour of transportation maintenance and repair technician time, at $21.61 per hour (including benefits), to replace vehicle safety equipment. This is a one-time cost. In the PEA, the Agency used an estimate of 5 percent of the number of employees (per size class) to determine the number of instances per size class when a maintenance and repair technician would need to reinstall previously removed safety equipment. OSHA did not receive any comment indicating that the estimate of the cost of reinstalling safety equipment was misstated. Table 22 presents estimates of these costs which total $13,557.

Table 22

Reinstalling Safety Equipment Costs by Establishment

Industry Code	Industry Name	Size Class	Employees	Occurrences	Instances	Unit Cost	Total Cost	Annualized Cost
NAICS 336611	Shipyards	1,000 & Up	65,921	0.05	3,296	$21.61	$71,230	$10,142
		500-999	5,261	0.05	263	$21.61	$5,685	$809
		200-499	7,328	0.05	366	$21.61	$7,918	$1,127
		100-199	4,310	0.05	216	$21.61	$4,657	$663
		20-99	1,303	0.05	65	$21.61	$1,408	$201
	Contractor/Off-Site	20-99	1,957	0.05	98	$21.61	$2,115	$301
		0-19	2,041	0.05	102	$21.61	$2,205	$314
		Total	88,121		4,406		$95,219	$13,557

Source: Office of Regulatory Analysis, OSHA

Section 1915.94 Servicing Multi-Piece and Single-Piece Rim Wheels

The provisions for servicing multi-piece and single-piece rim wheels are identical to those in the general industry standard (29 CFR 1910.177). The rule applies to servicing multi-piece and single-piece rim wheels used on large motor vehicles such as trucks, tractors, trailers, buses, and off-road vehicles. It does not apply to servicing rim wheels used on automobiles or on pickup trucks and vans equipped with automobile tires or truck tires designated "LT." OSHA assumed that no servicing of rim wheels takes place on commercial vessels.

OSHA believes affected employers already are using the servicing practices that § 1910.77 requires, or could adopt them with no real change in cost; therefore, the only new cost the provision would impose is employee training. OSHA estimates that training time is limited to startup training for existing employees and, thereafter, retraining as needed if an evaluation indicates than an employee is not retaining proficiency, as well as initial training for new employees who perform this servicing.

The Agency believes that only large shipyards perform this type of rim-wheel maintenance, and that other establishments engaged in shipyard employment contract out this task. OSHA estimates that each transportation maintenance and repair technician will receive a 30-minute training class (½ hour of employee time at $21.61 per hour = $10.80). The supervisor who teaches the class is estimated to spend 15 minutes preparing for the class (¼ hour of supervisor time at $32.98 per hour = $8.24), and 30 minutes delivering the training (½ hour of supervisor time at $32.98 per hour = $16.49). OSHA presented these cost estimates in the PEA, and solicited comment regarding these estimates for servicing rim wheels. The Agency did not receive any comments indicating that the estimates of costs were understated, or suggesting improvements to the cost estimates for this provision. The costs for training employees in servicing multi-piece and single-piece rim wheels which the Agency estimates to total $330 are presented in Table 23.

Table 23
Single & Multi-piece Rim Wheels Training Costs by Establishment

Industry Code	Industry Name	Size Class	Affected Establishments	Sessions/ Establishment	Total Sessions	Unit Cost	Total Cost	Annualized Cost
NAICS 336611	Shipyards	1,000 & Up	40	1	40	$35.54	$1,422	$202
		500-999	25	1	25	$35.54	$889	$127
		Total					$2,310	$330

Source: Office of Regulatory Analysis, OSHA

Estimated Total Industry Compliance Costs

Estimated costs of the final rule are both directly and indirectly functions of type, size, and number of affected establishments. In addition, they are a function of the number of first aid providers who require CPR training, the number of authorized and affected employees for lockout/tags-plus, the number of motor vehicles requiring re-installation of motor-vehicle safety equipment, and the amount of rim-wheel servicing performed. Table 24 shows the estimated cost of the final rule by provision. The Agency estimates that compliance with the rule will cost $4,185,342 (total annualized) annually for the affected establishments and industries combined. The lockout/tags-plus provisions account for the largest portion (about 75 percent) of these costs.

Table 24		
Total Annualized Compliance Costs by Provision		
		Total
Requirement		Annualized Costs
Sanitation		
	Handwashing Facilities	$748,709
Medical Services and First Aid		
	First Aid & CPR Training	$418,349
Lockout/Tags-plus		
	Energy Control Program	$367,007
	Securing Energy Sources	$513,406
	Lockout/Tags-plus Log	$264,763
	Lockout/Tags-plus Materials and Hardware	$135,503
	Incident Investigation	$1,056,202
	Program Audits	$254,191
	Information and Training	$413,325
	SUBTOTAL	$3,004,397
Vehicle Safety		
	Reinstalling Safety Equipment	$13,557
	Rim Wheel Training	$330
	SUBTOTAL	$13,887
TOTAL		$4,185,342
Source: Office of Regulatory Analysis, OSHA		

Table 25 outlines the estimated total annualized compliance costs per establishment. Larger establishments have greater annualized compliance costs. The economic impacts of these costs are presented in section F of this FEA.

Table 25

Estimated Total Annualized Compliance Costs Per Establishment

Industry Code	Industry Name	Size Class	Establishments	Total Annualized Costs	Average Cost Per Establishment
NAICS 336611	Shipyards	1,000& Up	40	$1,406,895	$35,172
		500-999	25	$286,561	$11,462
		250-500	32	$435,109	$13,597
		100-249	51	$590,158	$11,572
		20-99	31	$50,856	$1,650
	Contractor/Off-Site	20-99	85	$63,489	$745
		1-19	371	$150,509	$406
NAICS 11411	Commercial Fishing	1,000 & Up	7	$31,200	$4,457
		500-999	3	$7,292	$2,431
		200-499	1	$2,438	$2,438
		100-199	8	$8,366	$1,046
		20-99	25	$11,837	$473
		1-19	1076	$224,299	$208
NAICS 311712	Fish Processing	1,000 & Up	22	$121,565	$5,500
		500-999	6	$16,440	$2,669
		200-499	11	$37,182	$3,421
		100-199	17	$30,589	$1,835
		20-99	46	$43,743	$943
		1-19	98	$37,324	$382
NAICS 488330	Tug & Towing Services	1,000 & Up	45	$103,093	$2,272
		500-999	27	$67,641	$2,530
		200-499	8	$25,900	$3,197
		100-199	13	$24,368	$1,880
		20-99	88	$86,531	$980
		1-19	468	$249,210	$532
NAICS 483	Passenger Vessels	20-99	20	$19,091	$964
		0-19	101	$53,654	$533
		TOTAL	2725	$4,185,341	$1,536

Source: Office of Regulatory Analysis

Net Benefits

In accordance with EO 12866 and OMB policy, and for informational purposes, the Agency compared the estimated costs of compliance to the monetized benefits of the final rule. The Agency estimates monetized death benefits of $10.4 million and monetized injury benefits of $23.4 million annually (see the Benefits section of this FEA), for total monetized benefits of $33.8 million. When the total annualized compliance costs are compared to these estimates (total monetized benefits), the Agency concludes that the net benefits of the final rule will total about $29.6 million.

F. Economic Impacts, Feasibility, and Regulatory Flexibility Screening Analysis

OSHA determined that the costs of complying with the final rule will not impose significant economic impacts on employers in the affected industries; therefore, OSHA concludes that the rule is economically feasible. The rule imposes modest costs, and the increased safety and reduction in injuries and fatalities associated with the final rule will reduce employers' direct and indirect costs. This analysis of economic impacts is based on the industry data presented in the Industrial Profile section, and the cost estimates presented in the Costs of Compliance section of this FEA.

Economic Impacts

To determine whether the rule's projected costs of compliance would raise issues of economic feasibility for affected employers and would alter the competitive structure of the affected industries, OSHA compared quantitative estimates of the compliance costs (section D of this FEA) with industry revenues and profits. After accounting for current industry practice with regard to general working conditions in shipyard employment and the costs of compliance under the final rule, OSHA estimated that the annualized incremental (new) compliance costs of the rule will be $4,185,342.

Compliance with the rule will not involve large up-front investments. The major costs of the final rule involve the

control of hazardous energy. As mentioned earlier, many establishments engaged in shipyard employment already have developed and implemented written programs for the control of hazardous energy, including most large and very large establishments. For many of these establishments, their energy-control programs cover servicing operations both at landside facilities and aboard vessels. Other establishments have, at a minimum, energy-control programs for servicing operations performed landside. Most costs related to the lockout/tags-plus requirements in the final rule, including written programs and procedures, hazard prevention, and training, are proportional to the number of workers and employers and revenues earned. The same is true for the costs related to implementing the first aid, including CPR, training and handwashing requirements in the final rule.

Economic Feasibility

To assess the standard's potential economic impacts, OSHA compared the anticipated costs of achieving compliance against revenues and profits of the affected entities. OSHA compared baseline financial data with total annualized costs of compliance by computing compliance costs as a percentage of revenues and as a percentage of pre-tax profits. This impact assessment is presented in Table 26 for the shipbuilding, ship-repair and shipbreaking sectors combined (and collectively referred to as "shipyards"), and for commercial fishing, fish processing on board vessels, tug and towing boats, and passenger vessels combined (collectively referred to as "commercial vessels"). This screening analysis is used to determine whether the compliance costs associated with the final rule would lead to significant impacts on affected establishments. The actual impact on profits and revenues in a given industry will depend on the price elasticity of demand for the services sold by establishments in that industry.

Table 26

Economic Impacts of the Standard

	Size Class	Per Establishment Compliance Cost	Compliance Cost as a % of Revenues	Compliance Cost as a % of Profits
Shipyards	1-19	$280	0.03%	0.63%
	1-200	$1,589	0.02%	0.41%
	1-1,000	$2,802	0.03%	0.58%
	All	$1,536	0.02%	0.33%
Commercial Vessels	1-19	$288	0.03%	0.97%
	1-200	$403	0.02%	0.53%
	1-1,000	$480	0.02%	0.48%
	All	$603	0.01%	0.39%

Source: Office of Regulatory Analysis

Price elasticity refers to the relationship between the price charged for a service and the demand for that service. The more elastic the relationship, the less able an establishment is to pass the costs of compliance through to its customers in the form of a price increase, and the more it will have to absorb the costs of compliance from its profits. When demand is inelastic, establishments can recover all the costs of compliance simply by raising the prices they charge for that service. Under this scenario, profits are untouched.

However, when demand is elastic, establishments cannot recover all the costs simply by passing the cost increase to customers in the form of a price increase. Instead, they must absorb some of the increase from their profits. In general, "[w]hen an industry is subjected to a higher cost, it does not simply swallow it; it raises its price and reduces its output, and in this way shifts a part of the cost to its consumers and a part to its suppliers" (*American Dental Ass'n* v. *Martin*, 984 F.2d 823, 829 (7th Cir. 1993)).

If demand is completely inelastic (*i.e.*, price elasticity is 0), then the impact of compliance costs that amount to 1 percent of revenues would be a 1 percent increase in the price of the product or service, with no decline in demand or in profits. Such a situation would most likely occur when there are few, if any, substitutes for the product or service offered by the affected sector, or if the products or services of the affected sector account only for a small portion of the income of its consumers. By contrast, if the demand is perfectly elastic (the price elasticity is infinitely large), then no increase in price is possible, and before-tax profits would be reduced by an amount equal to the compliance costs (minus any savings resulting from improved worker safety and health and reduced worker compensation insurance costs). Under this scenario, if the costs of compliance represent a large percentage of the sector's profits, some establishments might be forced to close. However, this scenario is highly unlikely to occur. It can only arise when there are other goods and services that are, in the eye of the consumer, perfect substitutes for the goods and services the affected establishments produce or provide.

A more likely or common scenario would be a price elasticity of 1. In this situation, if the costs of compliance amount to 1 percent of revenues, then production would decline by 1 percent and prices would rise by 1 percent. In this situation, the sector would remain in business and have the same revenues as before the rule became effective. In many instances, depending on the supply curve, the sector also would have approximately the same profits as before, but would produce 1 percent less of its services. Consumers would

effectively absorb the costs through a combination of increased prices and reduced consumption, which the court in *American Dental Ass'n,* 984 F.2d at 829, indicated is the more typical case.

In the case of this final rule, if costs are completely passed on to consumers, prices would increase by 0.01 to 0.03 percent, a consequence unlikely to have an effect on the viability of the affected industries. Alternatively, with no price increase, profits would decrease 0.33 percent for shipyards and 0.38 percent for commercial-vessel industries, a decrease that would have no effect on the economic viability of these industries. Therefore, OSHA concludes that this rule is economically feasible.

One commenter noted the precarious financial situation of the fishing and fish-processing industry, stating:

> A large part of Shipyard Employment in the Pacific Northwest hinges closely on to the success or failure of the fishing and fish processing industry. Because the fishing industry in our area is cyclical, one "bad" year or even a single "loss" season of fishing may in turn result in two or three abominable years for the rest of Shipyard Employment.
>
> The "minimal potential impact on both prices and profits" as stated in your report may not be applicable to the Shipyard Employment in the Pacific Northwest because both prices and profits do not remain constant in our region. In fact, they do vary greatly from year to year, and from season to season, and sometimes day to day.
>
> Hence, the conclusion made by OSHA "that the proposed regulation is economically feasible" definitely may not be appropriate or applicable to our region (Ex. 121.1).

OSHA understands the situation of the industries affected by this rule, and recognizes that profits are not consistent and are affected by a sometimes volatile marketplace. That said, the overall economic impacts of the final rule on profits in these industries are negligible, even in the case of an occasional poor season. The Agency also was unable to identify a regional variation in the impacts of the final rule, and believes that it will be not be more burdensome on affected establishments in the Pacific Northwest than on establishments in other parts of the country.

Regulatory Flexibility Screening Analysis

The RFA requires Federal agencies to determine whether their regulatory actions will have a significant impact on a substantial number of small entities. Pursuant to the RFA, OSHA assessed the small-business impact of the final rule. On the basis of a regulatory flexibility screening assessment and the underlying data, summarized above, OSHA certifies that the rule will not have a significant impact on a substantial number of small entities.

The RFA procedures require that OSHA examine costs as a percentage of revenues and profits. OSHA guidelines consider an impact potentially significant if any size class in any industry has compliance costs greater than 1 percent of revenues or costs greater than 5 percent of profits.

In the analysis of impacts, OSHA estimates the costs of compliance by dividing the per-establishment compliance cost by the per-establishment revenues, reported by the U.S. Census Bureau. In this case, the compliance costs as a percentage of revenues are estimated at 0.02 percent of revenues for all establishment size group in shipyards, and 0.01 percent of revenues for all establishment size groups in commercial-vessel industries (Table 27). Thus, when examined in the context of total revenues for the affected sectors, OSHA judges that the impact of the compliance costs on prices will not be significant. Even when examined by individual NAICS industry and size class, the costs of compliance as a percent of revenues does not rise to a level that is close to significant for any industry or size class.

OSHA also estimated the compliance costs as a percentage of pre-tax profits. Profits were estimated using total receipts and net income data published in the *Corporation Source Book of Statistics of Income* (IRS, 2006). As presented in Table 27, the average decline in profits for shipyards under this worst-case scenario would range from 0.33 percent (all employment size classifications) to 0.63 percent (1–19 employment size classifications). The worst-case scenario for commercial vessel industries would range from 0.38 percent (all employment-size classifications) to 0.96 percent (1–19 employment-size classification). Such declines would not have an effect on the competitive structure of any of the affected industries. Even when examined by individual NAICS industry and size class, the costs of compliance as a percent of profits does not rise to a level that is close to significant for any industry or size class. Although the Agency only presents economic impacts for the 1–19, 1–200, 1–1,000 employment-size classifications, as well as all firm categories combined, OSHA also estimated compliance costs for the following size classes: 100–199, 200–499, 500–1,000, and 1,000 and up (see the Costs of Compliance section of this FEA).

Table 27
Small Firm Impacts

	Size Class	Per Firm Compliance Cost	Compliance Cost as a % of Revenues	Compliance Cost as a % of Profits
Shipyards	1-19	$286	0.03%	0.63%
	1-200	$1,625	0.02%	0.41%
	1-1,000	$2,298	0.03%	0.46%
	All	$1,636	0.02%	0.33%
Commercial Vessels	1-19	$292	0.03%	0.96%
	1-200	$409	0.02%	0.53%
	1-1,000	$489	0.02%	0.48%
	All	$619	0.01%	0.38%

Source: Office of Regulatory Analysis

OSHA believes that, prior to the generation of the cost savings projected to accrue from implementation of the final rule, most affected establishments will respond to the increase in direct costs by increasing prices somewhat, and absorbing the remaining costs from profits. Commercial-fishing vessel establishments may absorb a greater amount of the cost increase from their profits because the market price they can command for their product likely cannot be influenced by the employers. However, the worst-case scenario reduction is still a very small percentage of profits, and the Agency does not believe that this will impose an undue burden on the industry. OSHA believes that most affected employers will experience little economic impact after the final rule is implemented. OSHA estimates that cost savings will soon offset any price and profit impacts.

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V. Environmental Impact

OSHA has reviewed the final rule on general working conditions in shipyard employment 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 (40 CFR part 1500 *et seq.*), and OSHA's DOL NEPA procedures (29 CFR Part 11). Based on this review, OSHA has determined that this final rule will have no significant effect on air, water, or soil quality; plant or animal life; use of land; or other aspects of the environment.

VI. Federalism

OSHA has reviewed this final rule in accordance with the Executive Order 13132 on Federalism (64 FR 43255, August 10, 1999). This E.O. requires that Federal agencies, to the extent possible, refrain from limiting State or local policymaking discretion, consult with State and local officials prior to taking any actions that would restrict State or local policymaking discretion, and take such actions only when clear constitutional and statutory authority exists for the action, and where there is a problem of national significance. The E.O. allows Federal agencies to preempt State law only where the statute contains an express preemption provision or there is some other clear evidence that Congress intended preemption of State law, or where the exercise of State authority conflicts with the exercise of Federal authority under the Federal statute. Any such preemption is to be limited to the extent possible.

In Section 18 of the OSH Act (29 U.S.C. 667) Congress expressly provides that States may adopt, with Federal OSHA approval, a plan for the development and enforcement of occupational safety and health standards. States that obtain Federal approval for such plans are referred to as "State-Plan States" (29 U.S.C. 667). Occupational safety and health standards developed by such State-Plan States, among other things, must be at least as effective in providing safe and healthful employment and places of employment as Federal OSHA standards. Subject to these requirements, State-Plan States are free to develop and enforce under State law their own requirements for occupational safety and health standards.

This final rule complies with E.O. 13132. In States that do not have OSHA-approved State Plans, this rule limits State policy options in the same manner as all OSHA standards. In States with OSHA-approved State Plans, this action does not significantly limit State policy options.

VII. Unfunded Mandates Reform Act

OSHA reviewed this final rule in accordance with the UMRA (2 U.S.C. 1501 *et seq.*) and Executive Order 12875 (58 FR 58093, October 28, 1993). As discussed above in section IV of this preamble ("Final Economic and Regulatory Flexibility Analysis"), the final rule does not include any Federal mandate that may result in increased expenditures by State, local, and tribal governments, and OSHA estimates that compliance with the rule will require expenditures by affected private employers of considerably less than $100 million per year. Therefore, this rule is not a "significant regulatory action" within the meaning of the

UMRA (2 U.S.C. 1532) and is not subject to review of the budgetary effects of the final standard on the private sector (2 U.S.C. 1532(a)). OSHA standards do not apply to State, local, or tribal governments except in States that have voluntarily elected to adopt a State Plan approved by the Agency. Consequently, this final rule does not meet the definition of a "Federal intergovernmental mandate" (see sec. 421(5) of UMRA, 2 U.S.C. 658(5))). In sum, this action does not mandate that State, local, and tribal governments adopt new, unfunded regulatory obligations.

VIII. Office of Management and Budget Review Under the Paperwork Reduction Act of 1995

The final General Working Conditions in Shipyard Employment Standard contains collection of information requirements (paperwork) that are subject to review by the Office of Management and Budget (OMB). In accordance with the Paperwork Reduction Act of 1995 (PRA–95) (44 U.S.C. 3506(c)(2)), the proposed regulation solicited public comments on the *General Working Conditions in Shipyard Employment (29 CFR 1915, subpart F)* Information Collection Request (ICR) (paperwork burden hour and cost analysis) for the proposal. The Department also submitted this ICR to OMB for review in accordance with 44 U.S.C. 3507(d) on December 20, 2007. On February 15, 2008, OMB informed the Department of Labor to use OMB Control Number 1218–0259 in future paperwork submissions involving this rulemaking. OMB also commented, "This OMB action is not an approval to conduct or sponsor an information collection under the Paperwork Reduction At of 1995." OMB also stated that "OMB will review the proposed collection again in parallel with the final regulation prior to approval."

OSHA received no public comments on the *General Working Conditions in Shipyard Employment (29 CFR 1915, subpart F)* ICR. A number of comments, described earlier in this preamble, contained information relevant to the burden hour and costs analysis that OSHA considered when it developed the revised ICR associated with this final rule.

The Department of Labor submitted the final ICR to OMB for approval. A copy of the ICR is available at *http://www.reginfo.gov*. OSHA will publish a separate notice in the **Federal Register** that will announce the results of that review. The Department of Labor notes that a Federal agency cannot conduct or sponsor a collection of information unless it is approved by OMB under the PRA–95, and displays a currently valid OMB control number. Also, notwithstanding any other provision of law, no employer shall be subject to penalty for failing to comply with a collection of information if the collection of information does not display a currently valid OMB control number.

The following paragraphs identify the collection of information requirements contained in the final rule.

Section 1915.83 Utilities

Paragraph (a)(1) requires employers to obtain a written or oral determination from a responsible vessel's representative, a contractor, or any other person who is qualified by training, knowledge, or experience to make such a determination, that the working pressure of the vessel's steam piping system is safe. Similarly paragraph (c)(3) requires employers to obtain a written or oral determination from a responsible vessel's representative, a contractor, or any other person who is qualified by training, knowledge, or experience to make such determination, that each circuit to be energized is in a safe condition. These collection of information requirements were not included in the proposal's ICR.

Section 1915.87 Medical Services and First Aid

Paragraph (f)(3) requires employers to store basket stretchers, or the equivalent, as well as related equipment, in a clearly marked location in a manner that prevents damage and protects them from environmental conditions. This requirement remains unchanged from the proposal's ICR.

Section 1915.88 Sanitation

Paragraph (e)(3) requires the employer to inform each employee engaged in the application of paints or coatings, or in other operations where hazardous or toxic substances can be ingested or absorbed, about the need for removing surface contaminants from their skins surface by thoroughly washing their hands and face at the end of the workshift and prior to eating, drinking, or smoking. OSHA maintains the proposal's determination that this requirement is a longstanding usual and customary practice on shipyard employment. OSHA adopted this requirement in 1972 pursuant to section 6(a) of the OSH Act, which allowed the Agency in the first two years after enactment of the Act to adopt as OSHA standards existing Federal and national consensus standards (37 FR 22458 (10/19/1972)). OSHA adopted this provision from safety standards promulgated under the Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941).

Section 1915.89 Control of Hazardous Energy (Lockout/Tags-Plus)

The proposal's ICR estimated burden hours and costs for "lockout/tagout" programs. The final ICR calculates burden hours and costs for "lockout/tags-plus" programs.

Developing Lockout/Tags-Plus Procedures

The proposal's ICR referenced developing procedures for the control of hazardous energy during the servicing of machinery, equipment, and systems as part of developing a lockout/tagout program. The final ICR provides additional details regarding the content of these procedures. Paragraph (b) requires the employer to establish and implement a written program and procedures for lockout and tags-plus systems to control hazardous energy during the servicing of any machinery, equipment, or system in shipyard employment. The program must cover: (1) Procedures for lockout/tags-plus systems while servicing machinery, equipment, or systems in accordance with paragraph (c); (2) procedures for protecting employees involved in servicing any machinery, equipment, or system in accordance with paragraphs (d) through (m); (3) specifications for locks and tags-plus hardware in accordance with paragraph (n); (4) employee information and training in accordance with paragraph (o); incident investigations in accordance with paragraph (p); and (6) program audits in accordance with paragraph (q).

Lockout/Tags-Plus Log

This collection of information requirement was not contained in the proposal's ICR. Paragraph (c)(7)(iv) requires that the employer ensure that the lockout/tags-plus coordinator maintains and administers a continuous log of each lockout and tags-plus system.

Lockout/Tags-Plus Written Procedures

Paragraph (d)(1) requires the employer to establish and implement written procedures to prevent energization or startup, or the release of hazardous energy, while authorized employees are servicing any machinery, equipment, or system.

Notification of Employees

Paragraph (e)(1)(ii) requires employers to notify each affected employee that the machinery, equipment, or system will

be shutdown and deenergized before applying a lockout/tags-plus system and beginning servicing. In addition, paragraph (i)(1)(i) requires the authorized employee to notify all other authorized and affected employees that the lockout/tags-plus system will be removed before any lockout/tags-plus system is removed and the machinery, equipment, or system restored to use.

Communication With Outside Personnel (Contractors, Ship Crew, etc.)

Paragraph (l)(2) requires the host employer to establish and implement procedures for the lockout/tags-plus program to protect workers from hazardous energy in multi-employer worksites. The host employer is responsible for informing each contract employer about the content of the host employer's lockout/tags-plus program and procedures, and instructing each contract employer to follow the host employer's lockout/tags-plus program and procedures. Also, the host employer must ensure that the lockout/tags-plus coordinator knows about all servicing operations and communicates this information with each contract employer who performs servicing or works in an area where servicing is being conducted.

Paragraph (l)(3) requires the contract employer, when working in a multi-employer worksite, to follow the host employer's lockout/tags-plus program and procedures, and to ensure that the host employer knows about the lockout-tags plus hazards associated with the contract employer's work, and what the contract employer is doing to address them. The contract employer also must inform the host employer of any previously unidentified lockout/tags-plus hazards that the contract employer identifies at the multi-employer worksite.

Lockout Tags-Plus Materials and Hardware

Paragraphs (n)(3)(iv) and (v) require that each lock and tag indicate the identity of the authorized employee applying it; and that each tag warns against hazardous conditions that could arise if the machinery, equipment, or system is energized, and that it include a legend such as one of the following: "Do Not Start," "Do Not Open," "Do Not Energize," or "Do Not Operate." The proposal's ICR stated that the identity of the employee applying the device is exempt from the definition of "information" under 5 CFR 1320.3(h). Further, since the regulation provides specific language to the employer for public disclosure on the tag, this is not a collection of information under 5 CFR 1320.3(c)(2). Therefore, the ICR did not have burden hour or costs associated with this information collection requirement. However, since the tag must also warn against hazardous conditions if the machine, equipment, or system is energized, OSHA has taken the burden for employers to tag a system, and the cost for employers to purchase a tag, in the final ICR.

Information and Training

Paragraph (o)(7) requires the employer to maintain records that employee training has been accomplished and is current. The training records must contain at least the employee's name, date of training, and subject of training.

Incident Investigations

The proposal's ICR did not contain collection of information requirements for incident investigations.

Paragraph (p)(2) requires the employer to promptly initiate an incident investigation and notify each authorized and affected employee who was, or could reasonably have been, affected by the incident.

Paragraph (p)(4) requires the employer to prepare a written report of the incident investigation. The written report must include: (1) The date and time of the incident; (2) the date and time the incident investigation began; (3) the location of the incident; (4) a description of the incident; (5) the factors that contributed to the incident; (6) a copy of any lockout/tags-plus log that was current at the time of the incident; and (7) any corrective actions that need to be taken as a result of the incident.

Paragraph (p)(6) requires the employer to complete the incident investigation and written report, and implement corrective actions, within 30 days following the incident.

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

Auditing Energy-Control Procedures

The following collection of information requirements were not included in the proposed ICR. However, these collection of information requirements are similar to those contained in the proposal's Inspection and Certification Control procedures, which are not included in the final ICR.

Paragraph (q)(1) requires the employer to conduct, an audit, at least annually, of the lockout/tags-plus programs and procedures that are currently in use.

Paragraph (q)(4) requires, within 15 days of the completion of an audit, the employer to prepare and deliver a written audit report that includes at least: (1) The date of the audit; (2) the names of the individual(s) who performed the audit; (3) the identity of the procedure, and the machinery, equipment, or system, being audited; (4) the findings of the program audit and recommended actions to correct deviations or deficiencies identified during the audit; (5) incident investigation reports compiled since the previous audit; and (6) corrective actions the employer has taken in response to the audit. Conducting an audit of the energy-control procedures will ensure that the procedures in place are working properly and help to identify any deviations or inadequacies with the current procedures.

Section 1915.92 Retention of DOT Markings, Placards and Labels; § 1915.93 Motor Vehicle Safety Equipment, Operation and Maintenance; and § 1915.94 Servicing Multi-piece and Single Piece Rim Wheels

OSHA maintained that the Agency would incur no additional burden hours or costs for the collections of information requirements contained in the above mention of sections.

The final rule imposes program change increase of 99,645 initial new burden hours to 2,725 shipyard-employment establishments after the effective date of the final standard. Table 28 summarizes the burden hours and costs (Capital Costs and Maintenance) associated with each collection of information requirement contained in the final rule.

TABLE 28—GENERAL WORKING CONDITIONS IN SHIPYARD EMPLOYMENT (29 CFR 1915, SUBPART F) INFORMATION COLLECTION REQUEST (ICR)

[Summary of Burden Hours and Costs]

Collection of information	Initial burden hours	Recurring burden hours	Cost (tags and ties)	Number of initial responses
Marking Location of Stretchers (§ 1915.87(f)(3))	3	3	0	18
Developing Lockout/tags-plus Procedures (§ 1915.89 (b), (l)(1), and (l)(3))	18,988	7,846	$3,065	2,725
Lockout/tag-plus Log (§ 1915.89 (c)(7)(iv))	10,090	10,090	0	126,127
Notification of the Application and Removal of the Lockout or Tags-plus System for the Electrical Devices (§ 1915.89 (e)(1), (l)(2), (n)(3)(iv), and (i)(1)(i))	6,368	6,368	0	124,149
Notification of the Application and Removal of the Lockout or Tags-plus System for the Air and Hydraulic Power Sources (§ 1915.89 (e)(1), (l)(2), and (i)(1)(i))	14,464	14,464	0	14,464
Preparing Written Reports of the Incident Investigation (§ 1915.89 (p)(4))	44,097	44,097	0	1,102
Auditing of Energy Control Procedures (§ 1915.89(q)(4))	3,625	3,625	0	2,725
Employee Training and Training Certification (§ 1915.89(o)(7))	2,007	667	0	38,853
Disclosure of Records to OSHA (§ 1915.89 (r)(2))	3	3	0	38
Total	99,645	87,163	$3,065	310,181

IX. State Plan Requirements

When Federal OSHA promulgates a new rule or more stringent amendment to an existing rule, the 27 States and U.S. territories with their own OSHA-approved occupational safety and health plans (State-Plan States) must revise their standards to reflect the new rule or amendment, or show OSHA why there is no need for action (for example, because an existing State standard covering this area is already "at least as effective" as the new Federal standard or amendment) (29 CFR 1953.5(a)). The State rule must be at least as effective as the final Federal rule, must be applicable to both the private and public (State and local government) sectors, and must be promulgated within six months of the promulgation date of the final Federal rule. When OSHA promulgates a new rule or amendment that does not impose additional or more stringent requirements than an existing rule, States are not required to revise their standards, although OSHA may encourage them to do so.

Since this final rule will impose additional or more stringent requirements, those States that cover maritime issues and/or have public employees working in the industries the final rule covers will be required to revise their standards appropriately within six months of the promulgation date of this final rule unless they demonstrate that such amendments are not necessary because their existing standards are at least as effective in protecting workers as this final rule. Until such time as a State standard is promulgated, Federal OSHA will provide interim enforcement assistance, as appropriate, in those States that cover private-sector maritime activities.

Currently, only four States with their own State Plans (California, Minnesota, Vermont and Washington) 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 all the other State-Plan States: Alaska, Arizona, Connecticut (plan covers only State and local government employees), Hawaii, Illinois (plan covers only State and local government employees), Indiana, Iowa, Kentucky, Maryland, Michigan, Nevada, New Jersey (plan covers only State and local government employees), New Mexico, New York (plan covers only State and local government employees), North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Virgin Islands (plan covers only territorial government employees), Virginia, and Wyoming.

X. Effective Dates

As discussed in Section I of this preamble ("Background"), OSHA is revising and updating the standards on general working conditions in shipyard employment to reflect advances in industry practices and technology, consolidating certain safety and health requirements into a single provision, and providing protection from hazards not previously addressed, including the control of hazardous energy. Due to comments received and testimony heard, OSHA significantly revised several provisions in the proposal, including the requirements for the control of hazardous energy.

The rulemaking record supports the need for the revisions and additions to subpart F to protect the safety and health of workers engaged in shipyard employment. OSHA currently requires, and shipyard employers implemented, many of the provisions in this subpart (for example, housekeeping and sanitation requirements). However, OSHA is aware that some employers (for example, small shipyards, fishing vessels) may need additional time to implement all of the requirements in the final rule for the control of hazardous energy. For example, they may need additional time to develop and implement or revise their lockout/tags-plus programs and procedures and complete all required initial training. Therefore, all sections of the final rule except for § 1915.89 will become effective and enforceable 90 days from the publication of this final rule. To ensure that employers have ample time to modify their lockout/tags-plus programs and practices, OSHA is allowing 180 days from the date of publication of this final rule for the lockout/tags-plus section to become effective and enforceable.

XI. List of Subjects

29 CFR Part 1910

Hazardous substances, Occupational safety and health, Reporting and recordkeeping requirements, and Vessels.

29 CFR Part 1915

Hazardous substances, Longshore and harbor workers, Occupational safety and health, Reporting and Recordkeeping requirements, Vessels, and Incorporation by reference.

XII. Authority and Signature

David Michaels, PhD, MPH, Assistant Secretary of Labor for Occupational

Safety and Health, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210, directed the preparation of this notice. The Agency is issuing this final rule under Sections 4, 6(b), and 8(g) 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 5–2007 (72 FR 31160, June 5, 2007); and 29 CFR 1911.

Signed at Washington, DC, on April 14, 2011.

David Michaels,

Assistant Secretary of Labor for Occupational Safety and Health.

XIII. Amendments to Standards

For the reasons set forth in the preamble, OSHA amends 29 CFR parts 1910 and 1915 as follows:

PART 1910—[AMENDED]

Part 1910 of title 29 of the Code of Federal Regulations is hereby amended as follows:

Subpart J—[Amended]

■ 1. The authority citation for subpart J of 29 CFR part 1910 is revised to read as follows:

Authority: Secs. 4, 6, and 8 of the 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), 1–90 (55 FR 9033), 6–96 (62 FR 111), 3–2000 (65 FR 50017), 5–2002 (67 FR 65008), 5–2007 (72 FR 31159), or 4–2010 (75 FR 55355) as applicable.

Section 1910.145, also issued under 29 CFR 1911.2.

■ 2. In § 1910.145, paragraphs (a)(1) and (f)(1)(ii) are revised to read as follows:

§ 1910.145 Specifications for accident prevention signs and tags.

(a) *Scope.* (1) These specifications apply to the design, application, and use of signs or symbols (as included in paragraphs (c) through (e) of this section) that indicate and, insofar as possible, define specific hazards that could harm workers or the public, or both, or to property damage. These specifications are intended to cover all safety signs except those designed for streets, highways, and railroads. These specifications do not apply to plant bulletin boards or to safety posters.

* * * * *

(f) * * *

(1) * * *

(ii) This paragraph (f) does not apply to construction or agriculture.

* * * * *

■ 3. In § 1910.147, paragraphs (a)(1) is revised to read as follows:

§ 1910.147 The control of hazardous energy (lockout/tagout).

(a) *Scope, application, and purpose*—(1) *Scope.*

(i) This standard covers the servicing and maintenance of machines and equipment in which the energization or start up of the machines or equipment, or release of stored energy, could harm employees. This standard establishes minimum performance requirements for the control of such hazardous energy.

(ii) This standard does not cover the following:

(A) Construction and agriculture employment;

(B) Employment covered by parts 1915, 1917, and 1918 of this title;

(C) Installations under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering;

(D) Exposure to electrical hazards from work on, near, or with conductors or equipment in electric-utilization installations, which is covered by subpart S of this part; and

(E) Oil and gas well drilling and servicing.

* * * * *

Subpart N—[Amended]

■ 4. The authority citation for subpart N of 29 CFR part 1910 is revised to read as follows:

Authority: Secs. 4, 6, and 8 of the 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), 1–90 (55 FR 9033), 6–96 (62 FR 111), 3–2000 (65 FR 50017), 5–2002 (67 FR 65008), 5–2007 (72 FR 31159), or 4–2010 (75 FR 55355) as applicable.

Section 1910.177, also issued under 29 CFR part 1911.

§ 1910.77 [Amended]

■ 5. In § 1910.177, paragraph (a)(2) is revised to read as follows:

(a) * * *

(2) This section does not apply to employers and places of employment regulated under the Longshoring Standards, 29 CFR part 1918; Construction Safety Standards, 29 CFR part 1926; or Agriculture Standards, 29 CFR part 1928.

* * * * *

PART 1915—[AMENDED]

■ 6. The authority citation for part 1915 is revised to read as follows:

Authority: Sec. 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); secs. 4, 6, and 8 of the 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), 1–90 (55 FR 9033), 6–96 (62 FR 111), 3–2000 (65 FR 50017), 5–2002 (67 FR 65008), 5–2007 (72 FR 31159), or 4–2010 (75 FR 55355) as applicable; 29 CFR part 1911.

■ 7. In § 1915.5, add paragraph (d)(1)(xii) and (d)(1)(xiii) to read as follows:

§ 1915.5 Incorporation by reference.

* * * * *

(d) * * *

(1) * * *

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

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

* * * * *

Subpart F—[Amended]

■ 8. Subpart F of 29 CFR part 1915 is revised to read as follows:

Subpart F—General Working Conditions

Sec.

1915.80 Scope, application, definitions and effective dates.
1915.81 Housekeeping.
1915.82 Lighting.
1915.83 Utilities.
1915.84 Working alone.
1915.85 Vessel radar and communication systems.
1915.86 Lifeboats.
1915.87 Medical services and first aid.
1915.88 Sanitation.
1915.89 Control of hazardous energy (lockout/tagout).
1915.90 Safety color code for marking physical hazards.
1915.91 Accident prevention signs and tags.
1915.92 Retention of DOT markings, placards, and labels.
1915.93 Motor vehicle safety equipment, operation, and maintenance.
1915.94 Servicing of multi-piece and single-piece rim wheels.

Subpart F—General Working Conditions

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

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

(b) *Definitions applicable to this subpart.*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(16) *Lockout/tags-plus materials and hardware.* Locks, chains, wedges, blanks, key blocks, adapter pins, self-locking fasteners, or other hardware used for isolating, blocking, or securing machinery, equipment, or systems to prevent the release of energy or the startup or energization of machinery, equipment, or systems to be serviced.

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

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

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

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

(21) *Portable toilet.* A non-sewered portable facility for collecting and containing urine and feces. A portable toilet may be either flushable or non-

flushable. For purposes of this section, portable toilets do not include privies.

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

(23) *Readily accessible/available.* Capable of being reached quickly enough to ensure, for example, that emergency medical services and first aid intervention are appropriate or that employees can reach sanitation facilities in time to meet their health and personal needs.

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

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

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

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

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

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

(30) *Tag.* A prominent warning device that includes a means of attachment that can be securely fastened to an energy-isolating device in accordance with an established procedure to indicate that the energy-isolating device and the equipment being controlled must not be operated until the tag is removed by an authorized employee.

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

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

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

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

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

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

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

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

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

§ 1915.81 Housekeeping.

(a) *General requirements.*

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

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

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

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

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

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

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

(b) *Walkways.*

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

(i) Provides adequate passage;

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

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

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

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

(B) Place each hose and cord underneath walkways;

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

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

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

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

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

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

(3) Is maintained, so far as practicable, in a dry condition. When a wet process

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

§ 1915.82 Lighting.

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

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

TABLE F–1 TO § 1915.82—MINIMUM LIGHTING INTENSITIES IN FOOT-CANDLES

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

Note to table F–1 to § 1915.82: The required illumination levels in this table do not apply to emergency or portable lights.

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

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

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

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

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

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

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

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

(5) Lighting stringers do not overload branch circuits;

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

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

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

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

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

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

§ 1915.83 Utilities.

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

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

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

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

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

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

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

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

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

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

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

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

(c) *Electric shore power.* When a vessel is supplied with electric shore

power, the employer shall take the following precautions prior to energizing any of the vessel's circuits:

(1) Ensure that the vessel is grounded;

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

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

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

§ 1915.84 Working alone.

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

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

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

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

§ 1915.85 Vessel radar and communication systems.

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

(b) The employer shall secure each vessel's radar and communication system so it is incapable of energizing or emitting radiation before any employee begins work:

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

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

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

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

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

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

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

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

§ 1915.86 Lifeboats.

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

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

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

§ 1915.87 Medical services and first aid.

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

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

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

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

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

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

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

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

(5) The employer shall ensure that each first aid provider maintains current first aid and CPR certifications, such as issued by the Red Cross, American Heart Association, or other equivalent organization.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix A to § 1915.87—First Aid Kits and Automated External Defibrillators (Non-Mandatory)

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

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

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

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

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

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

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

§ 1915.88 Sanitation.

(a) *General requirements.* (1) The employer shall provide adequate and readily accessible sanitation facilities.

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

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

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

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

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

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

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

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

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

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

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

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

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

TABLE F–2 TO § 1915.88

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

Note to Table F–2 of § 1915.88: When toilets will only be used by men, urinals may be provided instead of toilets, except that the number of toilets in such cases shall not be reduced to less than two-thirds of the minimum specified.

(3) *Portable toilets.* (i) The employer shall provide portable toilets, pursuant to paragraph (d)(2)(i) and Table to paragraph (d)(2) of this section, only when the employer demonstrates that it is not feasible to provide sewered toilets, or when there is a temporary increase in the number of employees for a short duration of time.

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

(4) *Exception for normally unattended worksites and mobile work crews.* The requirement to provide toilets does not apply to normally unattended worksites

and mobile work crews, provided that the employer ensures that employees have immediately available transportation to readily accessible sanitation facilities that are maintained in a clean, sanitary, and serviceable condition and meet the other requirements of this section.

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

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

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

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

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

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

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

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

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

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

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

(i) *Waste disposal.* (1) The employer shall provide waste receptacles that meet the following requirements:

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

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

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

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

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

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

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

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

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

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

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

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

(B) On any vessel or vessel section.

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

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

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

(i) Work on cord-and-plug-connected machinery, equipment, or system, provided the employer ensures that the machinery, equipment, or system is unplugged and the plug is under the exclusive control of the employee performing the servicing;

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

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

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

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

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

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

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

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

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

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

(3) If an energy-isolating device is not capable of being locked, the employer shall ensure the use of a tags-plus system to prevent energization or

startup, or the release of hazardous energy, before any servicing is started.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(d) *Lockout/tags-plus written procedures.* (1) The employer shall establish and implement written procedures to prevent energization or startup, or the release of hazardous energy, during the servicing of any machinery, equipment, or system. Each procedure shall include:

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

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

(iii) The steps that must be followed for:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(e) *Procedures for shutdown and isolation.* (1) Before an authorized employee shuts down any machinery, equipment, or system, the employer shall:

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

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

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

(C) The means to control these hazards; and

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

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

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

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

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

(f) *Procedures for applying lockout/tags-plus systems.* (1) The employer shall ensure that only an authorized employee applies a lockout/tags-plus system.

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

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

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

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

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

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

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

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

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

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

(2) Removes nonessential employees from the work area;

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

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

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

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

(i) *Procedures for removal of lockout and tags-plus systems.* (1) Before removing any lockout/tags-plus system and restoring the machinery, equipment, or system to use, the employer shall ensure that the authorized employee does the following:

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

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

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

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

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

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

(ii) Make all reasonable efforts to contact the authorized employee to

inform him/her that the lockout/tags-plus system has been removed; and

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(6) *Employee retraining.*

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

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

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

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

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

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

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

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

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

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

(p) *Incident investigation.* (1) The employer shall investigate each incident that resulted in, or could reasonably have resulted in, energization or startup, or the release of hazardous energy,

while servicing machinery, equipment, or systems.

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

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

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

(i) The date and time of the incident;

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

(iii) Location of the incident;

(iv) A description of the incident;

(v) The factors that contributed to the incident;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(i) The date of the audit;

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

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

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

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

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

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

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

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

TABLE TO PARAGRAPH (R)(1) OF THIS SECTION—RETENTION OF RECORDS REQUIRED BY § 1915.89

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

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

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

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

General

Lockout/Tags-Plus Procedure

Lockout/Tags-Plus Procedure for

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

Purpose

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

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

Compliance With This Program

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

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

Procedures for Lockout/Tags-Plus Systems

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

Method of notifying all affected employees.

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

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

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

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

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

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

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

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

Type(s) of hazardous energy—methods used to control them.

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

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

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

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

Procedures for Removal of Lockout/Tags-Plus Systems

When servicing is complete and the machinery, equipment, or system is ready to return to normal operating condition, the following steps shall be taken:

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

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

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

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

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

§ 1915.90 Safety color code for marking physical hazards.

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

§ 1915.91 Accident prevention signs and tags.

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

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

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

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

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

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

(e) For the purposes of this section, the term "hazardous material" and any other terms not defined in this section have the same definition as specified in the U.S. Department of Transportation Hazardous Materials Regulations.

§ 1915.93 Motor vehicle safety equipment, operation and maintenance.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Subpart J—[Amended]

■ 9. In § 1915.162, paragraph (a)(1) is revised as follows:

§ 1915.162 Ship's boilers.

(a) * * *

(1) The isolation and shutoff valves connecting the dead boiler with the live system or systems shall be secured, blanked, and then locked or tagged, in accordance with § 1915.89, indicating that employees are working on the boiler. This lock or tag shall not be removed nor the valves unblanked until it is determined that this may be done without creating a hazard to the employees working on the boiler, or until the work on the boiler is completed, in accordance with § 1915.89. When valves are welded instead of bolted, at least two isolation and shutoff valves connecting the dead boiler with the live system or systems shall be secured, and then locked or tagged, in accordance with § 1915.89.

* * * * *

■ 10. In § 1915.163, paragraph (a)(1) is revised to read as follows:

§ 1915.163 Ship's piping systems.

(a) * * *

(1) The isolation and shutoff valves connecting the dead system with the live system or systems shall be secured, blanked, and then locked or tagged, in accordance with § 1915.89, indicating that employees are working on the systems. The lock or tag shall not be removed or the valves unblanked until it is determined that this may be done without creating a hazard to the employees working on the system, or until the work on the system is completed, in accordance with § 1915.89. When valves are welded instead of bolted, at least two isolation and shutoff valves connecting the dead system with the live system or systems shall be secured, and then locked or tagged, in accordance with § 1915.89.

* * * * *

■ 11. In § 1915.164, paragraphs (a)(2) and (a)(3) are revised to read as follows:

§ 1915.164 Ship's propulsion machinery.

(a) * * *

(2) If the jacking gear is steam driven, the employer shall ensure that the stop valves to the jacking gear are secured, and then locked or tagged, in accordance with § 1915.89.

(3) If the jacking gear is electrically driven, the circuit controlling the jacking gear shall be de-energized by tripping the circuit breaker, opening the switch, or removing the fuse, whichever is appropriate, and then locked or tagged in accordance with § 1915.89.

* * * * *

■ 12. In § 1915.181, paragraph (c) is revised to read as follows:

§ 1915.181 Electric circuits and distribution boards.

* * * * *

(c) De-energizing the circuit shall be accomplished by opening the circuit breaker, opening the switch, or removing the fuse, whichever method is appropriate. The circuit breaker, switch, or fuse location shall then be locked out or tagged in accordance with § 1915.89.

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