AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

FEDERAL REGISTER

Vol. 80 Monday,
No. 85 May 4, 2015

Part II

Department of Labor

Occupational Safety and Health Administration

29 CFR Part 1926

Confined Spaces in Construction; Final Rule

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Part 1926

[Docket ID–OSHA–2007–0026]

RIN 1218–AB47

Confined Spaces in Construction

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

ACTION: Final rule.

SUMMARY: OSHA is adding a new subpart to provide protections to employees working in confined spaces in construction. This new subpart replaces OSHA's one training requirement for confined space work with a comprehensive standard that includes a permit program designed to protect employees from exposure to many hazards associated with work in confined spaces, including atmospheric and physical hazards. The final rule is similar in content and organization to the general industry confined spaces standard, but also incorporates several provisions from the proposed rule to address construction-specific hazards, accounts for advancements in technology, and improves enforceability of the requirements.

DATES: The final rule becomes effective on August 3, 2015.

ADDRESSES: In accordance with 28 U.S.C. 2112(a), the Agency designates Ms. Ann Rosenthal, the Associate Solicitor of Labor for Occupational Safety and Health, Office of the Solicitor of Labor, Room S4004, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210, to receive petitions for review of the final rule.

FOR FURTHER INFORMATION CONTACT:

General information and press inquiries: Mr. Frank Meilinger, Office of Communications, Room N3647, OSHA, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone (202) 693–1999; email *meilinger.francis2@dol.gov.*

Technical information: Ms. Jessica L. Douma, Directorate of Construction, Room N–3468, OSHA, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone (202) 693–2020 or fax (202) 693–1689; email *douma.jessica@dol.gov.*

For additional copies of this **Federal Register** document, contact: OSHA, Office of Publications, U.S. Department of Labor, Room N3101, 200 Constitution Avenue NW, Washington, DC, 20210; telephone (202) 693–1888. Electronic copies of this **Federal Register** document are available at *http://www.regulations.gov.* Electronic copies of this **Federal Register** document, as well as news releases and other relevant documents, are available at OSHA's Web page at *http://www.osha.gov.*

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Executive Summary
A. Introduction
B. Need for Regulation
C. Affected Establishments
D. Benefits, Net Benefits, and Cost Effectiveness
E. Compliance Costs
F. Economic Impacts
G. Final Regulatory Flexibility Analysis
II. Background
A. Record Citations
B. History
C. Need for a Rule Regulating Confined Spaces in Construction
III. Summary and Explanation of the Final Standard
1926.1201—Scope
1926.1202—Definitions
1926.1203—General Requirements
1926.1204—Permit Required Confined Space Program
1926.1205—Permitting process
1926.1206—Entry permit
1926.1207—Training
1926.1208—Duties of Authorized Entrants
1926.1209—Duties of Attendants
1926.1210—Duties of Entry Supervisors
1926.1211—Rescue
1926.1212—Employee Participation
1926.1213—Provision of Documents to the Secretary
IV. Agency Determinations
A. Legal Authority
B. Final Economic Analysis and Regulatory Flexibility Analysis
1. Introduction
2. Need for Regulation
3. Profile of Affected Industries
4. Benefits and Net Benefits
5. Technological Feasibility
6. Costs of Compliance
7. Economic Feasibility and Regulatory Flexibility Determination
8. Final Regulatory Flexibility Analysis
9. Sensitivity Analysis
10. References
C. Office of Management and Budget Review Under the Paperwork Reduction Act of 1995
D. Federalism
E. State-Plan States
F. Unfunded Mandates Reform Act
G. Consultation and Coordination With Indian Tribal Governments
H. Applicability of Existing Consensus Standards
V. Authority and Signature
VI. Amendments to Standards

I. Executive Summary

A. Introduction

OSHA last issued rules addressing work in confined spaces in 1993; however, those provisions applied only to general industry work. A single training provision, issued in 1979, applies to confined space work in construction. Following the promulgation of the general industry rule, OSHA agreed to propose a standard for confined spaces in construction as part of a settlement of a legal challenge filed by the United Steelworkers of America. After consulting with the Advisory Committee for Construction Safety and Health (ACCSH) on a draft, and holding several stakeholder meetings in locations across the country, OSHA developed a draft and conducted a Small Business Advocacy Review Panel (SBAR Panel) in 2003. The Agency published its proposed rule for confined spaces in construction on November 28, 2007 (72 FR 67351). The proposal incorporated feedback from ACCSH, the stakeholder meetings, and the SBAR Panel, and addressed issues unique to the construction industry, such as higher employee turnover rates, worksites that change frequently, and the multi-employer business model that is common on construction worksites.

During the SBAR Panel, some small entity representatives expressed a preference for the general industry rule and requested that OSHA consider adopting that rule for the construction industry. When the proposed rule was published, OSHA requested comment on how the Agency could adapt a standard similar to the general industry rule for the construction sector. Commenters indicated that they had been following the general industry rule for quite some time and suggested adopting that standard with some modifications for the construction industry. OSHA considered the unique challenges faced by the construction industry as well as the requests by commenters for more consistency between the general industry and construction standards. The final rule reflects the organization, language, and most of the substantive requirements of the general industry rule. Some of the aspects of the construction industry that are not present in general industry work are addressed by modifications such as information exchange requirements to ensure that multiple employers have shared vital safety information. OSHA also adjusted the construction rule to account for advances in technology and equipment that allow for continuous monitoring of hazards. Other differences between the regulatory text of the general industry rule and this standard reflect improvements in clarity of language and enforcement considerations that have been addressed

in interpretations of the general industry rule.

B. Need for Regulation

Prior to the promulgation of this rule, OSHA had one provision in its construction standards for a general training requirement when employees work in confined spaces. This provision at 29 CFR 1926.21(b)(6) provided limited guidance, instructing employers to train employees as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective emergency equipment required. OSHA has determined that this final rule, which provides a higher level of guidance and safety information to employers engaged in this kind of work, will reduce the average number of fatalities and injuries in confined spaces covered by this standard by 96 percent.

C. Affected Establishments

The final rule affects establishments in several sectors of the construction industry, including work involving buildings, highways, bridges, tunnels, utility lines, and other types of projects. Also potentially affected are general contractors, as well as specialty-trade construction contractors and employers engaged in some types of residential construction work.

D. Benefits, Net Benefits, and Cost Effectiveness

OSHA expects the final rule to improve the safety of workers who encounter confined spaces in construction. The programmatic approach of the final rule includes provisions for: Identifying confined spaces and the hazards they may contain; allowing employers to organize the work to avoid entry into a potentially hazardous space; removing hazards prior to entry to avoid employee exposure; restricting entry through a permit system where employers cannot remove the hazard; providing appropriate testing and equipment when entry is required; and arranging for rescue services to remove entrants from a confined space when necessary.

An estimated 6 fatalities and 812 injuries occur annually among employees involved in construction work in confined spaces addressed by the provisions of this rulemaking. Based on a review and analysis of the incident reports associated with the reported injuries and fatalities, OSHA expects full compliance with the final rule to prevent 96 percent of the relevant injuries and fatalities. Thus, OSHA estimates that the final rule will prevent approximately 5.2 fatalities and 780 additional injuries annually. Applying an average monetary value of $62,000 per prevented injury and a value of $8.7 million per prevented fatality (value of statistical life) results in estimated monetized benefits of $93.6 million annually.

OSHA estimated the net monetized benefits of the final rule to be about $33 million annually when costs are annualized at 7 percent ($93.6 million in benefits minus $60.3 million in costs). Table IV–1 summarizes the costs, benefits, net benefits, and cost effectiveness of the final rule.

TABLE IV–1—NET BENEFITS

[Millions of 2009 dollars]

	7% discount rate	3% discount rate
Annualized Costs		
Evaluation, Classification, Information Exchange and Notification	$12.4	$12.2
Written Program, Issue Permits, Verify Safety, Review Procedures	4.2	4.2
Provide Ventilation and Isolate Hazards	2.8	2.7
Atmospheric Monitoring	11.4	11.3
Attendant	3.6	3.6
Rescue Capability	8.2	7.6
Training	11.3	11.3
Other Requirements	6.4	6.3
Total Annual Costs	60.3	59.2
Annual Benefits		
Number of Injuries Prevented		780
Number of Fatalities Prevented		5.2
Monetized Benefits		93.6
Net Annual Monetized Benefits (Benefits Less Costs)		
	33.3	34.4

Totals may not equal the sum of the components due to rounding.
Source: Office of Regulatory Analysis, OSHA. Details provided in text.

E. Compliance Costs

The estimated costs of compliance with this rule represent the additional costs necessary for employers to achieve full compliance. They do not include costs for employers that are already in compliance with the new requirements imposed by the final rule; nor do they include costs employers must incur to achieve full compliance with existing applicable requirements.

OSHA based the Preliminary Economic Analysis and Initial Regulatory Flexibility Analysis for the proposed rule, in part, on a report prepared by CONSAD Corp. [2] [1] under contract to OSHA. For the final economic analysis (FEA), OSHA updated data on establishments, employment, wages, and revenues, and updated the analyses in the final rule with these new cost inputs. OSHA estimated the total annualized cost of compliance with the present rulemaking to be between about $59.2 million (when costs are annualized at 3 percent)

[1] References are available at the end of this section of the preamble.

and $60.3 million (when costs are annualized at 7 percent). The final rule's requirements for employers to evaluate, classify, and exchange information account for the largest component of the total compliance costs, at approximately $12.2 million to $12.4 million (when costs are annualized at 3 and 7 percent, respectively). Other compliance costs associated with the final rule include costs related to atmospheric monitoring—($11.3 million to $11.4 million), training ($11.3 million), rescue capability ($7.6 million to $8.2 million), written programs, permits, and review procedures ($4.2 million), attendants ($3.6 million),—and ventilation and hazard isolation ($2.7 million to $2.8 million).

F. Economic Impacts

To assess the economic impacts associated with compliance with the final rule, OSHA developed quantitative estimates of the potential economic impact of the requirements in this rule on entities in each affected industry. OSHA compared the estimated costs of compliance with industry revenues and profits to provide an assessment of potential economic impacts.

The costs of compliance for the final rule are not large in relation to the corresponding annual financial flows associated with the regulated activities. The estimated costs of compliance (when annualized at 7 percent) represent about 0.08 percent (less than 1 percent) of revenues and 1.6 percent of profits, on average, across all entities. One industry, NACIS 23621 Industrial Building Construction, showed the potential for compliance costs to exceed 10 percent of annual profits (10.5 percent), but the Agency concludes that the final standard is still feasible for this industry because it affects less than 2 percent of all firms in that industry sector each year, and OSHA believes that firms engaged in confined spaces work are larger and more profitable than average. Moreover, OSHA does not believe that industries will absorb all or most of the final standard costs in lost profits, as the price elasticity of demand in construction is sufficiently inelastic for minor price increases to offset costs—here, a price increase of less than 0.5 percent (or one-half of 1 percent).

OSHA concludes that compliance with the requirements of the final rule is economically feasible in every affected industry sector.

In addition, based on an analysis of the costs and economic impacts associated with this rulemaking, OSHA concludes that the effects of the final rule on international trade, employment, wages, and economic growth for the United States are negligible.

G. Final Regulatory Flexibility Analysis

The Regulatory Flexibility Act, as amended in 1996 by the Small Business Regulatory Enforcement Fairness Act, requires the preparation of a Final Regulatory Flexibility Analysis for certain rules promulgated by agencies (5 U.S.C. 601–612). Under the provisions of the law, each such analysis must contain: (1) A statement of the need for, and objectives of, the rule; (2) a statement of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis, a statement of the assessment of the agency of such issues, and a statement of any changes made in the final rule as a result of such comments; (3) a response to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration, and a detailed statement of any change made to the proposed rule in the final rule as a result of those comments; (4) a description and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available; (5) a description of the projected reporting, recordkeeping, and other compliance requirements of the rule, including an estimate of the classes of small entities that will be subject to the requirement, and the type of professional skills necessary for preparation of the report or record; and (6) a description of the steps the agency took to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule, and why the agency rejected each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities.

OSHA analyzed the potential impact of the final rule on small and very small entities, as described further under the heading "Final Regulatory Flexibility Analysis," later in this preamble (see Section IV). OSHA concludes that the compliance costs are equivalent to approximately 1.64 percent of profits for affected small entities generally, and less than approximately 0.10 percent (less than 1 percent) of annual revenues for very small industries, though the inelasticity of demand in construction would allow the costs to be offset by price increases in most industries.

II. Background

A. Record Citations

References in parentheses are to exhibits or transcripts in the docket for this rulemaking. Documents from the subpart AA rulemaking record are available under Docket OSHA–2007–0026 on the Federal eRulemaking Portal at *http://www.regulations.gov* or in the OSHA Docket Office. The term "ID" refers to the column labeled "ID" under Docket No. OSHA–2007–0026 on *http://www.regulations.gov*. This column lists individual records in the docket. This document will identify each of these records only by the last three digits of the record, such as "ID–032" for OSHA–2007–0026–0032. Identification of records from dockets other than records in OSHA–2007–0026 will be by their full ID number. In addition, the transcripts for the public hearings OSHA held on July 22–23, 2008 are identified by the docket number in the record under Docket No. OSHA–2007–0026–0210 and –0211. To aid readers in locating citations to the transcripts, this document refers to these citations using the abbreviation "Tr." and the corresponding page numbers, such as ID–201, Tr. pp. 10–15.

B. History

On March 25, 1980, OSHA published an Advanced Notice of Proposed Rulemaking (ANPR) on confined spaces for the construction industry (45 FR 19266). The ANPR posed 31 questions concerning confined-space hazards in the construction industry, and the Agency received 75 comments in response to these questions. However, OSHA took no further action on this regulatory initiative at the time.

The Agency subsequently published a Notice of Proposed Rulemaking (NPRM) for a general industry confined spaces rule on June 5, 1989 (54 FR 24080). OSHA issued the general industry confined spaces rule (29 CFR 1910.146) on January 14, 1993 (58 FR 4462).

The general industry standard requires employers to classify hazardous confined spaces as "permit-required confined spaces" and to implement specific procedures to ensure the safety of employees who enter them. It contains detailed procedures for developing a written confined-space program, monitoring atmospheric hazards, isolating physical hazards through lock out tag out procedures, training employees, preventing unauthorized employees from entering these spaces, providing rescue (both non entry and entry rescue), and maintaining records. The general industry standard specifies a limited

exception from some of the permit-required confined-space requirements when the only hazard in a confined space is an atmospheric hazard and ventilation equipment will control the atmospheric hazard at safe levels. It also provides protection to employees from non-atmospheric hazards (for example, physical hazards) in confined spaces. However, the general industry standard does not apply to construction employers, and, as such, does not specify the appropriate level of employee protection based on the hazards created by construction activities performed in confined spaces.

In 1993, as part of the litigation activity associated with the newly promulgated general industry standard, OSHA agreed in a settlement with the United Steel Workers of America to issue a proposed rule to extend confined-space protection to construction employees. On February 18, 1994, OSHA submitted a draft proposed standard for confined spaces in construction to the Advisory Committee for Construction Safety and Health (ACCSH) for comment. ACCSH established a work group on March 22, 1994, to address the OSHA draft proposed standard and report its findings to the full committee. ACCSH adopted the work group report on May 7, 1994 and recommended that OSHA incorporate it into a rulemaking docket. In this report, ACCSH noted that the general industry standard did not meet the needs of the construction industry. ACCSH found that employers often do not identify or classify confined spaces encountered or generated at construction worksites prior to the beginning of a construction project, and noted the difficulties faced by employers generally on construction worksites, where conditions often change rapidly and many different subcontractors may perform work simultaneously.

Consequently, ACCSH established a work group to draft a proposed standard that would meet the unique needs of the construction industry. The draft proposed standard emphasized identifying different types of confined spaces encountered in construction (for example, spaces in which the employer isolates all hazards or controls atmospheric hazards at safe levels, and spaces that are permit-required spaces), as well as inter-contractor information exchange and the detailed protections necessary to eliminate or control specific hazards.

As the result of the ACCSH work group review, ACCSH submitted a draft proposed standard for confined spaces in construction to OSHA in 1996. ACCSH recommended that OSHA use the draft as a proposed confined spaces standard. OSHA determined that the ACCSH draft proposed standard needed revision to make it easier to understand, especially for small employers that do not employ a separate safety staff. The Agency also determined that the draft proposed standard did not address adequately certain hazards, such as hazards encountered in sewer-construction work. Consequently, OSHA determined that it was necessary to develop a new draft proposed standard.

In 1998, OSHA completed a new draft proposed standard, but discovered that there were several issues that the Agency needed to resolve before it could finalize the draft proposed standard. To get feedback from the construction community, OSHA held three stakeholders meetings in October of 2000 across the country. The topics discussed at the stakeholder meetings were: (1) Typical confined spaces encountered in construction; (2) whether the proposed standard should require an early-warning system for spaces in which the employer could not isolate an engulfment hazard (such as in some sewer situations); (3) the need for, and cost of, continuous monitoring for atmospheric hazards; (4) how a confined spaces standard for construction could accommodate the needs of small businesses; and (5) whether the proposed standard should permit an attendant to perform his or her duties for more than one confined space at a time.

In late 2003, OSHA completed drafting the proposed standard and convened a panel under the Small Business Regulatory Enforcement Fairness Act (SBREFA) to solicit comments on the proposal from small business entities. The SBREFA panel conducted two conference-call discussions, which were open to the public, in which small entity representatives expressed their concerns about the draft proposed standard; these representatives also submitted written comments to the record that covered the issues. The SBREFA panel then submitted its recommendations to the Agency in November 2003.

The Agency published a proposed rule for confined spaces in construction on November 28, 2007 (72 FR 67351). The proposed confined spaces standard for construction reflected input from stakeholder meetings, ACCSH, and the SBREFA review process. For example, OSHA removed a provision that addressed working in hazardous enclosed spaces (*i.e.*, spaces designed for human occupancy but subject to a hazardous atmosphere), which small business entities participating in the SBREFA review process considered burdensome and unnecessary; OSHA removed this provision because it believes that existing construction standards (for example, 29 CFR 1926.55) adequately address these hazards. The proposed standard used a confined-space classification approach consistent with the ACCSH recommendations. OSHA organized the proposed standard chronologically to guide the employer from its initial encounter with a potential confined space through the steps necessary to ensure adequate protection for employees. In addition, it addressed the need for coordination and information exchange at construction sites, which typically have multiple employers.

The Agency recognized that a number of requirements in the proposed standard for confined spaces in construction duplicated, or were similar to, the provisions of the general industry standard for permit-required confined spaces. Nevertheless, OSHA had concerns about whether the general industry standard adequately addressed the unique characteristics of confined spaces in construction. The feedback that OSHA received from ACCSH, stakeholders, and the SBREFA process indicated that, compared to general industry, the construction industry experiences higher employee turnover rates because construction employees often work at multiple worksites performing short-term tasks. Unlike most general industry worksites, construction worksites are continually evolving, with the number and characteristics of confined spaces changing as work progresses. Also, multiple contractors and controlling contractors are more common on construction worksites than general industry worksites. Therefore, a construction standard for confined spaces, even more so than the general industry standard for confined spaces, must emphasize training, continuous worksite evaluation, and communication requirements

Decision to abandon the proposed new classification system and adapt an alternative that is more similar to the general industry standard.

During the SBREFA review process, some small entity representatives urged OSHA to consider adopting the general industry standard for construction, and to solicit comment on how the Agency could adapt an alternative standard similar to the general industry standard to the construction sector. When the Agency published the proposed construction standard, it requested

public comments on how to adapt an alternative standard similar to the general industry standard for the construction industry (72 FR 67352, 67401 (Nov. 28, 2007)). During the comment period and the public hearings OSHA held on July 22–23, 2008, OSHA received many comments and much testimony regarding the issue of using an adapted version of the general industry standard as the basis for the final rule rather than the new classification systems proposed in the NPRM. A clear majority of comments were in favor of finalizing a confined spaces in construction standard that more closely resembles the general industry standard for confined spaces. (See, *e.g.*, ID–032; –047; –075; –088; –092; –095; –105; –106; –115; –117; –118; –119; –120; –121; –125; 150; –152; –153; 185; –189; –210, Tr. pp. 54–60, 74–76, 174–175, 282–284; –211, Tr. pp. 73, 172, and 238–239.) Several commenters proposed adopting the general industry standard with some adaptations for the construction context, though not all of these commenters specified, or agreed on, what specific adaptations were appropriate (see, *e.g.*, ID–092; –117; –125). The Agency received a number of comments suggesting that many construction employers were currently following the general industry confined spaces standard (see, *e.g.*, ID–075; –085; –088; –092; –095; –112; –117; –118; –120; –121; –125; –147).

For the reasons discussed in the preamble to the proposed rule, and in light of the comments and testimony the Agency received, OSHA remains convinced that the general industry standard does not adequately address confined-space hazards as these hazards arise in the construction industry. Moreover, the 19 years of experience that employers have working with the general industry rule, and that OSHA has enforcing the general industry rule, highlight several areas in which additional clarification in the language of the general industry standard could improve the effectiveness of a new construction standard. Therefore, OSHA is not simply incorporating the general standard by reference into the construction standards.

OSHA believes that the particular duties and obligations in the general industry standard and the proposed construction standard are similar, and that the public's confusion over the re-organized structure in the proposed rule is the result of the degree of detail in the proposed rule, as well as its organization. Most notably, compared to the general industry rule, the proposed rule added specificity to the general industry standard's broad, performance-based requirements, and defined a larger number of confined-space classifications.

Nevertheless, in recognition of the commenter requests for more consistency between the two standards, OSHA is using the organization, language, and most of the substantive requirements in the general industry confined spaces standard as the basis for the final confined spaces in construction rule. However, differences in employee and worksite characteristics between the construction industry and general industry, as well as the comments and testimony of the regulated community indicating the need for consistency and continuity in OSHA requirements, prompted OSHA to develop a final rule for confined spaces in the construction industry that contains important requirements from the proposed rule and some additional changes. Many of these changes, such as the information exchange requirements, are designed to address the heightened need, on constantly evolving construction worksites for communication, worksite evaluation, and training for confined spaces in construction. In addition, several regulatory provisions in the general industry rule differ from the regulatory provisions of this final rule because the provisions of this final rule: (1) Address construction-specific issues; (2) account for advancements in technology; (3) address concerns raised by the regulated community through comment and at the hearing; or (4) reflect improvements in language for modern regulatory drafting ("must" in place of "shall"), clarity and enforcement considerations. In most cases, the preamble that follows this introductory section explains the differences between the provisions of the final rule and the general industry rule.

The Agency believes that it provided adequate notice of the substantive terms of the final rule, as well as an extensive description of the subjects and issues involved. Accordingly, the Agency fairly apprised interested persons of the content of the rulemaking, and the comments and hearing testimony provide ample evidence that interested parties to the rulemaking understood the issues and potential outcomes of the rulemaking. See, *e.g.*, *Nat'l Mining Ass'n* v. *Mine Safety & Health Admin.*, 512 F.3d 696, 699 (D.C. Cir. 2008); *Miami-Dade County* v. *U.S. E.P.A.*, 529 F.3d 1049, 1059 (11th Cir. 2008); *United Steelworkers of America, AFL–CIO–CLC* v. *Marshall*, 647 F.2d 1189, 1221 (D.C. Cir. 1980) ("a final rule may properly differ from a proposed rule and indeed must so differ when the record evidence warrants the change. . . . Where the change between proposed and final rule is important, the question for the court is whether the final rule is a 'logical outgrowth' of the rulemaking proceeding"). The resulting final standard is a logical outgrowth of the proposal, and the number of comments urging an adapted version of the general industry standard provides a clear indication that the affected members of the public are not only familiar with the general industry standard, but also viewed the inclusion of part or all of the general industry standard's structure and language as a potential outcome of this rulemaking. The confined-space issues the Agency addresses in the final rule are the same as in the proposed rule, and the Agency addressed the criticisms and suggestions made by interested parties in response to the proposed rule. In short, the combination of OSHA's request for comment on the approach that it ultimately adopted in the final rule, the explanation of the hazards it sought to address in proposal, and the comments and testimony received in response to the proposal provided the regulated community with adequate notice regarding the outcome of the rulemaking. Therefore, the Agency concludes that there is no basis for further delaying promulgation of the standard to obtain comment on the approach adopted in this final rule.

Many of the comments OSHA received on the proposal related to specific requirements included in the detailed procedures of the proposed standard. As a result of finalizing a confined spaces in construction standard that closely resembles the general industry standard, much of this detailed language does not appear in this final rule. In some cases, OSHA addressed the substance of the comment in the discussion of the most relevant preamble section in this final rule. In other instances, the issue raised in the comment became moot as a result of OSHA's decision not to include the proposed text in the final rule. Therefore, OSHA is not directly responding to each of these particular comments in the summary and explanation of the final rule.

OSHA considered, but ultimately rejected, several other regulatory alternatives based on the comments submitted to the Agency. For example, some commenters suggested that employers should have the option of following either 29 CFR 1910.146 or this final rule (ID–089, p. 2; –147, p. 4). This suggestion relates to some commenters' concern that having separate rules for confined spaces in construction and

general industry makes it confusing for employers that perform both construction and maintenance inside a confined space to comply with the different requirements of each rule based on the type of the work they are performing (see, *e.g.*, ID–119, p. 3). OSHA developed this standard because of the unique hazards of confined-space work in construction and, although this final rule is similar to § 1910.146, there are differences when certain procedures are necessary to protect employees from the unique hazards of construction confined-space work. Therefore, an employer does not have the option of bypassing the procedures that are unique to this final rule by complying instead with § 1910.146. Such a policy would severely undermine OSHA's effort to protect employees from the unique hazards present during confined-space operations in construction.

OSHA recognizes that the differences between § 1910.146 and this final rule can make it more complicated for employers to comply with two different sets of procedures if they perform maintenance and construction work at the same time in the same confined space. In order to ease the compliance burden on these employers, OSHA will consider compliance with this final rule as compliance with § 1910.146. This enforcement policy was suggested by at least one commenter (ID–211, Tr. p. 303).

Another commenter suggested that OSHA issue a directive on confined-space work in construction instead of a final rule (ID–100, p. 5). OSHA generally issues a directive on a particular work practice after the Agency issues a rule, not in lieu of a rule; accordingly, the directive provides guidance as to how the Agency will enforce a standard. The rulemaking process, on the other hand, provides the public with notice and an opportunity to comment on the Agency's proposed action, and the Agency may use the information gathered during this process to impose substantive duties on employers, such as employers engaged in confined-space construction work. The information gathered by the Agency during the rulemaking process for this final rule supports issuing a final rule for confined-space work in construction. Therefore, OSHA rejects the alternative approach suggested by the commenter.

A different set of commenters focused on individual states' confined spaces standards. One commenter asserted that several State-Plan States have effective confined space standards and that this rule will unnecessarily force those states to change these standards (ID–135, p. 3). A similar comment discussed Virginia's confined spaces rule, but did not suggest OSHA adopt that rule (ID–047, p. 1). Another commenter suggested OSHA adopt the majority of California's confined spaces rule (ID–077, p. 1). OSHA notes that the Occupational Safety and Health Act of 1970 (OSH Act) allows for different regulatory schemes to address the hazards of confined-space work provided those standards are at least as effective as the Federal OSHA standard. The record indicates that, by issuing a final rule that is similar to § 1910.146, OSHA is not drastically changing industry practice for addressing confined-space hazards. (See, *e.g.*, ID–047; –075; –085; –088; –092; –095; –112; –117; –118; –120; –121; –125; –147; –189.) Therefore, OSHA believes that State-Plan States that have standards applicable to construction work in confined spaces that are similar to § 1910.146 will not have to make major changes to their existing rules to ensure that these rules are at least as effective as this final rule. When a State-Plan State's confined spaces rule is not as effective as this final rule, OSHA believes that the record warrants a change in the State-Plan State's rule so that it will provide construction employees with the same level of protection afforded to them by this final rule. For a full discussion of State-Plan States, see Section IV.E ("State-Plan States") later in this preamble.

C. Need for a Rule Regulating Confined Spaces in Construction

Before promulgating this final rule, OSHA had one existing provision in its construction standards that included a general training requirement for employers working in confined spaces. A broad "safety and training" requirement in 29 CFR 1926.21(b)(6), adopted by the Agency in 1979, provided limited guidance: Under this provision, employers were only required to instruct employees required to enter into confined or enclosed spaces as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required. Fatality and injury data, OSHA enforcement experience, and advice from ACCSH indicate that § 1926.21(b)(6) did not adequately protect construction employees in confined spaces from atmospheric, physical, and other hazards. Even when § 1926.21(b)(6) applied, it required employers only to train employees who work in confined spaces—it did not address how to protect trained employees while they are working in such spaces, nor did it address the actions of employers outside the spaces engaged in activities that might harm employees inside the spaces. For situations in which none of the construction standards apply, the employer was still required to comply with the general-duty requirement of the OSH Act to "furnish to each of [its] employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to [its] employees" (29 U.S.C. 654), but this "general duty" is often more difficult for OSHA to enforce and does not provide the same level of guidance and safety information provided in a standard.

As noted in the economic analysis section of the preamble to this final rule, OSHA determined that employees in the construction industry who perform work in confined spaces face a significant risk of death or serious injury, and that this final rule would substantially reduce that risk. At present, OSHA estimates that 20,479 establishments annually have employees entering at least one confined space as defined by this final rule. OSHA estimates that, each year, 6 fatalities and 900 injuries occur among employees working in confined spaces covered by this final rule. OSHA determined that the final rule, when implemented properly by employers, will reduce the average number of fatalities and injuries in confined spaces covered by this standard by 96 percent (5.2 fatalities prevented annually, and 780 injuries prevented annually). (For further explanation of the significant-risk calculations, see section V.B. ("Final Economic Analysis and Regulatory Flexibility Analysis") of this document.)

III. Summary and Explanation of the Final Standard

Explanation of Changes to Subpart V—Power Transmission and Distribution

Subpart V of part 1926 governs construction work involving power transmission, generation, and distribution. OSHA recently updated subpart V (79 FR 20316 (April 11, 2014). When it did so, OSHA required compliance with the general industry confined-spaces standard at § 1910.146 in several provisions of subpart V. OSHA did so because at that time there was no comprehensive confined-spaces standard for construction, but the Agency explained in the subpart V preamble that "the references to the general industry standard in final § 1926.953 are included as a placeholder

pending the promulgation of the confined spaces in construction standard. OSHA intends to change these references to refer to the construction standard when it promulgates that standard." (79 FR 20376) OSHA is, therefore, amending subpart V in this rulemaking to replace references to the general industry confined spaces standard with references to this final construction rule, because OSHA specifically tailored this final rule to construction work, making the confined spaces in construction rule more appropriate than the general industry standard for construction work addressed by subpart V.

Amendments to Definition of "Enclosed Space" in § 1926.968

An "enclosed space" is a term of art under subpart V and the corresponding general industry standard for electric power generation, transmission, and distribution (§ 1910.269) describing a workspace such as a manhole or vault that is designed for periodic employee entry under normal operating conditions, and that, under normal conditions, does not contain a hazardous atmosphere, but may contain a hazardous atmosphere under abnormal conditions (§ 1910.269(x) and § 1926.968). There is overlap between an enclosed space and a "permit-required confined space" (permit space) as defined in the confined spaces standards for general industry (§ 1910.146) and construction (new subpart AA): An enclosed space meets the definition of a permit space—while it is not expected to contain a hazardous atmosphere, it has the potential to contain one—but the definition of permit-space is broader than the definition of enclosed space. For instance, if a space contains a hazardous atmosphere under normal conditions, that space is a permit space under § 1910.146 or new subpart AA, but it is not an enclosed space under final § 1910.269 or subpart V.

The note to the definition of "enclosed space" in § 1910.269(x) states that enclosed spaces expected to contain a hazardous atmosphere meet the definition of permit spaces in § 1910.146, and entry into them must conform to that standard. Subpart V, however, did not have any definition of "enclosed space" until OSHA amended it in 2014 by adding a definition that matched the general industry definition in § 1910.269(x) except that it did not include the note. OSHA explained in the preamble to the subpart V amendments that it did not include the note at that time because there was no comprehensive corresponding confined spaces construction standard to reference in place of § 1910.146, but OSHA intended to add a corresponding note to § 1926.268 when it promulgated the new construction confined spaces standard (see 79 FR 20376–20377). As part of this rulemaking, OSHA is therefore adding a note to the definition of "enclosed space" in § 1926.968 that corresponds to the note in § 1910.269(x), replacing the reference to § 1910.146 with a reference to subpart AA.

Amendments to § 1926.953

Prior to this rulemaking, § 1926.953(a) in subpart V, as amended in 2014, required that entry into an enclosed space to perform construction work meet the permit-space entry requirements of paragraphs (d) through (k) of § 1910.146 when the precautions taken under §§ 1926.953 and 1926.965 were insufficient to eliminate hazards in the enclosed space that could endanger the life of an entrant or interfere with escape from the space. Similarly, § 1926.953(g) stated that employees may not enter any enclosed space while it contains a hazardous atmosphere, unless the entry conforms to the permit-required confined spaces standard in § 1910.146. OSHA is amending §§ 1926.953(a) and 1926.953(g) by replacing each reference to § 1910.146 with a reference to subpart AA so that the appropriate construction standard, rather than a general industry standard, will apply.

OSHA is also adding a sentence to § 1926.953(a) to clarify that employers may comply with the requirements of § 1926.953 "in lieu of" most of the requirements in new subpart AA when the entry into the enclosed space is a routine entry for subpart V work and there is no hazardous atmosphere in the space. Without this clarifying sentence, employers could have been confused about which standard applied. OSHA determined that § 1926.953 provides adequate protection to employees in that situation and announced in the subpart V preamble that it intended to add the sentence when it issued this final rule (see 79 FR 20376).

The new "in lieu of" sentence in § 1926.953(a) corresponds to a similar sentence in § 1910.269(e) specifying that employers are not required to comply with § 1910.146(d) through (k) for the same type of routine entries into enclosed spaces. OSHA has used slightly different wording from the language in § 1910.269 to emphasize that "in lieu of" language is only applicable where the entry is routine and the space does not contain hazards that could cause death or impede exit. As with the general industry standard, the new sentence in § 1926.1953(a) only exempts employers from compliance with some, but not all, of subpart AA's requirements. In the "in lieu of" sentence in § 1910.269, OSHA only excuses employers from compliance with § 1910.146(d) through (k) for these routine entries, but employers must still comply with the requirements in § 1910.146(c) and (l), including the requirements to assess the space, prevent unauthorized entry, communicate with and coordinate with the host employer when applicable, and to involve entrants and their representatives in the process. Likewise, in § 1926.953(a), the enclosed spaces requirements apply in lieu of the permit requirements in § 1926.1204 through § 1211, but employers still need to comply with subpart AA's corresponding requirements in § 1926.1203 to assess the space, prevent unauthorized entry, and coordinate with and communicate with the controlling contractor, in addition to the requirements in § 1211 to involve entrants and their representatives in the process.

Finally, in addition to some minor, non-substantive grammatical changes to improve the paragraph, OSHA is also revising the note to paragraph § 1926.953, which appears at the end of the section, by replacing its reference to § 1910.146 with a reference to new subpart AA. The note clarifies that OSHA considers employers who comply with new subpart AA when entering an enclosed space as in compliance with § 1926.353(a). Some employers may prefer to comply with new subpart AA rather than § 1926.353(a), and subpart AA protects employees entering enclosed spaces at least as effectively as the provisions in § 1926.353.

Section 1926.1201—Scope

The scope of new 29 CFR part 1926, subpart AA—Confined Spaces in Construction is set forth in 29 CFR 1926.1201. This subpart provides minimum safety and health requirements and procedures to protect employees who work in confined spaces. It addresses how to protect employees from confined-space hazards. The final rule includes requirements for training, identification and assessment of confined spaces, hazard analysis, entering, working, exiting, and rescue for confined spaces containing a variety of different hazards.

The proposed rule contained an "Introduction" section that provided a general overview of the standard and stated that the proposed standard would cover "working within or near a confined space that is subject to a

hazard" (see proposed § 1926.1201(a)). OSHA removed the "Introduction" section to make this final rule similar to § 1910.146, and to avoid confusion caused by potential overlap with the "Scope" provisions. Section 1926.1201 in the final rule is the scope section.

Paragraph (a). Although many commenters urged OSHA to conform this final rule to the general industry standard as much as possible, the scope section for confined spaces in general industry at § 1910.146(a) expressly excludes construction work. Therefore, it is impractical for OSHA to change the language in final rule § 1926.1201 to mirror § 1910.146(a). Instead, OSHA structured the scope section in final rule § 1926.1201 in a manner that draws from the language in the scope sections of the general industry standard and the proposed rule. As with the scope of the general industry standard, which states that it protects employees from the hazards of entry in permit-required confined spaces (§ 1910.146(a)), OSHA phrased final § 1926.1201(a) in terms of the employees protected by the final standard. In contrast, the scope of the proposed rule focused on employers (see proposed § 1926.1202(a)). While the final standard necessarily imposes the duties exclusively on employers, OSHA concluded that phrasing the scope in terms of employers "who have confined spaces at their job site" was potentially more problematic than the general industry approach because the regulated community could misinterpret the proposed language as requiring some analysis of the extent to which the employer exercised control over a particular part of a construction site.

A number of commenters expressed confusion about the description of the standard included in the proposed introduction, which appeared to function as an additional statement about the scope of the rule (see, *e.g.*, ID–032.0; –100.1; –105.1; –114.1; –119.1; –120.1; –125.1; –135.0.) In particular, many commenters asserted that the reference to work "within or near a confined space," as used in the proposed description of the standard, was too vague, and requested that OSHA clarify its meaning. (See, *e.g.*, ID–031, p. 4; –061, p. 7; –095, p. 1; –101, p. 2; p. 1; –106, p. 1; –117, p. 7; –120, p. 2; –121, p. 8; –124, p. 4; p.–125, p. 5.) In response, OSHA did not include the phrase "within or near a confined space" in the scope section in this final rule. Instead, in final § 1926.1201(a), OSHA describes the scope in more definite terms by stating that the new standard protects employees engaged in construction activities at a worksite with one or more confined spaces, which is similar to the language of the proposed rule except that it avoids the reference to "their job site." The language in final § 1926.1201(a) incorporates a bright-line test (whether or not the worksite has a confined space) to underscore two important points in the final rule that also are true for the general industry standard and the proposed rule: First, all employers engaged in construction have a duty under the final standard to ensure that their employees do not enter a confined space except in accordance with the requirements of the standard, and the presence of a confined space on the worksite triggers this duty rather than the type of work the employer is performing. Second, there are critical components of this standard, such as information sharing and coordination of work, that apply to certain employers that, regardless of whether their employees are authorized to enter a confined space, have information necessary for the protection of employees working inside confined spaces, or are engaged in activities that could, either alone or in conjunction with activities inside the confined space, endanger the employees working inside a confined space. Final § 1926.1201(a) makes it clear that the focus of the final standard is on the type of work performed, and whether that work could produce, and expose employees to, confined space hazards. Although final § 1926.1201(a) differs slightly from proposed § 1926.1202(a), this difference does not affect the scope of the final rule; it merely makes the scope more precise than the scope of the proposed rule. This change also is consistent with the proposed "Introduction" section in proposed § 1926.1201(a).

Final § 1926.1201(a) includes a note with a non-exhaustive list of potential confined spaces that commonly occur on a construction worksite. This list provides examples for employers who may be unfamiliar with confined spaces in construction. The note to final § 1926.1201(a) is identical to the note to proposed § 1926.1202(a).

One commenter asserted that OSHA should exclude steel tanks, which OSHA included in the list of examples of confined spaces in construction in the proposed rule, from the new standard when the tanks are under construction because this activity does not produce an atmospheric hazard (ID–138, p. 2; –214.1, p. 4; –210, Tr. p. 217). In particular, the commenter asserted that contractors typically do not close entirely steel tanks under construction until the final phase of construction and that, prior to the final phase, the tanks typically have sufficient natural ventilation to prevent a hazardous atmosphere from forming. The final phase is typically conducted without any employees inside the tank (ID–210, Tr. p. 5).

Whether a confined space exists is a separate analysis from whether a hazard exists, unless the hazard prevents unrestricted egress from the space. A steel tank is a confined space at any stage of construction when it has limited or restricted means for entry and exit (see the definition of a confined space in § 1926.1202, which is discussed later in this preamble). However, OSHA recognizes that a significant portion of steel-tank construction activity may not result in work inside a confined space if contractors generally do not assemble the tank sections in a manner that would place an employee inside a space with limited egress. Even when construction of the tank results in such a space, the space may not contain a hazard that would render it a permit-required confined space. If the space is not a permit-required confined space, then the employer's duties are very limited. In such spaces, the employer's responsibility under this standard would be limited to verifying what the commenter asserts is true: There is no atmospheric hazard or other hazard. Nevertheless, the commenter acknowledged that welding activities in some steel tank construction, particularly for relatively small tanks, could produce the types of hazardous atmospheres this standard is intended to address (ID–210, Tr. pp. 228–229). Thus, OSHA is not categorically excluding steel tanks from coverage under this standard and continues to include steel tanks in the list of potential confined spaces to alert employers that the process of steel-tank construction could place employees in a space that meets the definition of a permit-required confined space.

Another commenter asserted that the note did not include wind turbines (ID–210, Tr. p. 154). This commenter misunderstood the reference to "turbines" in the note in the proposed and final rules. The reference to "turbines" is general, and applies to all turbines that meet the definition of a confined space.

It is important to note that only the presence of a hazard inside a confined space will trigger the majority of procedures required by this final rule. One commenter asserted that limited egress is a continual hazard to every employee in a confined space, regardless of whether any other hazards exist (ID–060, p. 3). Therefore, the

commenter argued that the permit requirements of this final rule, including the requirement to have a rescue service available, should apply to all confined spaces, even those spaces in which another hazard does not exist. This approach would apparently treat all confined spaces as permit spaces, which would be a radical departure from OSHA's longstanding treatment of confined spaces in the general industry. OSHA does not agree that such a departure, or the additional costs that employers would incur because of such departure, are warranted in the absence of employee exposure to some hazard inside the confined space. Limited egress in a confined space is a safety concern only when an employee cannot readily exit a confined space to avoid being exposed to a hazard within the space. Limited egress, by itself, is unlikely to injure or kill an employee. If limited egress is the only safety concern, then OSHA concludes that it is not reasonable to require employers to comply with the provisions of this final rule that pertain to permit spaces. In such a circumstance, employers already must follow existing construction standards that apply to work in an enclosed space (for example, § 1926.353—Ventilation and protection in welding, cutting, and heating at, and 1926.55—Gases, vapors, fumes, dusts, and mists).

Another commenter noted that the shipyard employment standard at 29 CFR part 1915 includes confined spaces requirements and was unsure whether this new construction standard will apply to confined space construction work performed in a shipyard (ID–028, p. 1). It will. OSHA focuses on the type of work activity, not necessarily the location of the work activity, in determining whether this confined spaces in construction standard or the shipyard employment standard, part 1915, applies. See, *e.g.*, Feb. 9, 2004, letter to Jack Swarthout.[2] The shipyard employment standards apply to ship repairing, shipbuilding, ship breaking, and related employment. This confined spaces in construction standard covers confined space work in shipyards to the extent that it is construction work and is not ship repairing, shipbuilding, ship breaking, or related employment. An example in which this confined spaces in construction standard applies is the construction of a building on the grounds of a shipyard. Non-construction work performed in a shipyard is not subject to this final rule; either 1910.146 or the shipyard employment standard at 29 CFR part 1915, subpart B—Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment would cover such work.

Paragraph (b) Exceptions. This paragraph explicitly excludes construction work regulated by 29 CFR part 1926, subpart Y—Diving, construction work regulated by 29 CFR part 1926, subpart P—Excavation, and construction work regulated by 29 CFR part 1926, subpart S—Underground Construction, Caissons, Cofferdams and Compressed Air from the scope of this final rule. Accordingly, this provision exempts employers operating under one of the three listed exemptions from complying with this final rule for work within a confined space, so long as that work falls within the scope of one of the listed subparts.

The Agency exempted each type of work covered by the listed subparts from the requirements of this standard because OSHA specifically tailored the existing requirements in these subparts to protect employees from the hazards associated with confined spaces. In addition, OSHA believes that overlapping standards covering these activities could be unnecessarily burdensome to employers, or cause some confusion about the appropriate procedures to use.

Under § 1926.1201(b)(3), this confined spaces standard does not apply to construction activities covered by 29 CFR part 1926, subpart Y, which encompasses diving and related support operations conducted in connection with all types of work and employments, including construction (29 CFR 1926.701, referencing 29 CFR 1910.401). As defined in subpart Y, a "diver" is an employee working in water using underwater apparatus which supplies compressed breathing gas at the ambient pressure (§ 1926.701, referencing § 1910.402). The Agency notes that, if a diver engages in construction activity in an area that meets the definition of a confined space under this final rule, and is not working in water or removes his/her underwater breathing apparatus, then, in most cases, the activity is outside the scope of subpart Y because the employee is no longer a "diver"; in such a case, the requirements of this confined spaces standard apply instead.

The other exemptions set forth in final § 1926.1201(b) are identical to the proposed exemptions except that OSHA removed the "non-sewer" limitation for the exemption that applies to 29 CFR part 1926, subpart P—Excavations and 29 CFR part 1926, subpart S—Underground Construction. Under § 1926.1201(b)(1) and (b)(2), OSHA exempted construction activities covered by subparts P and S. In its explanation in the proposed rule, the Agency noted that subparts P and S generally provide adequate protections against hazards in excavations and underground work (72 FR 67356 (Nov. 28, 2007)). In light of the additional hazards associated with sewers as continuous systems that often have hazardous atmospheres and engulfment hazards, the Agency proposed limiting the Excavations, and Underground Construction exemptions to "non-sewer" work, which would have the effect of applying this final standard, in addition to subpart P or subpart S, whenever an employer performed excavation or trenching construction work related to a sewer system. One commenter urged OSHA to limit the exemption further, characterizing subpart P as "insufficient for addressing potential worker exposures to hazardous atmospheres," and asserting that this final rule should apply to excavations where a hazardous atmosphere exists because the confined spaces standard would provide more comprehensive protection for employees than the excavation standard (ID–105, p. 5). The commenter did not, however, provide any basis for this assessment. Two commenters emphasized the significance of the hazards posed by excavation, and urged OSHA to protect employees from those hazards; however, they did not discuss subpart P—Excavations and did not provide a clear rationale for why those standards do not provide adequate protection for employees working in excavations (ID–032, p. 4; –034, p. 1).

A different commenter asserted that OSHA should apply the confined spaces standard to hazards in excavation work not covered by the excavation requirements (ID–025, p. 2). In other words, OSHA should exempt excavation work unless there is a hazard present not addressed by subpart P—Excavations, but addressed by this confined spaces standard, in which case the confined-space requirements applicable to addressing that specific hazard would apply. The commenter did not provide an example of a hazard that could be present in excavations but not addressed by subpart P. Also, OSHA believes that the approach advocated by the commenter would lead to confusion, and may not promote safety. OSHA designed the confined spaces standard to work as a comprehensive system, not through piecemeal application. Therefore, OSHA concludes that it is

[2] All of the letters and memoranda included in this preamble are available at *www.osha.gov*.

not appropriate to limit the exemption as requested by the commenter.

Another commenter asserted that the excavation standards in subpart P do not provide protection against hazards associated with applying waterproofing products on building foundations below grade level (ID–106). OSHA disagrees with this commenter. Even assuming that the particular waterproofing product used would constitute an atmospheric hazard, 29 CFR 1926.651(g) requires an employer to test for atmospheric hazards and to take adequate precautions to protect employees accordingly.

Most of the commenters who addressed the issue of the potential overlap between this final standard and the excavation and underground construction requirements in subparts P and S, respectively, requested that OSHA expand the exemption to exclude all work subject to those standards from the scope of the final rule, regardless of whether the excavation or underground work connects to a sewer, because other OSHA standards, primarily subpart P, adequately cover such work (ID–060, p. 1; –108, p. 2; –117, p. 6; –124, p. 3; –140, p. 6; –143, p. 1). One of these commenters noted that subpart P's requirements "include testing the trench/excavation(s) before workers enter them when a hazardous atmosphere exists or could reasonably be expected to exist (*e.g.* excavations near landfills or in areas where hazardous substances may be stored) and providing proper respiratory protection or ventilation to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions," and also include appropriate rescue provisions (ID–117, pp. 6 and 7). Furthermore, several of the commenters asserted that applying both this final rule and the excavation standards to work inside all excavations would result in a confusing and disjointed regulatory scheme that could reduce employee safety (ID–060, p. 1; –108, p. 2; –117, p. 6; –140, p. 6). OSHA agrees with these comments and, therefore, the Agency excluded all excavation work from the scope of the final rule (see § 1926.1201(b)(1)).

Although the exemption in the final rule may be broader than the proposed exemption because the final rule does not cover underground sewer work and sewer excavation work, the expanded exemption is still consistent with OSHA's intent in the proposed rule. In proposing to apply the confined spaces standard to all sewer work, the Agency emphasized the extraordinary dangers associated with sewer systems, including the difficulties in isolating hazards in a contiguous system, and the extremely hazardous atmospheres that can develop in sewers and quickly cause fatalities. These dangers, however, primarily involve *existing* sewer structures, rather than construction of new sewer systems; new systems would not necessarily present such hazards until connected to an existing sewer system. Under this final rule, the limitations on the scope of subparts P and S will ensure that the confined-space requirements apply to most construction work *within existing* sewer structures, as explained in the following discussion of the interaction between this confined spaces standard and subparts P and S. In the context of sewer work, the principal hazards associated with the *excavation* work around the sewer lines are likely to be atmospheric hazards that arise from the soil surrounding an existing sewer pipe (from leaching or other sources), as well as potential hazards associated with the release of hazardous substances from the sewer pipe. These hazards are similar to the hazards encountered during excavation and underground work near landfills and water mains that OSHA exempted from coverage in the proposed rule because OSHA regarded the protections of subparts P and S as sufficient (see 72 FR 67356).

OSHA considered the common scenario in which an employer digs down to an existing sewer line, then excavates a new trench in which it lays new sewer pipe and connects it to an existing sewer line. During the "tie in" process of connecting the new sewer pipe to the existing sewer line, employees could potentially be exposed to atmospheric hazards and physical hazards emanating from the existing sewer line. While any entry into the existing sewer line, including placing any part of the body inside existing line (see definition of "entry" in § 1926.1202), would be governed by the confined spaces standard, OSHA does not believe that hazards from the existing sewer line should subject the entire excavation project to the confined spaces standard. Employers already have a duty under subpart P to address the atmospheric and physical hazards in the excavation, and employers must anticipate and address the hazards that might come from the existing sewer line. Employers must use extreme caution in unsealing the existing sewer line. Before opening the existing line, employers must, whenever possible, isolate the existing line to be opened from the rest of the sewer and ensure that employees are removed from the excavation.

Based on the record, OSHA concludes that subparts P and S are also sufficient to address the hazards associated with excavation work around sewers and the construction of new sewers, while the confined spaces standard will address the work inside the sewer pipes where the atmospheric and physical hazards are greatest.

Clarification of the Scope of Subparts P and S

OSHA does not intend for this final standard to overlap with 29 CFR part 1926, subpart P or 29 CFR part 1926, subpart S. Each of these standards contains specific provisions addressing many of the same hazards that could arise in the same space. The Agency is, therefore, taking this opportunity to clarify the scope of subparts P and S relative to the scope of this final confined spaces standard, thereby simplifying the regulatory scheme for employers working in these spaces.

Subpart P applies to "all open excavations made in the earth's surface," including trenches (§ 1926.650(a)). For example, the work of digging trenches, shoring up the trenches, and placing a sewer pipe or other materials into the trenches are subject to subpart P. When an employer is excavating a trench to install a new storm drain, subpart P applies to all excavation and trenching activities. The final confined spaces standard applies, however, to non-excavation work within a confined space located in an excavation, as this work would expose employees to additional hazards besides excavation-related hazards. For example, this final standard covers entry into a prefabricated storm drain, other pipe, or manhole even if located at the bottom of an open excavation.

Subpart S applies to the construction of underground tunnels, shafts, chambers, and passageways and cut-and-cover excavations which are both physically connected to ongoing underground construction operations within the scope of the subpart, and covered in such a manner as to create conditions characteristic of underground construction (§ 1926.800(a)(1)). For subpart S to apply, "the tunnel or other underground structure must be under 'construction.'" See October 1, 2010, letter #20061017–7300. For example, the construction of an underground structure by boring a tunnel through soil and providing the concrete or metal supports necessary to preserve the opening is subject to subpart S, as are structural modifications such as upgrading a

tunnel wall to construct a new structure following a collapse.[3] OSHA developed subpart S to protect employees from the hazards associated with the construction of underground structures, and OSHA concludes that the subpart S standard provides more appropriate protections in these situations than this final confined spaces standard.

In the context of underground work, this final standard applies mainly to construction activities inside an existing underground confined space, as opposed to the initial construction of that underground space.[4] Examples of activities covered by this confined spaces standard include: installing a structure within an existing tunnel, working inside a large pipe or vault located within an existing sewer tunnel, laying a new cable inside an existing sewer tunnel, upgrading a grate in an existing sewer system, installing a new lining in a sewer pipe, adding tile or grout or other sealant to an existing concrete tunnel, or attaching equipment to the walls of an existing tunnel.[5] OSHA recognizes that, in large underground construction projects, the distinction between an existing portion of a tunnel and the construction of a new tunnel might not be clear when the same employees are working to construct a tunnel, or employees add equipment or structures to tunnel walls at the same time they are digging the tunnel. To avoid requirements that could potentially cause confusion and extra burdens by forcing employers to switch back and forth between different standards during the same general tunnel-construction project, OSHA will treat non-structural work performed in conjunction with initial construction of an underground space as covered by subpart S. For example, if employees install a cable as part of the initial sewer tunnel-construction project, subpart S would cover both the employees engaged in tunnel construction and those engaged in cable installation. Otherwise, the result would be different employees working on the same construction project in the same space, but under different standards with significantly different requirements.

One commenter representing homebuilders asserted that house foundations and basement excavations become "trenches" when contractors construct formwork, foundations, or walls, and, therefore, subpart P, rather than the final confined spaces standard, should cover these work areas (ID–117, pp. 6 and 7). According to the commenter, OSHA should not consider this type of work area a confined space because it is subject to natural ventilation. Whether a work area is subject to natural ventilation is not dispositive in determining whether the area meets the definition of a confined space in final § 1926.1202. However, if the work is "excavation" work or "trench" work under subpart P, then this final rule would not apply. OSHA agrees that subpart P, and not this confined spaces standard, would apply to the construction of most house foundations in an excavated area until the contractor backfills the area adjacent to the foundation or otherwise covers the foundation or the other areas. However, depending on the particular circumstances at the worksite, once the backfill or other covering occurs, the area inside the foundation space could be a confined space subject to this final rule if it meets all of the criteria in the definition of a confined space in § 1926.1201.

Other Requests for Exemptions

1. Home Construction

One commenter requested that OSHA exempt the following areas from coverage under this standard: attics, crawl spaces, basements, cabinets, and "similar areas in home building" (ID–117, pp. 6 and 7). The commenter's rationale for these exemptions was that these spaces "do not contain hazardous atmospheres or engulfment hazards" (*id*). The commenter did not provide any basis for the assertion that these areas are inherently free of the identified hazards, and OSHA does not agree that these spaces are always inherently free from such hazards. Hazardous gases or other substances may occur in almost any confined space. For example, one employee may store or apply an epoxy or other chemical in a crawl space, which could expose that employee or a subsequent entrant to a hazardous atmosphere. A different commenter noted that surface coatings such as paints and epoxies are seemingly stable, and, while generally undetectable through air monitoring once applied and dried, could result in significant safety and health hazards to employees who are welding or involved in other hot work in a confined space (ID–213.1, pp. 6 and 7).

Moreover, hazardous atmospheres and engulfment hazards are only two types of hazards that could cause death or serious injury to employees in a confined space. The commenter requesting the exemption did not provide any indication that the spaces would be free of physical hazards that could trap, kill, or seriously injure the employees. In fact, the final economic analysis for this rule cites several fatalities that resulted from exposure to physical hazards (generally electrical) in crawlspaces under homes. Therefore, a categorical exemption for these types of spaces is inappropriate, and would be inconsistent with the purpose of the standard.

However, while a categorical exemption is not appropriate, OSHA anticipates that, in new construction, employers may be able to organize work practices to avoid placing workers in areas that meet the definition of a confined space (for example, complete work in what will eventually become a crawl space before constructing the overhead portion of the crawl space, apply insulation to an attic floor before the underlying ceiling below it is installed, complete basement work before the overhead structure is installed or after stairways are in place). Furthermore, if the commenter is correct that the majority of the spaces it identified do not contain a hazardous atmosphere or other hazards, then the employer would have only a limited duty under this standard because a permit program would not be necessary if the spaces do not contain such hazards. Accordingly, employers would only need to identify the spaces and ensure that the confined spaces remain free of hazards.

2. 29 CFR Part 1926, Subpart V Work

Commenters representing the electric utilities asserted that OSHA should not

[3] OSHA previously determined that the underground construction requirements in subpart S also apply to tunnels placed underwater. See August 8, 2002, memorandum to K. Frank Gravitt. This new confined spaces standard does not affect that previous determination. However, this confined spaces standard does cover construction work that occurs inside an underwater tunnel following the initial construction of that tunnel.

[4] Note that the distinctions discussed here are solely for the purposes of determining which construction standard applies. This discussion does not impact OSHA's analysis of whether an activity constitutes construction work as opposed to maintenance work.

[5] OSHA notes that in a 1991 memorandum the Agency applied subpart S to the "rehabilitation" of a sewer tunnel originally completed in 1932. January 21, 1991, memorandum to Michael Connors. OSHA issued the memorandum before it issued either this standard or the general industry standard for confined spaces, and, thus, before it had reason to consider potential overlap between a confined spaces standard and other construction standards, or could point to any other employee protections. Depending on the extent of the "rehabilitation" and the activities involved, the new confined spaces standard may apply instead to such projects in the future. For example, subpart S would cover the "rehabilitation" of an existing tunnel that involves expansion of the existing sewer or an improvement of a collapsed wall. However, this final confined spaces standard would cover "rehabilitation" that consists of adding sealant to the existing tunnel structure, or attaching equipment or new materials to the tunnel walls. To the extent that the 1991 memorandum requires a different result, this final standard supersedes it.

require employers engaged in 29 CFR part 1926, subpart V work to follow two different confined spaces standards (ID–112, pp. 3 and 4; –134, p. 2; –210, Tr. pp. 106–108, 142). These commenters stated that general industry electric-utility work practices are similar to construction electric-utility work practices. OSHA addresses the commenters' preference to have identical confined-space provisions applicable to both general industry and construction earlier in this preamble where the Agency explains why it chose to adopt a modified version of the general industry standard as the confined spaces in construction final rule. As discussed there, OSHA will also treat compliance with this new rule as compliance with the general industry confined spaces rule when one or more employers are engaged in both general industry work and construction work at the same time in the same space.

To the extent that the commenters were requesting that OSHA exempt all subpart V work from all of the new confined-space requirements in final subpart AA, OSHA declines to do so. First, the general industry standard includes no such broad exemption, and the record does not indicate why electric-utility industry work in confined spaces is less hazardous or otherwise less suitable for coverage by a confined spaces standard than the work of any other industry. The general industry electric power generation, transmission, and distribution rule, § 1910.269, does not exempt that industry from the general industry confined-space requirements at § 1910.146: to the contrary, the "enclosed spaces" provision in § 1910.269(e) expressly requires employers to comply with the requirements in § 1910.146 when the enclosed-space entry will not be routine in nature or the space contains a hazardous atmosphere that cannot be controlled through the steps specified in § 1910.269(e).

As explained earlier in this preamble, OSHA anticipated in its recent amendments to the corresponding construction rule, 29 CFR part 1926, subpart V—Electric Power Generation, Transmission, and Distribution; Electrical Protective Equipment, that the confined spaces in construction standard would provide the parallel integral protections to employers engaged in construction work that involves conducting non-routine entries into enclosed spaces, or where the enclosed spaces contain hazards that are not controlled by the enclosed spaces requirement (see § 1926.953(a) and its explanation at 79 FR 20375–20376).). OSHA explained that the enclosed spaces provisions in § 1926.953(a) are only intended to address routine entries with a limited type of hazard, while the general industry confined spaces standard (which the Agency noted it intended replace with the construction version in this final rule) applies to all other entries into enclosed spaces. The confined space standard "ensures that employees working in enclosed spaces will be afforded protection in circumstances in which the Subpart V provisions are insufficiently protective" (79 FR 20376). If OSHA exempts employers engaged in subpart V work from the confined spaces standard, it would be creating a regulatory gap that is not present in the general industry context.

The commenter asserted that electric utility work in "power generation facilities and other electric utility installations" is sufficiently similar that OSHA has previously acknowledged it should be regulated in the same manner, regardless of whether the employer is engaged in construction or general industry activity (ID–112.1, p. 4–5). To the extent that this commenter is requesting greater consistency between the construction rule and the general industry rule, OSHA has provided that in this final rule. To the extent that this commenter is requesting an exemption from the construction standard so that it could comply instead with the general industry standard, OSHA disagrees because such an approach would result in a regulatory gap. Section 1910.146 is a general industry standard that, by its own terms, could not apply to construction activities beyond the scope of the previous § 1926.953 incorporation, but that incorporation of § 1910.146 was limited: it only applied to routine entries into enclosed spaces. Not all enclosed spaces are permit-required confined spaces and not all entries are routine. Further, while in general industry, "routine" entries for maintenance work covers a relatively broad range of activities, in the context of construction work a "routine" entry would be much narrower. In practice, a complete exemption from the new construction rule for confined spaces would leave many subpart V workers completely unprotected from the hazards in many confined spaces.

Paragraph (c)—Other Standards. This final rule replaces the confined spaces training requirement previously specified in § 1926.21(b), but does not replace any other construction standards. Rather, OSHA developed this final rule to work in conjunction with other construction standards to provide additional protections needed to address hazards that may arise when employees are working in or near a confined space. No requirement in this confined spaces final rule supplants or diminishes employer duties imposed by any other OSHA standard, and the Agency included § 1926.1201(c) in this final standard to emphasize that point. When both the scope of final § 1926.1201 and the provisions in another OSHA construction standard related to confined-space hazards cover an activity, OSHA requires employers to comply with both provisions (§ 1926.1201(c)). For example, while 29 CFR part 1926, subpart D—Occupational Health and Environmental Controls contains requirements for ventilation when working in potentially hazardous atmospheric conditions, it does not address other equipment or workplace conditions covered by this final rule. Therefore, where a potential hazardous atmosphere exists and this final confined spaces rule requires ventilation to control that hazard, the employer must ventilate in accordance with § 1926.57. However, the remaining provisions of this confined spaces rule will still apply: for example, if the situation requires rescue, the employer must provide rescue in accordance with this final rule.

In the preamble to the proposal, OSHA also discussed the overlap of the confined-spaces standard with its construction welding standard in subpart J of 29 CFR part 1926. The Agency explained that both standards would apply, noting for example that subpart J sets criteria for the use of a lifeline system in the confined space, but does not set criteria for the use of rescue services or provide the same level of procedures and controls for permit-required confined spaces (72 FR 67356 (Nov. 28, 2007)). OSHA designed the welding standard to protect employees solely from the hazards of welding, which include metal fume, gases, and smoke hazards associated with the welding process, physical hazards from the welding device or contact with the hot welding surface, potential explosion of the gas tanks, and hazards from working with specific materials. The confined-spaces standard, however, addresses a wider range of hazards than the welding standard, and OSHA considers the confined-spaces standard more detailed and comprehensive than the welding standard in its protection of employees from those other hazards for purposes of 29 CFR 1910.5(c).[6] Although the

[6] The OSHA regulation addressing the overlap of different standards is in 29 CFR 1910.5. Paragraph

Continued

welding standard has a section designed to address the hazards of welding in a confined space, the Agency is applying the provisions of the confined-spaces standard to all other hazards associated with confined-spaces work to the extent these provisions of the confined-spaces standard do not conflict with employee protections in subpart J. Therefore, as OSHA explained in the proposal, the rescue service and entry procedures must meet the requirements of this confined-spaces standard, while the employer must use a lifeline system as required to meet the criteria in subpart J. Specifically, employers must comply with the requirements of § 1926.1203(c) to prevent unauthorized entry, and the subpart AA requirements to implement a permit program (including posting a permit) to provide for entry in accordance with §§ 1926.1203(d), 1926.1204, 1926.1205, and 1926.1206. Employers must comply with the ventilation requirements in § 1926.353(a) of subpart J to address atmospheric hazards produced by welding fumes, but employers also must comply with § 1926.1204(c), which requires ventilation as necessary to control any atmospheric hazards beyond those generated by welding because the welding standard does not address those hazards. Employers also must comply with the identification, assessment, and information-exchange and coordination requirements in § 1926.1203(a), (b), and (h), and the relevant training required by § 1926.1207. Employers must develop a rescue plan in accordance with § 1926.353(b)(3) of subpart J, but also must assess and select a rescue service in accordance with §§ 1926.1204(i) and 1926.1211(a) and (c), and equip and train its in-house rescue services pursuant to § 1926.1211(a) and (b). Finally, employers must comply with additional confined-spaces requirements not addressed in the welding standard, such as the requirement to make Safety Data Sheets available to the medical facility treating any entrant exposed to hazardous substance (§ 1926.1211(d)), and the employee-participation requirements in § 1926.1212.

Subpart D—Occupational Health and Environmental Controls, at § 1926.64(f)(4) and (j), discussed above, and in subpart V—Power Distribution and Transmission, at § 1926.950(a), provide other examples of potential overlap with existing standards. In general, the final confined-spaces standard applies to hazards not addressed by subpart V. Subpart V generally protects employees from electrical hazards but does not necessarily address a hazardous atmosphere or other physical hazards in the confined space; the requirements of the confined-spaces standard address those hazards, and employers must comply with these requirements during confined-spaces operations. For example, in § 1926.953 of subpart V OSHA specifically addresses the overlap between the "enclosed spaces" requirements of subpart V and the confined spaces standard, mandating compliance with the confined-spaces requirements when hazards remain even after an employer has complied with all of the measures described in subpart V.

Language in proposed § 1926.1202(d) not included—Statement on other duties of controlling contractors. Proposed § 1926.1202(d) contained a statement that the information-sharing requirements in the rule do not limit a controlling contractor's responsibilities under any other provisions of the rule or the OSH Act, including those responsibilities described in OSHA Directive CPL 02–00–124: Multi-Employer Citation Policy (Dec. 10, 1999). The proposed rule text listed several specific examples of controlling contractor duties.

OSHA is not including that statement or any equivalent statement in the final rule for several reasons. First, such a statement is unnecessary because it is only a reminder that OSHA has a wide variety of health and safety standards that could apply to various activities of controlling contractors and host employers, depending on their activities and responsibilities. OSHA does not typically include such a reminder in the regulatory text of its standards. For example, OSHA does not include a similar statement in the general industry confined spaces standard even though that standard includes specific duties for host employers, and the host employers could also have additional duties under other standards or if they qualify as controlling employers or exposing employers under OSHA's multi-employer citation policy.

Second, OSHA is concerned that the regulated community will view the inclusion of such a statement in this standard as implying that standards without the same statement preempt other potentially applicable standards or policies. OSHA did not intend such an implication, and it does not have the time or resources to revise all of its standards to include this statement.

Third, several commenters found fault with the statement in the proposed rule. One commenter noted the statement was incomplete because it addressed controlling contractors, not host employers (ID–117, p. 19). Another commenter implied that the statement would not be helpful unless it listed all of the other potential duties to which controlling contractors could be subject (ID–211, Tr. p. 76).

1926.1202—Definitions

Final rule § 1926.1202 provides definitions for key words used to describe the requirements of this final rule. OSHA adopted most of the definitions from its general industry confined spaces standard (29 CFR 1910.146); most definitions also are generally consistent with the voluntary consensus standard on confined spaces, ANSI Z117.1–2003. Unless otherwise noted, these definitions are applicable only to this confined spaces in construction standard; OSHA added an introductory statement to that effect in § 1926.1202 of the final rule. OSHA took many of the definitions of the terms used in final rule § 1926.1202 from other OSHA construction standards; the Agency included these definitions in this final rule to minimize the need to reference those other standards.

Several commenters objected that some of the definitions of terms used in the proposed confined spaces in construction standard were different than the definitions for identical terms in the general industry confined spaces standard at § 1910.146(b) (ID–086, p. 3; –112, p. 7; –147, pp. 2–3). For the reasons set forth in section II.B (History) of this preamble, in the final rule OSHA revised many of these definitions so that the terms are consistent with the general industry terms defined at § 1910.146(b): *entry, entry supervisor, hazardous atmosphere, immediately dangerous to life and health, permit-required confined space, rescue service, retrieval system,* and *testing.*

In addition, OSHA included some terms in the Definitions section of this final rule not defined in the proposed rule, but defined in the general industry confined spaces standard at

(c)(1) of that regulation states that if a particular standard is specifically applicable to a condition, practice, means, method, operation, or process, it shall prevail over any different general standard which might otherwise be applicable to the same condition, practice, means, method, operation, or process. Paragraph (c)(2), however, provides that any standard shall apply according to its terms even though particular standards are also prescribed for the industry to the extent that none of such particular standards applies. The Agency interprets this regulation in this context to mean that the welding standard is the more specific standard addressing welding hazards and, therefore, applies to welding activities even when conducted in confined spaces; however, several provisions of the confined-spaces standard apply to confined-space hazards not addressed by the welding standard (see examples later in this paragraph), and employers must comply with these provisions when their employees are exposed to these hazards during confined-space operations.

§ 1910.146(b), including: *acceptable entry conditions, hot work, inerting, line-breaking, non-permit confined space,* and *prohibited condition.* Again, for the reasons explained in preamble section II.B (History), OSHA made definitions of these terms in this final rule consistent with § 1910.146(b). In general, OSHA defined the terms identically to the general industry standard or revised the definition slightly to make grammatical improvements or to clarify the meaning of the term. When OSHA deviated substantively in the final definition from the term as defined in § 1910.146(b), the Agency explains its reasons for doing so in the individual preamble paragraph addressing that definition.

One commenter urged OSHA to define certain terms exactly as ANSI Z–117.1–.2003 defines the terms (ID–086, p. 3). The Agency does not agree that such an approach is appropriate. The commenter did not explain why the definitions as proposed were inappropriate, how the change would improve safety, or why the consensus standard was preferable to the longstanding definitions in the general industry standard that most commenters supported. OSHA selected the definitions in this final rule specifically for the activities and equipment covered by this final rule and, to the extent possible, to be consistent with the definitions in § 1910.146(b) so as to reduce confusion among the regulated community and facilitate compliance. In many cases, the ANSI standards were not as clear or comprehensive as the final language, and therefore less preferable for a mandatory and legally enforceable standard.

Some commenters also noted that OSHA proposed definitions for many terms not defined in § 1910.146(b) (ID–112, p. 9; –147, pp. 2–3). These commenters did not, however, specifically object to these definitions, identify errors, suggest improvements, or otherwise give a reason why OSHA should not include these definitions in the final rule. In this regard, the final standard uses some terms, such as *early warning system* and *controlling contractor,* not used in the general industry confined spaces standard. The general industry confined spaces standard uses other terms not defined in § 1910.146(b). In general, for definitions in either of these categories, OSHA made the definition in this final rule identical to the definition in the proposed rule. When the Agency includes in the final rule a definition that does not have a parallel definition in the general industry standard, and when the Agency revises a definition from the proposed definition, it explains the reasons for its decision below in the discussion accompanying that definition.

OSHA also decided not to include several of the proposed definitions, such as definitions of *contractor, controlled atmosphere confined space,* and *isolated hazard confined space* in this final rule because OSHA did not use these terms in this final rule. In addition, the final rule does not include a definition of "protect" or "protection" because the Agency believes these terms, as used in this final rule, are sufficiently clear from their ordinary use. The general industry standard uses these terms without definition. In addition, the general industry standard does not include a definition of "control," but OSHA is including a definition of this term in this final rule to clarify that ventilation and other atmospheric controls provide some level of worker protection, even if such measure are not fully protective.

OSHA believes that the construction industry readily understands most of the defined terms in the final rule because these terms are self-explanatory or are consistent with the definitions used in § 1910.146 and ANSI 117.1–2003. Nevertheless, OSHA includes an expanded discussion for several of the defined terms, and, when necessary, explains differences between the definition in the final rule and the definitions contained in either the proposed rule or § 1910.146(b). The Agency also addresses comments on terminology received during the SBREFA process and the public comment period, including comments made through testimony during the public hearing.

1. Defined Terms

Acceptable entry conditions means the conditions that must exist in a permit space, before an employee may enter that space, to ensure that employees can safely enter into, and safely work within, the space. The definition differs slightly from the definition of the term in § 1910.146(b). OSHA added "before an employee may enter that space" to clarify that employers are to measure and determine "acceptable entry conditions" before entry. Once entry occurs, the employer must continue to monitor the permit space and terminate the entry if a prohibited condition (*i.e.,* a condition that is not an "acceptable entry condition") arises. (See the discussion of final § 1926.1204(c)(1) for an explanation of how an employer must consider the work it will perform inside a confined space when identifying "acceptable entry conditions.") In the NPRM, OSHA defined "planned condition" in a similar manner. In the final rule, OSHA uses and defines the term in the same manner as the general industry standard to provide consistency between the two standards.

Attendant means an individual stationed outside one or more permit spaces who assesses the status of authorized entrants and who must perform the duties specified in § 1926.1209—Duties of Attendants. The general industry definition of "attendant" refers to an attendant who performs "all attendant duties assigned. . ..." In the final construction rule, the attendant's duties are specified in § 1926.1209—Duties of Attendants. OSHA refers to an attendant's responsibility to "assess," rather than "monitor" as in the general industry standard, because "monitor" is a term of art in the new standard (but not under the general industry standard). However, there is no substantive difference from the definition in the general industry standard.

Authorized entrant means an employee who is authorized by the entry supervisor to enter a permit space. The general industry rule defines "authorized entrant" based on who the *employer* authorizes to enter the permit space. OSHA shifted the focus to who the *entry supervisor* authorizes to enter the space to avoid confusion about who the authorizing employer is on a multi-employer worksite. This revision clarifies that an entry supervisor has the duty to identify the authorized entrants on the entry permit, regardless of whether or not they are employees of another employer.

Barrier means a physical obstruction that blocks or limits access. One commenter suggested that OSHA place a note under the definition of "barrier" explaining that a barrier does not block or limit egress (ID–025, p. 2). This revision is unnecessary because there are provisions in the final rule that require employers to provide unobstructed egress when employees are inside a confined space. For example, final rule § 1926.1204(d)(7) requires an employer to provide equipment needed for safe egress from a Permit-Required Confined Space ("PRCS" or "permit space"), and final rule § 1926.1208(e) requires the authorized entrant to exit a PRCS as quickly as possible under certain circumstances. Therefore, an employer would be in violation of this final rule when a barrier that prohibits or limits persons from entering a PRCS from outside the space also prohibits or limits

egress for authorized entrants seeking to exit the permit space, even though the definition of "barrier" does not address egress explicitly. Locking a bolt on a door that is the only means of egress from a permit space, for example, could constitute a prohibited barrier that would interfere with egress from the permit space.

Blanking or blinding means the absolute closure of a pipe, line, or duct by fastening a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore, and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate. OSHA took this definition directly from § 1910.146, and uses this term the same way in this final rule as in the general industry standard.

Competent person means a person capable of identifying existing and predictable hazardous conditions, and who has the authority to address them promptly. Section 1926.1203 of the proposed rule did not use or define "competent person," but required the employer to identify and assess confined spaces. Several commenters suggested that OSHA clarify that a competent person make these determinations, and to include in the final rule the same definition for "competent person" as the one contained in other OSHA construction standards (ID–025, p. 2; –028, p. 4; –095, p. 2; –124, p. 7; –150, p. 3). OSHA agrees with these commenters and, therefore, added its customary definition to the final rule. OSHA uses this well-known definition in several of its construction standards. See, *e.g.*, §§ 1926.32(f), 1926.450(b), 1926.650(b), 1926.751, and 1926.1401; see also the discussion of final § 1926.1203(a) for a further explanation of why OSHA included a competent person requirement in this final rule.

Confined space means a space that: (1) Is large enough and so configured that an employee can bodily enter it; (2) has limited or restricted means for entry and exit; and (3) is not designed for continuous employee occupancy. OSHA based the definition of "confined space" on the definition of "confined space" in the general industry confined spaces standard at § 1910.146(b). It describes a space where three elements exist. First, the configuration of the space is such that a person can enter into it with his/her entire body (although the "entry" occurs as soon as any part of the body crosses into the confined space).[7] Second, there is limited or restricted entry or exit from the space. Third, the space is not designed for continuous employee occupancy.

OSHA is not including in the definition of "confined space" in the final rule the requirement that employees be able to "perform assigned work," which it included in the general industry definition in § 1910.146(b). OSHA did not include this phrase in this final standard because it was superfluous, and to avoid arguments that it added ambiguity. Some in the regulated community might attempt to interpret the phrase incorrectly to suggest that this final standard, and the majority of the protections provided by the standard, would not apply if the entrant did not have an assignment to perform on entering the space, or if the employee was unable to perform work inside the space. Therefore, this final rule addresses confined spaces in terms of the hazards present, rather than the purpose for entering the space. By removing the unnecessary language from the proposed definition of "confined space," OSHA makes it clear that this final standard covers any entry into a confined space. This does not imply that "performed assigned work" has a substantive meaning in the general industry standard; OSHA is simply taking the opportunity to improve the language of the definition as it proposed. OSHA did not include the "perform assigned work" language in the proposed definition of "confined space" adopted in this final rule, and received no comment on the absence of that language.

The final definition also includes an additional change from the general industry standard. The definition of "confined space" in § 1910.146(b) contains examples of different types of confined spaces in a parenthetical to the second part of the definition. OSHA did not include this parenthetical in this final rule to avoid confusing these examples with a note to § 1926.1201(a) that provides a more comprehensive, but not exclusive, list of examples of confined spaces.

One commenter asserted that the proposed definition of a confined space is too broad because it includes attics, crawlspaces, cabinets, unfinished basements, swimming pools, window wells or utility closets that contain water heaters in single-family residential homes, but those spaces "do not present the kind of risk the standard is intended to address." (ID–117, p. 5). Although some of these spaces could meet the definition of a confined space, the Agency does not agree that this definition is too broad. As noted earlier when OSHA rejected the same commenter's request for a complete exemption from the standard, the commenter provides no support for the assertion that these spaces do not present the kind of risks this standard is addressed and the crawl-space fatalities included in the final economic analysis clearly demonstrate that these spaces are not inherently safe. OSHA defined the term broadly to ensure that employers perform the requisite evaluation to determine whether a known or potential hazard exists in those spaces. The majority of the requirements of this final rule would apply only if a known or potential hazard is found to exist in the confined space, but the initial assessment required by this standard is crucial to discovering whether such hazards are present. Therefore, an employer performing construction work inside attics or any of the other spaces noted by this commenter must comply with only the reevaluation provisions in this final rule when no atmospheric or physical hazard exists in a confined space. If an employer does not wish to conduct an evaluation, then the employer can either prevent its employees from entering the space or design the construction process to avoid the need for entry into a confined space.

One commenter expressed confusion as to the meaning of the third element of the confined space definition: "not designed for continuous employee occupancy" (ID–119, p. 5). The third element captures all spaces where conditions are such that employees would normally exit the space relatively soon after entering, absent the construction activity. When determining whether a space is designed for continuous occupancy, it is appropriate to focus on the design of the space and whether that space is still configured as designed. See October 22, 1993, letter to Robert Bee; December 20, 1994, letter to Edward Donoghue; June 22, 1995, letter to Dan Freeman (noting difference between the "primary function" and "design" of a confined space). For example, if a space that meets the definition of a confined space has a powered ventilation system that allows for continuous occupancy, but that system is not functional or the construction activity would interfere with the proper function of that system, then the space would be a confined space subject to this final standard. See

[7] See March 5, 2008, letter to Andrew Lewis (no confined space where it is impossible for employee to fit his entire body into the space); October 18, 1995, letter to Charles M. Bessey (entry occurs when any part of the body breaks the plane of the opening of a space large enough to allow full entry, regardless of intent to fully enter).

October 27, 1995, letter to William Taylor.

The same commenter also asked for additional examples of confined spaces (ID–119, p. 5). The note in final rule § 1926.1201(a) provides examples of locations where confined spaces may occur. In addition, OSHA notes that numerous letters of interpretation are available providing additional guidance as to the meaning of a "confined space" in the context of the general industry standard. OSHA is adopting into its construction rule the guidance regarding the definition of a confined space provided by the letters of interpretation referenced in the previous paragraph. In addition, the following letters apply with respect to the definition of a confined space in this final standard as they did to the general industry standard: September 19, 1994, letter to Edward Donoghue Associates, Inc. (elevator pit can be a confined space); June 15, 1992, letter to George Kennedy (storm sewer manhole entrance can be a confined space); July 11, 1995, letter to Alan Sefton (entry by a robot does not trigger the standard); October 23, 1995, letter to Mark Arriens (roll off container, dump truck bed, and truck trailer can be confined spaces); October 27, 1995, letter to James Sharpe (entry limited if employee must bend down to avoid striking the top of an opening or step over a raised threshold); February 8, 1996, letter to Remi Morrissette (personnel airlock can be a confined space when both sets of doors cannot open at the same time); April 24, 1998, letter to Gregory Faeth (30-inch deep chest-type freezer not a confined space when person can simply stand up to get out); December 2, 2002, letter to Art Varga (dock leveler pit can be a confined space); March 8, 2005, letter to Ron Sands (box van of truck is not a confined space as normally used and configured). The Agency notes, however, that any guidance previously provided with respect to its previous confined spaces in construction standard, 29 CFR 1926.21, is no longer applicable or in effect. See, *e.g.*, July 10, 2006, letter to John Williams II.

One commenter requested that OSHA clarify the distinction between an "enclosed space" and a "confined space," and another commenter suggested that OSHA provide additional discussion of the hazards of an "enclosed space" in this final rule (ID–119, p. 6; –140, p. 4). As OSHA stated in the preamble to the proposed rule, the Small Business Advocacy Review Panel recommended that OSHA examine the benefits and costs associated with provisions addressing hazardous-enclosed spaces (72 FR 67398 (Nov. 28, 2007)). Consequently, the Agency decided not to include any new or additional requirements for hazardous-enclosed spaces in the final rule. Instead, OSHA relies on existing standards, such as § 1926.55—Gases, vapors, fumes, dusts, and mists, to address the hazards of working inside enclosed spaces. OSHA Technical Information Bulletin 02–05–30 is available to employers who are looking for guidance on the particular hazards of working in enclosed spaces. For example, this bulletin states that the OSHA respirator standard may apply when employees are working in enclosures that do not meet the definition of "confined space."

Another commenter questioned the inclusion of spaces equipped with ladders or stairways for employee entry or exit in the proposed definition of "confined space" (ID–013, p. 5). Both the proposed and final definitions of "confined space" include "limited or restricted" entry or exit. A space where an employee can enter or exit only with the use of a stairway or a ladder, like an attic, generally meets this definition of a confined space. See, *e.g.*, October 27, 1995, letter to James Sharpe. The following guidance provided earlier by OSHA with respect to the general industry standard definition of this term also is applicable to this construction standard:

> Ladders, and temporary, movable, spiral, or articulated stairs will usually be considered a limited or restricted means of egress. Fixed industrial stairs that meet OSHA standards will be considered a limited or restricted means of egress when the conditions or physical characteristics of the space, in light of the hazards present in it, would interfere with the entrant's ability to exit or be rescued in a hazardous situation.

OSHA Directive CPL 02–00–100: Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146 (May 5, 1995), Appendix E.

OSHA also clarified in the context of the general industry confined spaces standard that, although the Agency does not generally consider doorways and other portals through which a person can walk to be limited means of entry or exit, it may deem a space containing such a door or portal to be a confined space if the door or portal hinders an entrant's ability to escape from the confined space in an emergency (see 59 FR 55208 (Nov. 4, 1994)). The same interpretation applies in the construction context. OSHA provided the following explanation in its compliance directive on the general industry rule, which also applies in the construction context:

> A space has limited or restricted means of entry or exit if an entrant's ability to escape in an emergency would be hindered. The dimensions of a door and its location are factors in determining whether an entrant can easily escape; however, the presence of a door does not in and of itself mean that the space is not a confined space. For example, a space such as a bag house or crawl space that has a door leading into it, but also has pipes, conduits, ducts, or equipment or materials that an employee would be required to crawl over or under or squeeze around in order to escape, has limited or restricted means of exit. A piece of equipment with an access door, such as a conveyor feed, a drying oven, or a paint spray enclosure, will also be considered to have restricted means of entry or exit if an employee has to crawl to gain access to his or her intended work location. Similarly, an access door or portal which is too small to allow an employee to walk upright and unimpeded through it will be considered to restrict an employee's ability to escape.

OSHA Directive CPL 02–00–100: Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146 (May 5, 1995), Appendix E.

Another commenter asked OSHA to clarify whether a space that is temporary can still meet the definition of a confined space in the final rule (ID–136, p. 2). For example, the commenter asserted that a space constructed for the sole purpose of allowing employees to temporarily work over the end of a large open gas pipe could qualify as a confined space. In this particular example, the commenter emphasized the need for an employer to address the hazard of establishing an oxygen-deficient atmosphere as a result of purging the pipe with nitrogen.

OSHA agrees that a temporary space, including the temporary space provided in the commenter's example, can be a "confined space." The fact that the space described by the commenter is temporary does not prevent the space from meeting the definition of a confined space in this final rule. The temporary character of the space may be the most readily apparent factor in determining whether a temporary space would permit continuous employee occupancy.

OHSA did not define the term "contractor" in the final rule, as it did in the proposed rule. One commenter recognized that OSHA's proposed definition of "contractor" excluded controlling contractors (ID–099, p. 1). To simplify the terminology used throughout the standard, to address the inconsistency identified by the commenter, and to avoid other confusion with the term "controlling contractor," OSHA is using terms more precisely in the final rule. OSHA uses

the term "employer" to refer generically to employers, including employers that meet the final rule's definitions of "controlling contractor" or "host employers." OSHA also added the term "entry employer" to refer to employers performing confined-space entry. As discussed elsewhere in this preamble the Agency also is using "controlling contractor" and "host employer" to refer to other specific types of employers when necessary.

Control, as defined in this final standard, is an action taken, through engineering methods, to reduce the hazard level inside a confined space, including the maintenance of this reduced hazard level. This definition is consistent with the use of the term in the general industry confined spaces standard, although OSHA did not define the term in § 1910.146(b). The proposed rule's definition of "control" provided isolation as an example of a control action. However, controlling a hazard provides less protection to an employee than isolating the hazard because it does not result in the elimination or removal of the hazard. For example, ventilation is a control method that merely reduces the hazard level below its Permissible Exposure Limit (PEL) or Lower Explosive Limit (LEL) for the duration needed to protect employees in or near a confined space. Therefore, OSHA deleted the reference to isolation from the final standard to clarify the distinction between control and isolation. Otherwise, the final standard defines the term as proposed.

Controlling contractor is the employer that has overall responsibility for construction at the worksite. In addition, the note to this definition explains that, if a host employer has overall responsibility for construction at the worksite, then the host employer also is the controlling contractor under this final rule. The final rule's definition of "controlling contractor" is identical to the proposed rule's definition. The general industry confined spaces standard does not use the term "controlling contractor" and, therefore, § 1910.146(b) does not define the term.

OSHA included a definition of "controlling contractor" in this final rule because it is a common practice in construction work for a number of employers to be working at a construction site at the same time. Also, there often is one employer that has overall authority over the construction site, including the authority to change worksite conditions, set schedules, and alter work practices with regard to safety. This definition is nearly identical to the definition of the term as used in the OSHA's Steel Erection standard at 29 CFR part 1926, subpart R. The definition reflects the core principle of general supervisory control over the construction site. Under this final rule, OSHA clarified the responsibilities of different employers on the site and assigned specific duties to the controlling contractor, as distinguished from the host employer and the other employers (see final § 1926.1203(h)). Consequently, there is a need to define the term "controlling contractor."

Some commenters were unsure whether an employer with no contractual authority for the overall safety of a project could qualify as a "controlling contractor" (ID–106, p. 2; –129, p. 2). Another commenter asserted that an employer will have extreme difficulty exercising the control required by the standard without explicit contractual authority to do so (ID–120, p. 2). The facts and circumstances present at the job site determine whether an employer is a controlling contractor under this final rule: explicit contractual authority is sufficient to indicate a controlling contractor, but the absence of contractual authority is not definitive. In this regard, OSHA intends the controlling contractor's authority to be established in the same manner that a controlling employer's authority is established under OSHA's Multi-Employer Citation Policy. For more information about the role of the controlling employer, see OSHA Directive CPL 02–00–124: Multi-Employer Citation Policy.

Double block and bleed means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves. This can be done to eliminate the potential for substances in the sections of the pipes to enter the space. OSHA took this term directly from § 1910.146. The proposed definition was different grammatically, and also specified the exact position in which the closures were to be locked or tagged, but there is no substantive difference between the final language and the language in the proposed rule.

Early-warning system is the method used to alert attendants, as well as authorized entrants in a permit space, that an engulfment hazard may be developing. Examples of early-warning systems include: alarms activated by remote sensors and lookouts with equipment for immediately communicating with the authorized entrants and attendants. OSHA did not revise the definition from the proposed rule, other than to use "assess" rather than "monitor" because the latter is now a defined term under the standard. Although § 1910.146 does not explicitly include the "early warning system", the Agency included the term in the final rule to ensure that the regulated community understands that these systems must provide an effective means of warning attendants and authorized entrants that a non-isolated engulfment hazard may be developing in an area where it could flow into the work area. A clear understanding of this term will help employers ensure that authorized entrants have sufficient time to safely exit the space (see explanation of § 1926.1204(e)(1) below in this preamble). As illustrated by the non-exhaustive list of examples of early-warning systems in this definition, employers have flexibility regarding the type of early-warning system to use for continuously monitoring engulfment hazards. However, as stated in final rule § 1926.1204(e)(1)(iii), whatever warning system an employer selects, it must alert authorized entrants and attendants in sufficient time for the authorized entrants to safely exit the space.

Emergency means any occurrence inside or outside a space that could endanger an entrant. The definition is similar to the definition in the general industry standard, and is not substantively different from the definition provided in the proposed rule. The only distinction between the general industry standard and the final rule is that the final rule includes a loss of power in the non-exhaustive list of examples of emergencies. OSHA is specifying power loss to make it clear that unexpected loss of power can endanger entrants, particularly if the permit plan relied on the use of ventilation, monitoring, controls, communication with the attendant, or egress that would be affected by the loss of power. The definition is important because 1204(d)(5) requires employers to provide adequate lighting for egress in an emergency.

One commenter urged OSHA to clarify that an occurrence constituting the emergency must involve the work performed in the confined space (ID–099, p. 1). For example, in this commenter's view a heart attack that does not involve the working conditions in a confined space, but occurs while an employee is working in or near a confined space, would not qualify as an "emergency" under § 1926.1202. OSHA disagrees with this comment, and is not making this revision because the final standard uses the term "emergency" with respect to the provision of rescue services. (See, *e.g.*, final § 1926.1204(i), which requires the employer to develop and implement procedures for

responding to emergencies.) The Agency believes that an emergency occurs regardless of whether or not it is foreseeable based on the work the employee is performing within or near the confined space. Under the rescue provisions of this final standard, emergencies, regardless of their cause, require employers to initiate rescue of the affected employees working inside the confined space because of restricted access to, and egress from, the confined space.

Engulfment refers to the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance, such as water, dirt, sand, sawdust, or rocks. Any solid or liquid that can flow into a confined space and that can drown, suffocate, or crush an employee can be an engulfing medium. This definition is nearly identical to the definition of the same term in § 1910.146, except that it also includes "or suffocation" at the end of the definition, paraphrasing the following additional language from the proposed rule: "or the substance suffocates the individual." This additional language clarifies that the definition includes suffocation that does not result from strangulation, constriction, or the blockage of any respiratory mechanism. For example, the definition includes surrounding an employee with a flowable material even if personal protective equipment or some other barrier (for example, a person trapped in sand while wearing respirator mask with an enclosed air source) delays immediate drowning or suffocation. The final definition does not differ substantively from the definition in the proposed rule, and OSHA received no comments on the proposed definition.

Entry means the action by which any part of a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space, and occurs as soon as any part of the entrant's body breaks the plane of an opening into the space, whether or not such action is intentional or the person performs any work activities in the space. This definition is similar to the definition of "entry" in § 1910.146(b), except OSHA added the last clause to clarify that this is a bright-line definition: entry occurs under all circumstances in which the entrant's body breaks the physical threshold of the opening, regardless of the events or actions that caused entry. For example, when an employer assigns an employee a task that would not ordinarily involve entry into a confined space, and the employee inadvertently falls into the confined space and does not perform any work in that space, the employee entered the space at the instant the first part of the employee's body crosses the plane of the confined space. This clarification is consistent with OSHA's longstanding interpretation of the general industry standard. See October 18, 1995, letter to Charles Bessey. As a result, an entry employer's duty to prevent unauthorized entry under § 1926.1204(a) means that the employer must take the necessary steps, such as installing barriers when appropriate, to prevent both intentional and unintentional entries.

As noted in the explanation for the definition of "confined space," a space must be large enough to fit the entering employee's entire body to constitute a confined space. However, if the space is large enough to qualify as a confined space, any entry into that space constitutes an entry, even if the employee's entire body does not enter the space. This application is consistent with OSHA's design of this final standard: to ensure that this construction rule is enforceable. Therefore, OSHA declines to incorporate into this final rule its previous guidance offered with respect to the general industry rule to the extent that the guidance indicated that entry would not take place if only part of the body, and not the whole body, crossed the plane of the confined space. See July 13, 1993, letter to Dean Davenport (no entry into water pipe when employee stuck in an arm, but not the whole body). Absent some safeguard to ensure that the rest of the employee's body could not cross the threshold into the confined space, the likelihood of inadvertent entry into a space in the context of construction warrants a strict approach that differs from the more routine entries often associated with maintenance under the general industry standard. For example, an employee who sticks his/her head into a new space established during construction may be overcome by fumes and fall into the space or be rendered unable to remove his or her head from the space and avoid further exposure to the hazards.

The definition of "entry" in this final rule is slightly different than the proposed definition, but the differences do not change the substantive meaning of the term as proposed. OSHA made these changes to the proposed definition to make the final definition of "entry" similar to the definition of the term in § 1910.146(b).

Entry employer means an employer who decides that an employee it directs will enter a permit space. Paragraph (b) of § 1910.146 does not use the term "entry employer"; instead, the general industry standard refers generally to "employer." In general the term "entry employer" in this final rule and the term "employer" in § 1910.146(b) are synonymous because both terms identify the employer who must follow the accompanying confined-space procedures for employers that plan to enter a permit space. However, OSHA uses this term in this final rule to clarify that not all employers on a multi-employer worksite have duties associated with entering a permit space.

On a multi-employer worksite, each employer has a duty under this new standard to ensure that a competent person identifies all confined spaces in which any employee it directs may work (§ 1926.1203(a)). Each employer must then prevent the employees it directs from entering permit spaces or limit access to those spaces in accordance with the permit procedure (or alternatives) specified in this standard (see § 1926.1203(a) and (c)–(e)). Under the standard, an entry employer has a number of important duties that must be performed prior to anyone physically entering a permit space, such as the requirements for pre-entry information exchanges in § 1926.1203(h) and the duty to develop and implement a permit program to restrict access under § 1926.1204. Therefore, under the definition, an employer becomes an entry employer when it "decides that" an employee it directs will enter, rather than at the later point when the employee actually enters. An employer can be an entry employer regardless of whether that employer has completed any of the steps of instituting a permit program or an employee has actually entered the space.

However, OSHA does not intend for the "decides that" language in the definition to narrow the meaning of "employer" in any way or to focus on any deliberative or procedural process. OSHA has added a note to the definition of "entry employer" to emphasize that an employer cannot avoid the duties of the standard merely by refusing to decide whether its employees will enter a permit space, and OSHA will consider the failure to so decide to be an implicit decision to allow employees to enter those spaces if they are working in the proximity of the space.

The "an employee it directs" language encompasses temporary workers, permanent employees, and all other workers who are under the direction of the employer at the worksite, whether they are contracted directly or through a third party such as a staffing agency. For example, when a general contractor

contracts with a third party to bring on a temporary worker and assigns the worker to work in a permit space, the general contractor is an entry employer. However, if the temporary employee is assigned to a welding subcontractor, and the welding contractor makes the determination of where the temporary employee will work without direction from the general contractor, then the welding subcontractor would be the entry employer. The general contractor would not be an entry employer in the latter example.

Entry permit means the document, provided by the entry employer, which allows and controls entry into a permit space. Section 1926.1206—Entry Permit of this final standard specifies the contents of the permit. As part of its effort to specify the duties and responsibilities of different employers on a multi-employer worksite, OSHA specifies that the employer "who designated the space a permit space," must prepare the permit, rather than just "the employer" as in § 1910.146. This definition is otherwise identical to the definition in § 1910.146(b). In a typical multi-employer worksite, all employers would have the duty to identify confined spaces that their employees might enter, but only some employers must establish a permit program and complete permits.

Entry rescue means rescue that occurs when a rescue service enters a PRCS to rescue one or more employees. This definition is identical to the proposed definition of "entry rescue," except that the Agency clarifies that the term includes a rescue of a single employee. Section 1910.146(b) does not define "entry rescue" because the general industry standard does not use the term. The term is included in this final rule to make the requirements for each type of rescue more clear.

Entry supervisor means the qualified person (such as the employer, foreman, or crew chief) assigned by the employer to determine if acceptable entry conditions are present at a permit space where entry is planned, to authorize entry and oversee entry operations, and to terminate entry as required by the final standard. This definition is identical to the definition provided in § 1910.146(b), except that OSHA replaced "person" with "qualified person" as in the proposed rule (the proposed rule used "qualified individual"), to clarify that the individual must meet the requirements for "qualified person" as defined later in this section. The note to this definition, which clarifies that the entry supervisor may enter the permit space or serve as an attendant if the applicable requirements are met, is identical to the note in the general industry definition.

Hazard means a "physical hazard" or "hazardous atmosphere" as defined by this standard. The proposed rule defined this term, and OSHA is including it here to clarify that references to a "hazard" or "hazards" can mean either physical or atmospheric hazards, or both.

Hazardous atmosphere refers to the five enumerated atmospheres, any one of which may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, unaided escape from a permit space), injury, or acute illness. The proposed definition of "hazardous atmosphere" varied slightly from the definition in § 1910.146(b), and several commenters requested that OSHA make the definition in this final rule more similar to the definition in § 1910.146(b) (ID–017, p. 1; –132, p. 2; –138, p. 3; –153, p. 12). OSHA did so, as explained below, and the final definition is substantively identical to the definition in the general industry standard.

One commenter noted that the proposed definition included "existing or potential" atmospheres, and argued that this language, combined with OSHA's failure to include a note that is part of the general industry definition of "hazardous atmosphere," constituted an inappropriate expansion of the scope of this final standard compared to the general industry standard (ID–219.2, p. 72). OSHA addressed this commenter's concerns by adopting the general industry language, which does not refer to "existing or potential" atmospheres, and also included the note favored by the commenter. See the note after the fourth enumerated paragraph in the definition, which is substantively identical to the note in the general industry standard.

The five enumerated paragraphs or conditions in the definition address four specific types of hazardous atmospheres and a broad condition that encompasses any other atmosphere that is immediately dangerous to life or health. The first enumerated condition addresses an atmospheric condition that consists of a flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL). OSHA set this level to account for the difficulty employers have in detecting each and every flammable gas vapor, or mist. The LFL, as it is defined by the confined spaces in construction standard, refers to the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion. The LFL of the atmosphere is a cumulative measure that represents the mixture of different flammable elements, not just the presence of a single element that could lead to an explosion. Therefore, for the reasons explained below, OSHA has defined hazardous atmosphere as any atmosphere at or above 10 percent of a detected substance's LFL (10 percent LFL) to provide an adequate safety margin, and to ensure that an atmosphere does not exceed the LFL if one of a combination of substances goes undetected.

OSHA specifically asked for public comment on the propriety of defining a hazardous atmosphere for purposes of the confined spaces in construction standard at 10 LFL when § 1926.651(g)(1)(iii) prohibits exposure to atmospheres in excavations exceeding 20 percent of the LFL (20 percent LFL). Some commenters urged OSHA to permit 20 percent LFL in this final rule for the sake of uniformity, while another commenter favored this change only if credible data justifies this uniform LFL (ID–090, p. 1 and ID–108, p. 6; ID–060, p. 1, respectively). Other commenters, however, indicated that 10 percent LFL was more appropriate, and recommended that OSHA revise the subpart P LFL to 10 percent LFL to provide adequate safety to employees working in excavations (ID–132, p. 3; –140, p. 6). This last group of commenters noted that using 10 percent LFL would align the definition of "hazardous atmosphere" in this final rule with the general industry confined spaces rule at § 1910.146(b) and ANSI Z–117.1. One commenter also noted that because the LFL of many common petroleum based materials is approximately 1 percent of the total volume of the atmosphere, which would convert to 10,000 parts per million (ppm), 10 percent of that LFL is 1,000 ppm, which approaches the immediately dangerous to life or health (IDLH) (see below) level for many materials (ID–132, p. 3).

OSHA selected the 10 percent LFL in the final rule to match the general industry standard. As the Agency explained when selecting the 10 percent LFL in § 1910.146(b), the 10 percent level is "widely recognized as being the threshold value for a hazardous atmosphere" (58 FR 4473). The record indicates that this lower level continues to be more widely used and more appropriate than the 20 percent LFL suggested by the commenter, particularly now that the general industry standard is nearly 20 years old. (See also ANSI Z–117.1 (setting the maximum level at 10 percent LFL); ANSI 6.3.1.12 (setting the maximum level at *less than* 10 percent LFL.))

Moreover, the record does not include credible data to justify why the 20 percent LFL would be more appropriate for a confined space. OSHA may consider amending subpart P to a similar level in the future, but that decision is outside the scope of this rulemaking.

The second enumerated condition in the final definition addresses "hazardous atmosphere" consisting of an airborne combustible dust at a concentration that meets or exceeds its lower flammable limit (LFL). One commenter asked why OSHA did not propose a 10 percent LFL for combustible dust, similar to OSHA's approach for flammable gas, vapor, or mist in the first condition under this definition (ID–112, p. 6). OSHA did not propose a percentage of the LFL in defining a hazardous airborne combustible-dust concentration level for several reasons. Employers usually can visually judge the flammability hazard posed by airborne dust. Moreover, as OSHA noted in the preamble to the general industry standard, it is difficult at present to measure airborne concentrations of combustible dust reliably at a site, so there likely would be significant delays in determining whether the level of combustible dust meets the LFL at a particular site. Therefore, LFL determinations would appear to be unnecessarily burdensome with regard to combustible dust. OSHA concludes that the final rule will protect employees adequately so long as employers train their employees in the recognition of combustible dust, and ensure that the concentration of combustible dust remains below its LFL.

For this reason, OSHA has incorporated the note for this condition from § 1910.146(b), except that it has added the word "combustible" before "dust" to clarify the meaning of the note, and made a minor additional change from the proposed rule to make the final definition identical to § 1910.146(b). OSHA used LFL in this final rule definition, rather than "lower explosive limit (LEL)," which OSHA used in the proposed definition. OSHA notes, however, that the Agency uses these terms interchangeably. (See, *e.g.*, proposed definition of "lower flammable limit or lower explosive limit" at 72 FR 67406.)

The third condition of a hazardous atmosphere in this definition addresses the conditions of an atmospheric oxygen concentration below 19.5 percent ("oxygen deficient") or above 23.5 percent ("oxygen enriched") in a confined space. Four commenters suggested that OSHA change the oxygen-enriched level from 23.5 percent to 22 percent, which they noted is the level set by the National Fire Protection Association (NFPA)[8] (ID–25, p. 2; –27, p. 6; –28, p. 4; 95, p. 1). Two commenters suggested that increases in oxygen levels due to leaks of compressed oxygen used in "hot work" would more easily be detected if the maximum acceptable oxygen level was 22 percent instead of 23.5 percent (ID–95, p.1), as it is in the rules for maritime work. The commenters did not, however, provide any data or other information supporting the suggestion that the proposed level, which is identical to the level in the general industry standard, is not sufficiently protective. The absence of such information, the lack of incidents caused by oxygen levels between 22 and 23.5 percent lead OSHA to conclude that the difference is not significant. In addition, this consistency benefits employers that engage in both general industry and construction work. OSHA finalized the level at 23.5 percent so that it is consistent with the general industry confined spaces standard at § 1910.146(b), as well as the definition of "enriched oxygen" in OSHA's Respiratory Protection standard. This oxygen-enriched level also is the same as the level in the proposed definition of "hazardous atmosphere." OSHA continues to believe that the 23.5 percent level provides a sufficient amount of time for employers to detect a hazardous oxygen-enriched atmosphere, and to exit the space safely, before the oxygen level gets so high that it begins to have adverse effects on the exposed employees. Other standards, such as Subpart J—Welding and Subpart V—Electronic Transmission and Distribution, set forth protective requirements for employees engaged in "hot work" that address the commenters' concerns.

Additionally, OSHA recognizes that safe levels of oxygen vary with altitude, and that concentrations of oxygen at or above the oxygen deficient limit of 19.5 percent in this final rule may still pose atmospheric hazards at very high altitudes. For example, ANSI/ASSE Z88.2–1992 recognizes an IDLH circumstance at altitudes of 5,000 ft. above sea level or higher, if the oxygen concentration is at 19.5 percent.[9] The Agency believes that most confined-space work takes place at altitudes lower than 5,000 ft. above sea level, and retains the 19.5 percent oxygen deficient limit in this final rule. However, the Agency notes that to the extent a high altitude causes an otherwise permissible oxygen concentration to become IDLH, such circumstances may also result in a "hazardous atmosphere" as set forth in the fifth condition in OSHA's definition, which defines a "hazardous atmosphere" to include any other atmospheric condition that is IDLH.

The fourth condition in the definition of "hazardous atmosphere" addresses an airborne concentration of a substance that exceeds the permissible dose or exposure limit specified by OSHA. The final definition includes cross-references to the applicable PELs in subparts D—Occupational Health and Environmental Controls and Z—Toxic and Hazardous Substances of 29 CFR part 1926, rather than the general reference to PELs specified in "any OSHA requirement" contained in the proposed rule. The form of the definition now duplicates the form found in the general industry standard. In addition, removing the reference to "any OSHA requirement" avoids the implication that PELs in general industry standards would apply to construction work.

One commenter requested that OSHA insert a note under this fourth condition explaining that the PELs in § 1910.1000 also would apply under this condition (ID–028, p. 5). OSHA did not include a reference to § 1910.1000 because those general industry PELs do not apply to construction work. Section 1926.55 establishes the relevant PELs for construction.

OSHA did, however, include a note to the fourth condition of the definition that is substantively identical to the note to the fourth subheading of the § 1910.146(b) definition of "hazardous atmosphere," except that OSHA changed the word "provision" to "definition" to make it clear that the note applies to the types of hazards covered by the definition of "hazardous atmosphere." OSHA sets its construction PELs at different levels for different reasons; some of these PELs prevent harm from substances that manifest quickly in the human body, such as [hydrogen sulfide and carbon monoxide, among others], while OSHA sets other PELs prevent harm from substances that produce long-term health effects but do not produce any acute effect on employees. The note

[8] NFPA 53 defines "oxygen-enriched atmosphere" as one in which the concentration of oxygen exceeds 21 percent by volume or its partial pressure exceeds 21.3 kPa. (See NFPA 53, Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres, 2011 Edition at 3.3.25).

[9] The Agency also notes that an updated revision of ANSI/ASSE Z88.2–1992 was forthcoming at the time of its development of this final rule. The draft of the updated standard appeared to be consistent with the 1992 version on this issue.

makes clear that, for the purposes of determining whether a hazardous atmosphere exists under this final rule the result of a concentration of a substance in excess of its PEL, employers need to address only the substances with PELs that could result in immediate harm or impairment of the employee's ability to perform self-rescue. See also the discussion in the general industry preamble at 58 FR 4474. For example, a short-term exposure to silica is unlikely to cause immediate injury. Likewise, nitrogen and carbon dioxide will not impair self-rescue unless their levels are so high that they replace significant oxygen, so that they act as an asphyxiant. The same is true for any inert gases, for example argon, neon and helium. Most of the substances with an OSHA PEL (in subparts D and Z of the construction standards) are based on long-term, chronic risks to health. Presumably, most of these substances do not pose a risk of an acute health effect or of self-rescue at exposure levels near the PEL. However, if extremely high levels of exposure far above a PEL occurred, one of these substances could potentially pose a risk to self-rescue, which would in turn trigger the fourth condition of hazardous atmosphere.

The note also addresses a comment that PELs regulating substances with long-term effects, such as iron oxide emitted during welding or xylene emitted when painting, should not automatically trigger the PRCS requirements (ID–028). While OSHA agrees that iron oxide by itself would not trigger permit restrictions because the symptoms of iron oxide exposure would generally not prevent an entrant from exiting a confined space, xylene is highly flammable and would therefore present a hazard if the potential exists for the concentration of xylene to exceed the LFL.

A different commenter suggested that OSHA avoid potential confusion by rearranging the order in which the subparagraphs in the definition of "hazardous atmosphere" are presented to reflect the order in which OSHA requires atmospheric testing and monitoring (oxygen content, flammability, then toxicity—see § 1926.1204(e)(3) of the final rule) (ID–132, p. 2). OSHA does not agree that the order of presentation in this definition is likely to cause confusion, particularly when the actual order of testing is spelled out in § 1926.1203(e). OSHA did not make this change in the final rule so that it could to keep the definition of "hazardous atmosphere" in this final rule similar to the definition of that term in § 1910.146(b), including the order of the listed conditions.

Host employer means the employer that owns or manages the property where the construction work is taking place. As explained in the definition of "controlling contractor," OSHA added this definition to clarify the distinction between a host employer, a controlling contractor, and an employer performing confined space entry because each of these entities has specific obligations under this final rule. (See the discussion under "controlling contractor" above.) OSHA used the term "host employer" in the general industry standard without defining it, but the definition in this final rule is consistent with the use of the term in that general industry standard. It is also substantively the same as the proposed definition.

One commenter asserted that an employer should never meet the definition of "host employer" if the employer "had no employees at all (a home owner, for example, might fit this category) or had no employees 'engaged in construction work' (an owner of an office building might fit this category)" (ID–117, p. 5). OSHA notes that it has already addressed the commenter's first concern because an entity only meets the definition of a "host employer" under the final rule if it is "an employer." OSHA disagrees with the commenter's second assertion, and has addressed the propriety of placing duties on the host employer, and OSHA's authority for doing so, in the discussion of § 1926.1203(h) later in this preamble.

OSHA also added a note to the definition of "host employer" to address situations in which the owner of the property contracts with a management company to manage the property. OSHA understands that this type of arrangement is somewhat common with commercial properties, and that in many cases the management company will be the principal custodian of blueprints and other information about the property that identifies confined spaces on the property or is otherwise relevant to confined spaces work on that property. Because the host-employer requirements in final § 1926.1203(h)(1) are designed to ensure that relevant information about the property and known hazards therein is conveyed to employers who will be performing work in confined spaces, OSHA clarifies in the note that the entity that possesses that information, either the owner or the management company, will serve as the host employer for the purposes of this standard for as long as the company manages the property (if there is a change in management companies, the initial management company would return the information to the owner, and the host employer duties would revert to the property owner until discharged to the new management company). The note also clarifies that only one of these entities will serve as a host employer. If a property owner contracts with a third party to manage the property, turns over all relevant information about the property that it has (the locations of permit space the hazards they contain, and the previous precautions used to address them) to the management company, then OSHA will treat the management company (not the property owner) as the "host employer" under this standard. That management company, rather than the owner, must then maintain the relevant information about the property and fulfill the duties of the host employer under this standard (*e.g.*, share that information with the controlling contractor). For example, if the owner transfers its records to the management company, including a map of the property showing a confined space marked for storage of containers of flammable liquids, then the management company must relay to the controlling contractor hired to oversee welding operations the location of that space, its contents, and any previous measures used to address them (*e.g.*, "when the painters came, they tried to move the containers but the containers began to leak and soaked into the floors so the painters had to continuously ventilate the whole area during their entry.") The property owners would not have a separate duty to relay that information to the controlling contractor. In another example, the owner of a commercial property hires a professional property management company to manage a property. The property owner turns over all relevant information to the management company. The management company contracts with a general contractor to oversee renovations in a furnace room and boilers on the property, and the general contractor hires a subcontractor to perform the construction work inside the boilers, which are activated through an electrical system. Under this standard, the management company has a duty to notify the controlling contractor that the boiler tanks are connected to the electrical system, the way in which that electrical hazard is normally addressed (*e.g.*, isolating the electrical hazards by disconnecting, and locking out, the power source).

Hot work means operations capable of providing a source of ignition, such as riveting, welding, cutting, burning, and

heating. In § 1910.146(b), OSHA defined "hot work permit" to describe the same activity, but focused on the permit rather than the work. OSHA did not include the word "permit" in the definition in this final rule because the final regulatory text uses only the term "hot work," and does not use the term "hot work permit."

Immediately dangerous to life or health (IDLH) means any condition that could cause a threat to life, cause irreversible health effects, or otherwise inhibit an employee's ability to escape from a permit space. The proposed definition of "IDLH" also included separately any condition that exposes an employee to "serious physical harm," which some commenters opposed. (ID–0013, p. 2; ID–219.2, p. 74; ID–0147, p. 3.) In particular, one commenter noted that the definition of "IDLH" in § 1910.146(b) does not include every condition that could cause "serious physical harm," and asserted that the use of this term makes it less clear that an IDLH condition is one associated with urgent danger. (ID–0013, p. 2) For example, the commenter asserted that, under the proposed definition, an IDLH condition would be present when an employee breaks his/her nose.

Another commenter asserted that "irreversible adverse health effects" would not be an element of the IDLH definition unless OSHA adds language tying those effects to an impairment of the ability for self-rescue (ID–0219.2, p. 74.). OSHA notes that the revised definition of IDLH is applied in this standard through the definition of hazardous atmosphere, and excludes "an atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness" (see Note to the definition of "hazardous atmosphere"). Thus, the standard follows the general industry standard and is as appropriately focused on conditions that would impair the ability to self-rescue as is the definition in the general industry standard. In a comment submitted after the hearing for this rulemaking, the same commenter did not object to the inclusion of "irreversible adverse health effects" in the general industry standard, asserting that the general industry standard "does not regulate non-acute hazards" (ID–219.2, p. and 71.) However, OSHA finds no evidence in the record, even after 20 years of experience with the general industry standard, that this "irreversible adverse health effects" component of the IDLH definition would be less appropriate for the construction industry. OSHA has thus modified the definition of IDLH to focus on conditions which would impair an entrant's ability to self-rescue and either pose a threat to life or have the capacity to cause irreversible adverse health effects, and notes that all other OSHA standards regarding exposure to hazardous substances continue to apply.

Inerting means displacing the atmosphere in a permit space by adding a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. The definition is identical to the general industry definition, except for a minor grammatical change. OSHA also included a note from the general industry standard to remind employers that the inerting process results in an atmosphere that is oxygen deficient; oxygen deficiency is a separate atmospheric hazard identified in the third subparagraph of "hazardous atmosphere." Accordingly, the final rule prohibits employees from working in that space without a permit program which includes use of necessary PPE.

Isolate or Isolation means the process—such as misaligning or removing sections of lines, pipes or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages—that an employer uses to completely protect entrants from the release of energy or other hazard into a confined space. This definition is based on the definition in § 1910.146(b) and the proposed rule, but OSHA made two minor adjustments to the definition in this final rule and added a clarification regarding isolation of a portion of a contiguous space such as a sewer system. First, OSHA clarified that the purpose of isolation is to protect employees, rather than the space itself, from the release of hazards into the space. In most cases this involves isolating the entire space from a hazard, such as isolating a room from a potential source of flooding. However, in some cases employers may be able to isolate a hazard inside a confined space, and the final rule's emphasis on protecting employees, rather than the space, allows for that type of isolation. To that end, the second difference from the general industry definition is that in the final rule OSHA defines "isolate" to include employers' use of physical barriers to eliminate the opportunity for contact between an employee and a physical hazard inside a confined space, as requested by a commenter (ID–061, p. 6). This addresses commenter concerns that a single physical hazard such as low-hanging pipe or a sharp object would unnecessarily foreclose alternative entries under § 1926.1203(e) (discussed below) and require an employer to treat the entire space as a permit space even after the employer has taken steps to ensure that employees could not come in contact with the physical hazard. OSHA has reached a similar result in most circumstances by interpreting the general industry standard to allow employers to "eliminate" hazards in a similar manner without necessarily deeming it isolation. See, *e.g.*, October 27, 1995, letter to William Taylor (temporary floor could be used to eliminate fall hazard from inwardly converging walls). But in the construction context the addition to the definition of isolation addresses the issue directly and provides more flexibility for employers to address physical hazards for the purpose of alternative entries under § 1926.1203(e) (see the discussion of § 1926.1203(e) for additional explanation on the difference between the general industry standard and this final rule regarding alternative procedures for addressing permit spaces with hazardous atmospheres and physical hazards).

A different commenter suggested that using the term "isolation" to refer to the elimination of a physical or atmospheric hazard will be confusing since industry generally uses the term "isolation" to refer to the control of a hazard and not to the elimination of the hazard (ID–098.1). OSHA agrees that the terms are not interchangeable, and has tailored the definition of isolation accordingly. While eliminating a hazard or removing it altogether from a confined space would constitute means of isolating a hazard, isolating the hazard in the context of this rule does not necessarily eliminate it from the space altogether in the sense that the physical item may remain in the space and that it might still pose a hazard absent the isolation measures. For example, if exposed rebar is sticking out of a wall in a confined space, the employer may eliminate the hazard by pounding the rebar into the wall so that it does not protrude in any way; it may remove the hazard by cutting out the rebar and carrying it out of the space; or it may isolate the rebar by erecting a barrier in a manner that effectively prevents the possibility of anyone coming into contact with the rebar.

Both of the definitions in the general industry rule and this final rule permit "tagout" in addition to "lockout" as a means of isolating a hazard, but in both cases the tagout process involves more than the placement of a tag on equipment because tagging equipment does not prevent the release of a hazard into the space. As discussed below, OSHA has added definitions of "lockout" and "tagout" to ensure that

the regulatory text of this final rule reflects these critical elements of the general industry standard.

Several commenters asserted that the definition of "isolation" should not include misaligning or removing sections of lines, pipes, or ducts, but did not provide a reason for this assertion (ID–025, p.2; –027, p. 4; –095, p. 2). The general industry confined spaces standard at § 1910.146(b) includes misaligning or removing sections of lines, pipes, or ducts in its definition of "isolation." Without a clear reason to depart from this established understanding of the term "isolation," OSHA continues to include the misalignment or removal of sections of lines, pipes, or ducts as a form of "isolation" to match the definition of the term in § 1910.146(b). To the extent that the commenters were concerned that removing a section of pipe within a space would not isolate employees from a hazard entering the space, such an action would not meet the definition of "isolation" if it does not effectively and completely prevent employee exposure to the hazard. The removal of a section of a water pipe that would effectively divert water away from a confined space could be a form of isolating the employees in that space from the water hazard; disconnecting a sewer pipe in a location where fumes or physical hazards could still enter a confined space and affect employers (such as disconnecting the pipe at a location inside the confined space or immediately adjacent to the space where the remainder of the pipe entering the confined space is not sealed) does not meet the definition of "isolation."

Another commenter asserted that defining "isolation" differently from "control" could cause confusion (ID–025, p. 2). This comment highlights the need to have a separate definition: "Isolate or isolation" is distinct from "control" in this final rule because the former term requires the elimination or removal of the hazard. Control, on the other hand, merely entails a reduction in the degree of a hazard or a reduction in the risk that the hazard will cause an injury or death. For example, an employer can control an atmosphere through ventilation, but it cannot use ventilation to isolate a space from a hazard.

Limited or restricted means for entry or exit means a condition that may obstruct an employee's ability to exit or enter a confined space, including trip hazards, poor illumination, slippery floors, inclining surfaces and ladders (see the earlier discussion of the definition of "confined space" for a discussion of ladders). The proposed construction rule, but not the general industry standard, defined this term. The proposed definition referred to "hazards" rather than "trip hazards." OSHA did not include in this final standard the reference to all "hazards" because the Agency believes that term was potentially too broad, and that its inclusion in this final standard would render all the other examples redundant. Instead, the final definition refers to "trip hazards," which is a condition that is similar to the other examples, and provides a greater degree of guidance than the term "hazards."

One commenter objected to the inclusion of "poor illumination and slippery floors" in the definition, arguing that the regulated community does not generally understand these conditions as "limited or restricted means for entry and exit" as used in the general industry confined spaces standard at § 1910.146(b) (ID–153, p. 14). The commenter did not explain why poor illumination and slippery floors would not limit or restrict means for entry or exit. The same commenter acknowledged that § 1910.146 does not define this term, but nevertheless accused OSHA of "changing the meaning of the term." OSHA disagrees, and is retaining the list of examples in the final rule. The Agency previously explained in its compliance directive on general industry confined spaces, OSHA Directive CPL 02–00–100: Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146 (May 5, 1995), that a "space has limited or restricted means of entry or exit if an entrant's ability to escape in an emergency would be hindered." Therefore, OSHA concludes that the meaning of "limited or restricted means for entry and exit" as used in the general industry standard already encompasses these conditions, and that the Agency is simply providing the same guidance more explicitly in this final standard.

Line breaking refers to the process of opening a pipe or duct when the substance inside could injure an employee because of the characteristics of the substance or the manner in which it is released from the conductor. This definition is identical to the corresponding definition in the general industry standard. Although the term is not otherwise used in the text of this final standard (or in the text of the general industry standard), OSHA included it for parallelism with the general industry standard and to inform construction employers of the hazards that may be associated with opening an existing pipe or duct.

Lockout refers to a means of isolating a physical hazard (typically an electric-powered device) by placing a lockout device on an energy isolating device in accordance with established procedures to ensure that the equipment which poses a hazard and the energy isolating device cannot be operated or inadvertently energized until the lockout device is removed. This definition is identical to the definition in the general industry standard (see § 1910.147(b)). OSHA has included it to maintain consistency with the general industry approach to lockout in confined spaces. As discussed in the explanation for "Isolate or isolation", above, lockout is one method of isolating a physical hazard in a confined space.

Lower flammable limit (LFL) or lower explosive limit (LEL) means the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion. The measurement is usually expressed in terms of percentage by volume of gas or vapor in air. When more than one type of flammable substance is present in the air, the LFL is derived from the combined sum of all flammable substances as a percentage of the total atmosphere. The definition is identical to the proposed definition and is consistent with the use of the term in the general industry standard. The Agency did not receive any comments on this definition.

Monitor or monitoring means the process used to identify and evaluate the hazards after an authorized entrant enters the space. This is a process of checking for changes that the employer must perform in a periodic or continuous manner after the completion of the initial testing or evaluation of that space.[10] The proposed rule included a definition this term. OSHA included the definition in this final rule, but revised it slightly to make it clear that monitoring does not apply solely to atmospheric hazards.

Non-entry rescue means a rescue, usually by the attendant, that retrieves employees in a permit space without the rescuer entering the permit space. While the general industry standard does not include a definition of this term, the proposed rule did include such a definition. OSHA included the definition in this final rule, but clarified the distinction between entry rescue, as defined above, and rescue that does not involve entering the permit space.

Non-permit confined space means a confined space that meets the definition

[10] OSHA uses "periodic testing" and "periodic monitoring" interchangeably in this standard.

of a confined space, but does not meet the requirements for a permit-required confined space, as defined in this subpart. This term, as defined in the general industry standard at § 1910.146(b), requires a separate analysis of hazards or potential hazards. OSHA revised the general industry definition in the final rule to make it clear that a non-permit confined space is simply the inverse of a permit-required space: It meets all of the requirements to be a confined space, but does not meet the criteria to be a permit-required confined space (see the discussion of the definition of "permit-required confined space" below in this preamble). A confined space in which all physical hazards are isolated or eliminated and in which there are no actual or potential hazardous atmospheres is a non-permit confined space.

Oxygen deficient atmosphere means an atmosphere containing less than 19.5 percent oxygen by volume. This final standard defines the term exactly as it is in § 1910.146(b).

Oxygen enriched atmosphere means an atmosphere containing more than 23.5 percent oxygen by volume. The final standard also defines this term exactly as it is in § 1910.146(b).

OSHA based the general industry definitions for "oxygen deficient atmosphere" and "oxygen enriched atmosphere" on levels set by the National Institute for Safety and Health (NIOSH) (see 58 FR 4474 and 4476). The proposed rule did not include separate definitions of these terms, but did incorporate the same levels into the definition of "hazardous atmosphere." As discussed in the explanation above of "hazardous atmosphere," OSHA does not agree with several commenters' suggestions for an alternative oxygen level. OSHA did not receive any other comments disputing that the construction industry generally accepts these definitions of the terms.

Permit-required confined space (permit space) means a confined space that has at least one of the following characteristics: (1) Contains or has the potential to contain a hazardous atmosphere; (2) contains an engulfment hazard; (3) is configured so that it poses a risk of entrapment or asphyxiation; or (4) any other recognized serious hazards. OSHA revised this definition in final rule § 1926.1202 to make it identical to the definition in the general industry confined spaces standard at § 1910.146(b). Consequently, the final rule diverges from the proposed rule in that OSHA revised the order of the characteristics from the proposed rule, clarified that a potential hazardous atmosphere can trigger a permit space, and separated the third and fourth characteristics from the proposed definition ("an engulfment hazard or other physical hazard") so that engulfment hazards addressed in the second characteristic in the final definition while some physical hazards are encompassed by "other recognized serious safety or health hazard" in the fourth characteristic; there was not a fourth characteristic in the proposed definition. Otherwise, this definition is the same as the definition in the proposed rule.

Several commenters noted that the proposed definition of "permit-required confined space" included any "physical hazard," and asserted that the definition of "permit space" would, therefore, include non-serious hazards in a confined space (ID–013, p. 3; –147, pp. 2–4). In the proposed rule, OSHA addressed this concern in the definition of "physical hazard," which limited the definition to hazards that were capable of causing "death or serious physical harm." In this final rule, OSHA defined the term to match the definition in § 1910.146(b), which specifies that the phrase "contains any other recognized serious safety or health hazard" applies only to serious hazards, and the definition of serious physical harm (now "serious physical damage" in the final rule) excludes injuries that could not impair the ability of an entrant to escape the space without assistance. As noted in the explanation of the definition of hazardous atmosphere, this standard is focused on hazards that could impair the ability of an entrant to self-rescue.

The proposed definition of permit-required confined space referred to a "hazardous atmosphere," which OSHA defined to include an existing or "potential" atmosphere. One commenter urged OSHA to clarify that a "potential hazardous atmosphere" is a hazardous atmosphere that an employer could anticipate, as opposed to a hazardous atmosphere that is "remotely possible under unforeseen conditions," such as a train carrying chlorine crashing and causing a toxic cloud of chlorine that engulfs an entire worksite. (ID–0138, p. 4.) The phrase "potential to contain a hazardous atmosphere" in the context of this final rule refers to the existing conditions affecting the confined space at the time of entry and any changes to those conditions over the duration of the entry, and limits hazards to those hazards that a qualified person should anticipate would affect that space. If an employer becomes aware (or should be aware) of the release of a toxic gas that could enter the confined space, or detects such a gas near a ventilation source for that space, then the space would have the potential to contain a hazardous atmosphere when the PEL or LEL are below the "hazardous atmosphere" levels. The potential for a hazardous atmosphere remains until the employer confirms that the space is completely free of the toxic gas or the gas level rises to a hazardous level.

As OSHA stated in a December 2, 2005, letter to Ms. Laura Johnson, a potential hazard exists if the employer does not entirely remove the source of the hazard. For example, a space will have the potential to contain a flammable atmosphere if any piping, containers, materials brought into the space, or residual contamination of the space brings combustible dust or flammable gas, vapor, or mist into the space. Employers can refer to a substance's Safety Data Sheet (SDS) as one indicator of the hazards the employer should reasonably anticipate as a result of using a particular substance. Testing and monitoring are some other methods of identifying potentially flammable atmospheres. OSHA also previously clarified that an appropriate lockout procedure that blocks a potentially hazardous atmosphere does *not* eliminate the potential for a hazardous atmosphere, so the space cannot be classified as a non-permit-required space. See August 28, 1995 letter to William K. Principe. Under this final rule, however, employers who can effectively isolate a potential hazardous atmosphere by using one of the other techniques described in the definition of the term "isolation" in § 1926.1202 (excluding lockout/tagout) may be able to re-classify the space.

Permit-required confined space program (permit space program) means the employer's overall program for regulating employee entry into permit spaces and protecting employees from permit space hazards. This definition of this term in the final standard duplicates the term's definition in § 1910.146(b). An employer need not tailor a confined space program specifically to each space entered. If the permit contains most of the relevant information required by this final rule, the program may be general and designate the particular permit that the employer developed earlier for such work, along with any other testing procedures, PPE, or other information normally required in response to the types of hazard present in the space. Accordingly, the employer is still responsible for developing the appropriate plans and other information

required by this standard to address the unique conditions of each space.

In the general industry standard, OSHA uses the term "permit system" as a heading for § 1910.146(e), and defines it in § 1910.146(b). In the final rule, OSHA uses the term "permitting process" as the heading of the parallel requirement at § 1926.1205, but does not employ the term anywhere else in the text of the final rule. OSHA, therefore, chooses not to provide a separate definition of "permitting system" in § 1926.1205 because such a definition is unnecessary; the "permitting system" is comprised of the requirements of § 1926.1205.

Physical hazard means an existing or potential hazard that can cause death or serious physical damage. Examples include: Explosives (see paragraph (n) of § 1926.914 for the definition of "explosive"); mechanical, electrical, hydraulic, and pneumatic energy; radiation; temperature extremes; engulfment; noise; and inwardly converging surfaces. The term "physical hazard" also includes chemicals that can cause death or serious physical damage through skin or eye contact (rather than through inhalation). The general industry confined space standard does not define the term "physical hazard." OSHA uses the term "physical hazard" throughout this final rule, however, and defined this term in the proposed rule to clarify its meaning.

The proposed definition of "physical hazard" referred to a hazard that can cause harm "in or near a confined space," or a hazard that might "occur" in or near the confined space. OSHA deleted the language tying the location of where the harm could occur to the meaning of "physical hazard" because a condition establishing a physical hazard can exist wherever it is regardless of proximity to a confined space (*e.g.*, exploding dynamite is a physical hazard whether or not it is in or near a confined space, and an engulfment hazard may originate in a sewer far upstream from where employees are located). OSHA provides appropriate guidance in the implementing requirements of the final standard to ensure that the standard focuses on physical hazards related to confined spaces. See discussion of final §§ 1926.1203 and 1926.1204 in this preamble.

The proposed definition of "physical hazard" also referred to a hazard that has a "reasonable probability" of occurring, and referred to the same list of examples now incorporated into the text of the final rule. OSHA has replaced that phrase with "potential hazard" to keep the terminology consistent with the general industry standard. Both § 1910.146 and this final rule use the term "potential hazard" throughout the standard, so OSHA is using the term with which the industry is already familiar.

One commenter noted that, in the proposed rule, OSHA defined "physical hazard" to encompass not only hazards that could cause death or serious physical harm, but also "a hazard that has a reasonable probability of occurring in or near a confined space" (ID–219.2, p. 75). The latter part of the definition did not require the hazard to result in death or serious physical harm, so the commenter objected on the grounds that the definition of "hazard" would be unnecessarily broad because it would cover minor hazards (*i.e.*, "a stubbed pinky finger or toe") that would, in turn, trigger the permit restriction in the proposed standard (*id*). This final definition does not encompass stubbed fingers or toes or other minor injuries; therefore, the Agency did not include the extra component of the proposed definition in the final rule. The definition duplicates the general industry standard in this regard, and it also limits coverage to hazards that can cause death or "serious physical damage," which OSHA has defined to clarify the differences between "serious physical damage" in this standard and "serious physical harm" as it is used in other OSHA standards. For additional information, see the explanation for the definition of "serious physical damage" below in this preamble.

Another commenter asserted that the definition of "physical hazard" should not encompass equipment or material inside a confined space that could cause an "impact hazard" (*e.g.*, "a low hanging pipe or angle iron strut") simply because it is present inside a confined space and could injure an employee who comes into contact with it (ID–061, p. 7). The commenter expressed concern that if OSHA included these types of equipment or materials, the alternate procedures set forth in § 1926.1203(e) of the final rule would almost never be available because such spaces must be free of physical hazards. In response, OSHA modified the definition of "isolation" and the ventilation alternative procedure in § 1926.1203(e) to make it clear that this alternative procedure remains an option for employers if the employer protects entrants sufficiently from the impact hazards by eliminating them or isolating them through the use of engineering controls. For example, if a low-hanging pipe does not obstruct the entrance or egress of the space and is adequately padded to prevent potential employee exposure to the hazard, or there is enough room in the confined space to barricade the hazardous condition and prevent employee exposure to the hazard posed by the pipe, OSHA would consider the physical hazard isolated within the meaning of that term in this final standard. If there are no other physical hazards in the space, and the employer can demonstrate that it satisfied the other conditions of § 1926.1203(e), then the employer may use the ventilation alternative procedure in that space.

If, however, there is a piece of equipment or other physical object inside a confined space that could cause serious physical damage to an employee upon impact, and the employer does not eliminate or isolate that hazard, then the employer must follow all of the PRCS procedures set forth in § 1926.1204. The commenter did not provide any evidence of why an "impact hazard" is different than any other type of physical hazard, nor did the commenter indicate any inherent restrictions on physical movement that would necessarily limit the force of the impact to a level not capable of causing serious physical damage. In the absence of such evidence, OSHA believes that an object such as a low hanging pipe or angle-iron strut has the same potential to impair the ability of an entrant to exit the confined space unaided as other physical hazards. For example, an entrant could walk into a low-hanging pipe and receive a head injury that could render the entrant unconscious, or the entrant could receive some other form of serious injury to another part of the body that could render the entrant immobile.

Two commenters suggested that the examples in the definition should include both fire and crush hazards (ID–025, p. 2; –095, p. 2). Another commenter suggested that the final rule definition should include falls as an example (ID–211, Tr. p. 42.) OSHA agrees that each of these is an example of a physical hazard, but notes that the list of examples provided in the definition is not an exhaustive list. Therefore, OSHA concludes that it is not necessary to add to this non-exhaustive list.

The Agency included "noise" in the proposed definition of "physical hazard" as one example of such a hazard because sound waves constitute a physical disturbance of the air that results in a physical impact on the human ear. Several commenters asserted that excessive noise should not trigger the application of PRCS procedures when no other hazard exists (ID–112, p. 17; –114, p. 2; –138, p. 4). These commenters indicated that the

final standard should not treat noise as a physical hazard if the noise did not rise to the level of impairing the ability of an entrant to exit the space without aid; however, these commenters did not assert, or provide any evidence supporting the view, that noise alone is incapable of such impairment or otherwise causing serious physical damage, as OSHA defines it in this final rule. Therefore, OSHA is retaining the term "noise" as an example of a physical hazard in this final definition.

One of the commenters questioned whether noise levels exceeding the decibel levels specified in § 1926.52, OSHA's construction noise standard, would trigger the permit-space requirements. The final construction confined spaces standard does not specify this threshold, and OSHA notes that noise will only trigger PRCS procedures if it reaches a level at which it can cause death or serious physical damage. For example, noise would constitute a physical hazard if it is loud enough to substantially reduce the efficiency of the entrant's ears to process communications from the attendant or entry supervisor regarding exit instructions or other emergency information, thereby impairing the ability of the employee in the permit space to exit the space safely (see the definition of "serious physical damage," which includes "an impairment . . . in which a body part is made functionally useless or is substantially reduced in efficiency" and specifically mentions disorientation). OSHA has previously recognized the capacity of noise to create a hazardous situation by masking warning shouts or signals (see, *e.g.*, OSHA's preamble to § 1910.95, the general industry noise exposure standard, at 46 FR 4080 (Jan. 16, 1981). Employers generally can address these types of noise hazards by implementing a permit program that uses non-auditory cues, such as flashing lights, to resolve communication issues.

In some cases, the sound waves from an explosion or other air disturbance may be so intense that it might cause physical pain or disorient an entrant to the extent that it could impair the ability of the entrant to exit the space unaided. See, *e.g.*, Stephen A. Fausti, Ph.D., et al., *Auditory and vestibular dysfunction associated with blast-related traumatic brain injury, Journal of Rehabilitation Research and Development*, Vol. 46, No. 6 (2009) pp. 797–810 (discussing the impacts of excessive noise exposure, such as the noise caused by a blast or explosion, including immediate temporary hearing loss and sensory damage).

Two of these commenters asserted that the use of personal protective equipment can protect employees effectively from noise hazards, but expressed concern that OSHA would prohibit employers from working in a confined space with excessive noise because the definition of "control" provides explicitly that "personal protective equipment is not a control" (ID–114, p. 2.) As another commenter noted, OSHA would treat earplugs as protection from a hazard, but not control of the hazard, and, therefore, would prohibit work in an area with an uncontrolled noise hazard (ID–112, p. 17).

The final rule will not prevent work in a noisy confined space if employees are properly protected. In the final rule, OSHA requires employers to protect their employees adequately from confined-space hazards; in protecting employees, other construction standards also would apply. Therefore, if the noise is above the decibel levels specified in 29 CFR 1926.52, employers must protect their employers in accordance with that section, regardless of whether the noise conditions trigger the permit-space requirements of this final standard. OSHA's Field Operations Manual provides that employers may "rely on personal protective equipment and a hearing conservation program, rather than engineering and/or administrative controls, when hearing protectors will effectively attenuate the noise to which employees are exposed to acceptable levels." (CPL 02–00–150 at Ch. 4, XI.B). However, feasible administrative and/or engineering controls must be used when personal protective equipment may not reliably reduce noise levels received to the levels specified in the standard or when those controls are less expensive than an effective hearing conservation program. Employers choosing to rely on personal protective equipment instead of administrative or engineering controls must ensure that employees will be aware of continuous monitoring alarms and other hazard alerts in a timely manner regardless of PPE use. Therefore, to promote consistency with OSHA's treatment of noise hazards under § 1926.52, OSHA permits employers to use these same methods to address the noise hazards in a permit space so long as the administrative and engineering controls, or the personal protective equipment, do not interfere with the ability of the entrant to maintain effective communication with the attendant and other workers. Notwithstanding the general statement in the definition of "control" that personal protective equipment does not constitute a control, OSHA is permitting employers to use appropriate hearing-protection equipment as a means of addressing a noise hazard in a permit space when the PPE attenuates the noise to acceptable levels. However, if the employer is unable to reduce an employee's exposure to noise to a level where it does not constitute a threat of death or serious physical damage, then the employer must not permit employees to enter any portion of the permit space that would expose the employee to such a noise level.

Prohibited condition means any condition in a permit space not allowed by the permit during the period of authorized entry. This portion of the definition is identical to the definition in § 1910.146(b), and is similar to the definition of "unplanned condition" in the proposal. In addition, the Agency added a sentence to the definition in the final standard to clarify that a hazardous atmosphere is always a prohibited condition, unless the employer can demonstrate that use of appropriate PPE will effectively protect entrants; this added condition means that employees cannot work in a hazardous atmosphere without the appropriate PPE. The definition of hazardous atmosphere in the general industry standard implies this condition, which the Agency made explicit in this final rule for construction.

Qualified person means one who successfully demonstrates his/her ability to solve or resolve problems relating to the subject matter, the work, or the project. While the general industry does not include this term in the definition of "entry supervisor," the proposed rule did, and OSHA retained this term in the final standard. While the proposal did not define "qualified person," the final rule's definition is similar to definitions of the term found in § 1926.32(m) and other subparts of OSHA's construction safety standards (see, *e.g.*, § 1926.1401—Cranes and derricks in construction). In this way the final rule clarifies that an "entry supervisor" clarifies that the employer must ensure that the entry supervisor has sufficient experience to properly conduct identification, testing, and planning for the type of confined space involved.

Representative permit space means a confined space, or mock-up of a confined space, that has entrance openings that are similar to, and is of similar size, configuration, and accessibility to, the permit space that authorized entrants enter. OSHA simplified this definition from the definition included in the proposed rule, but the simplification is a non-

substantive change that clarifies the criteria for a representative permit space. OSHA changed the term from "simulated permit-required confined space" to "representative permit space" because the Agency used the latter term in the general industry confined spaces standard at § 1910.146; however, changing the terminology has no effect on the meaning of the term and the requirements relating to it. OSHA changed this terminology to make this final rule more consistent with § 1910.146, for the reasons set forth above in the section, "Decision to abandon the proposed new classification system."

Rescue means retrieving, and providing medical assistance to, one or more employees who are in a permit space. OSHA defined this term in the proposed rule, and included the term in the final rule unchanged except for addition of the phrase "one or more" to clarify that a rescue can involve the retrieval of a single employee.

Rescue service means the personnel designated to rescue employees from permit spaces. This definition duplicates the definition of the term in the general industry standard at § 1910.146. In the proposed rule, OSHA included specific statements that the term applied to both onsite and offsite personnel, and to personnel designated by the employer for either non-entry or entry rescue (or both). In the final standard, OSHA elected to use the broader language of the general industry standard for consistency; however, the Agency believes that there is no substantive difference between the proposed and final standards in the meaning of these statements.

Retrieval system means the equipment used for non-entry rescue of persons from permit spaces. The purpose of the retrieval system is to provide a means of removing an entrant from a space quickly without exposing any additional employees to the hazards of permit-space entry. This equipment typically includes a retrieval line attached around the chest of the entrant or to a full-body harness worn by the entrant, with the other end of the line attached to a lifting device or anchor. Alternatively, the retrieval system may consist of a retrieval line attached to wristlets or anklets when this method of pulling the entrant from the confined space would be safer than using a body harness.

The definition of this term in the final standard duplicates the definition found in § 1910.146 except that it allows for the use of anklets. In proposed § 1926.1213(a)(4), OSHA permitted the use of "ankle straps" for retrieval in certain cases, and at least one commenter supported this option in limited circumstances such as some horizontal entries (ID–94, p. 1) (see also the discussion of the requirements retrieval lines in § 1926.1211(c)(1)).

Serious physical damage refers to an impairment or illness in which a body part becomes functionally useless or substantially reduced in efficiency.

One commenter noted that the proposed definition ("serious physical harm" in the proposed rule) included impairments that are "chronic," in addition to impairments that are "acute," and asserted that this definition is, therefore, too broad because it would apply on exposing an employee to a minor hazard that would not interfere with the ability to self-rescue (ID–219.2, p. 76).

The term "serious physical harm" has a longstanding meaning within the OSH Act that developed over many years through litigation and many rulemakings. When developing the definition used in the final rule, OSHA used the Agency's common understanding of "serious physical harm," as provided in the Agency's Field Operations Manual (FOM), which provides guidance to OSHA personnel conducting inspections and other activities in the field.[11] The Agency acknowledges that the FOM, compared to the final rule, has a broader purpose of providing guidance for the enforcement of the OSH Act as a whole, and that the inclusion of the phrase "acute or chronic" from the FOM in the definition may not provide meaningful guidance in the context of this final rule. Therefore, OSHA changed the term to "serious physical damage" to distinguish it from the broader term used in the FOM and other contexts, and also did not include the phrase "or acute or chronic" in this definition. By doing so, OSHA addressed the commenter's concern that the reference to "chronic" impairments would "cause the standard to apply to conditions that cannot pose a significant risk of harm from the entry" and thereby "increase the cost of the standard so drastically as to render it infeasible for all construction industry sectors" (ID–219.2, p. 72). In addition, OSHA recognizes that a similar issue exists with the reference to illness. The proposed definition included "illnesses that could shorten life or substantially reduce physical or mental efficiency by impairing a normal functioning body part." This language could be read as including chronic illnesses that do not limit the ability to self-rescue. For the purposes of this standard only, OSHA intends the reference to illness to encompass only those illnesses that could interfere with the entrant's ability to exit the confined space. Therefore, the final rule deleted this language, and inserted "illness" after "impairment" to make clear that only illnesses that could impede self-rescue are covered in the meaning of serious physical damage.

Nevertheless, the Agency does not believe that these distinctions make a meaningful difference in employer duties because the majority of hazards in a confined space that could cause a serious physical injury are also likely to have the potential to impair the entrant's ability to exit the space without aid. As OSHA stated in the FOM in a note explaining the term "serious physical harm": "The key determination is the likelihood that death or serious harm will result *IF* an accident or exposure occurs" (Emphasis in the original).

Although one commenter belittled the proposed definition of "serious physical harm" as encompaasing a "stubbed pinky finger or toe" criticized the potentially broad scope of "serious physical harm" by suggesting that it would include "a stubbed pinky finger or toe" (ID–219.2, p. 75), such an argument improperly shifts the focus of the standard away from the hazard requiring protection and to the potential outcome of employee exposure to that hazard. If, for example, there is a physical obstruction in a confined space that is only capable of inflicting, as a maximum injury, a stubbed toe or finger, then OSHA agrees with the commenter that such an obstruction would not trigger any permit space requirements under this final standard. However, if it is reasonably foreseeable that an obstruction could cause the entrant to trip and either strike his/her head and lose consciousness, or fall and break his/her arm or leg thereby impairing the entrant's ability to exit the space, then the presence of this hazard would trigger the permit-space requirements of this standard, and the entry employer would need to address the hazard to protect employees it directs.

[11] OSHA based the definition in the proposed rule on the Field Inspection Reference Manual, chapter III, section C.2.b(2)(c). See 72 FR 67358. OSHA subsequently published the Field Operations Manual and updated it in April, 2011, but the definition of "serious physical harm" remains unchanged from the previous version: "Impairment of the body in which part of the body is made functionally useless or is substantially reduced in efficiency on or off the job. Such impairment may be permanent or temporary, chronic or acute. Injuries involving such impairment would usually require treatment by a medical doctor or other licensed health care professional." See CPL 02–00–150 II.C.3. at p. 4–11.

Tagout, as used in this confined spaces standard, is a two-step process that follows the general industry approach: First, a tagout device must be placed on a circuit or equipment that has been deenergized, in accordance with an established procedure, to indicate that circuit or equipment being controlled may not be operated until the tagout device is removed. Second, the employer must ensure that the tagout provides equivalent protection to lockout, or that lockout is infeasible. If lockout is infeasible, the employer must tag the equipment and also provide protection from stored (residual) energy. This ensures that the final rule is more closely aligned with the full protections required for general industry work.

Both the general industry rule and this final rule permit "tagout," in addition to "lockout," as a means of isolating some hazards. The Agency added a definition of "tagout" to the construction standard because OSHA intends the tagout process under this construction rule to parallel the process under the general industry rule, which requires compliance with § 1910.147—The control of hazardous energy (lockout/tagout) (see § 1910.146(b); § 1910.147(a)(3)(ii)).[12] That tagout process involves more than the placement of a tag on equipment, and the final rule's definition of "tagout" ensures that the regulatory text of this final rule reflects the critical additional elements of the general industry standard.

First, tagging equipment does not, by itself, prevent the release of a hazard into the space. Therefore, under § 1910.147(c)(2), an employer may use tagout alone (*i.e.*, not in conjunction with lockout) only if an energy isolating device is not capable of being locked out or the employer can demonstrate that the utilization of a tagout system will provide full employee protection. The standard specifies that "full employee protection" means that the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program (§ 1910.147(c)(3)). Paragraph (2) of the final rule's definition of tagout requires employers to ensure the same level of safety if they use tagout when lockout is feasible.

Second, the general industry standard provides examples safety measures employers may use as a part of the tagout process to reduce the likelihood of inadvertent energization: Removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle (§ 1910.147(c)(3)(ii)). Under the final rule, employers may also use these methods, when applicable to their work, as part of their process for fulfilling their obligation to ensure that tagout provides equivalent protection to lockout. Finally, even when tagout is used alone, the general industry standard requires the employer to relieve, disconnect, restrain and otherwise render safe stored (residual) energy (see § 1910.147(d)(5)).

This same requirement applies in this final rule to the use of tagout alone.

Test or testing means the process by which employers identify and evaluate the hazards that may confront entrants of a permit space. Testing includes specifying the identification and evaluation processes the employer will perform in the permit space. This definition is similar to the definition found in § 1910.146, except that OSHA added the word "test" to clarify that the definition applies to both words. OSHA is also including a note identical to the note to this definition on the general industry standard. The note emphasizes the importance of testing as the basis for developing and implementing adequate control measures.

Ventilate or ventilation means controlling a hazardous atmosphere using continuous forced-air mechanical systems that meet the requirements of 29 CFR 1926.57—Ventilation. This definition is identical to the definition of these terms in the proposed rule. Some commenters asserted that the final definition should allow for the use of suction as a form of ventilation (ID–061.1, p. 1; –210, Tr. p. 289). Although the final rule does not prohibit the use of suction, suction is not an adequate means of providing the general ventilation required by this final rule. The general industry standard does not include a definition of "ventilation," but OSHA interpreted that standard as precluding the use of "negative" suction ventilation to meet the requirements of the standard. See April 24, 1996, letter to Verne Brown. Suction may be appropriate to remove contaminants from a specific operation close to the source of the contaminant, but not for general ventilation of the entire confined space. OSHA is, therefore, including the proposed definition of "ventilate" in the final rule.

Another commenter requested clarification regarding how an employer can use forced air to "ventilate" while also complying with OSHA's welding requirements at § 1926.353(a) through (e) (ID–061.1, p. 2). Section 1926.353(a)(3) requires local exhaust ventilation (LEV) when general mechanical ventilation does not provide sufficient protection. In addition, § 1926.351(a)(1) authorizes the use of general mechanical ventilation. The overlap of the welding standard and this confined spaces standard is addressed earlier in the explanation of § 1926.1201(c). Both of these practices are consistent with the requirement in this final rule that employers use ventilation that consists of continuous forced-air. Accordingly, this confined spaces standard requires that employers use continuous forced-air ventilation to ventilate confined spaces. When an employee is welding inside a confined space, § 1926.353(a)(3) may require the employer to also implement LEV. In conclusion, OSHA believes that LEV alone is not sufficient for the purposes of providing general ventilation of a confined space because LEV might not eliminate all of the toxic material from the area, and any residual fumes would be more likely to build up and create a potential or actual hazardous atmosphere in a confined space.

Section 1926.1203—General Requirements

Final § 1926.1203 sets forth general requirements for employers that have operations within the scope of this standard. This section establishes a comprehensive regulatory framework under which employers must identify any permit spaces at their workplaces and take appropriate measures for the protection of affected employees. It is similar to the general industry rule at § 1910.146(c). The corresponding requirements in the proposed rule also were similar to the requirements in this final rule, but this final rule organizes the requirements differently.

Paragraph (a). Final § 1926.1203(a) is similar to the corresponding provision for general industry confined spaces at § 1910.146(c)(1), with some minor modifications. Final § 1926.1203(a) requires an employer to have a competent person evaluate the spaces in which employees it directs may work, and requires a two-step process for the evaluation: (1) The competent person must evaluate whether a space meets the definition of a confined space, and if so, (2) the competent person must identify, in accordance with other

[12] OSHA did not include a definition of "tagout" in the NPRM, though the preamble noted the Agency's intent that "appropriate lockout/tagout procedures" were required for isolation of physical hazards (72 FR 67386). As explained earlier in this preamble, OSHA is tailoring the final rule to follow the general industry rule more closely in response to numerous requests by commenters. If OSHA had allowed the use of tags without more, it would have been a key distinction from the general industry standard and would have allowed employers to circumvent most of the permit-space requirements involving physical hazards.

provisions of this final rule, any confined spaces that are PRCSs through consideration and evaluation of the ace, including testing of the space as cessary. The final construction rule specifies both the two-step approach and the competent-person requirement more explicitly than in the general industry standard.

OSHA added the competent-person requirement in response to several comments noting that the analysis required for these evaluations necessitated some level of expertise. (See ID–025, p. 2; –028, p. 4; –095, p. 2; –097, p. 3; –140, p. 3; –150, p. 2.) A "competent person," which § 1926.1202 defines under this standard, must be capable of identifying the hazards of permit spaces and have the authority to eliminate them promptly. Because final § 1926.1203(a) requires the competent person to conduct initial testing as necessary, the competent person also must be knowledgeable about appropriate testing. The correct initial identification of permit spaces is an important part of preventing unauthorized entry into those spaces and ensuring that authorized entrants have adequate protection.

As discussed in the explanation of the definition of "entry employer," each employer has a responsibility to protect l the employees that it directs, ncluding employees hired directly by that employer as well as other employees, such as temporary workers, who are under its the control at the worksite. Thus, each employer who directs a temporary worker to a work area must ensure that a competent person evaluates that area for confined spaces and permit spaces.

Final § 1926.1203(a) also differs from the general industry rule in that it explicitly specifies that the competent person must identify confined and permit spaces through consideration and evaluation of other elements of the confined space, and testing as necessary. The atmospheric-testing requirement in this final rule is less specific than the atmospheric-testing requirement in proposed § 1926.1204(b), which would have required employers to test for atmospheric hazards using the procedures in proposed § 1926.1204(b)(3). However, final § 1926.1203(a) is more specific than the corresponding provision in the general industry rule, which states that employers must "evaluate the workplace" to determine if any spaces are permit-required spaces. ccordingly, this final provision explicitly requires testing if necessary to assess whether a confined space is a permit-required confined space.

The testing required by final § 1926.1203(a) is only initial testing; final § 1926.1204(b) addresses the detailed evaluation and identification of hazards found within the space (see discussion later in this preamble). The primary purpose of the assessment required by § 1926.1203(a) is to determine whether the space is a permit space so that this information can be conveyed to employees, the controlling contractor, and other employers at the site in order to prohibit unauthorized entry. In some cases employers may discover that the space is a permit space after only limited testing and decide not to allow their employees to enter the space at that point rather than fully assessing the space. Employers who intend to enter, however, may choose to conduct more thorough testing that satisfies the requirements of both § 1926.1203(a) and § 1926.1204(b) at the same time, so long as it does not delay their notification of their employees and the controlling contractor of the existence of the permit space.

Final § 1926.1203(a) also requires the competent person to consider and evaluate other elements of the confined space to determine if it is a permit-required confined space. Such elements include the configuration of the space and any physical hazards or obstacles to egress from the space. Both the testing and consideration of the space are essential in making an initial determination whether a confined space is a permit-required space; the Agency believes that requiring these basic steps will ensure that employers correctly identify PRCSs.

OSHA determined that employers must identify confined spaces that meet the definition of a permit space at the time their work begins on a worksite rather than when an employer decides that employees will enter a confined space. The Agency believes that the initial workplace survey is essential because it alerts employers to the need to take measures to prevent unauthorized entry into these spaces. OSHA further notes that while it may not always be feasible for employers to create and follow a full permit program before assessing an previously unexplored confined space, when it is feasible employers must treat any entry into a confined space as if the space was a permit space and eliminate or isolate the hazards before entry (see § 1926.1203(d) and (g)(2); § 1926.1204(b)(2)). This applies to entries performed to determine whether or not that space is a permit space.

Final § 1926.1203(a) states that there are two steps to be followed. The first step in the evaluation process is to determine whether a space meets the definition of a confined space. If the employer determines that there is a confined space on the worksite, the second step requires the employer to evaluate, in accordance with other provisions of this final rule, whether there are any actual or potential hazards in the confined space. Actual or potential hazards the employer must consider include atmospheric, engulfment, physical, or any other type of hazard. Both stages of the initial evaluation are crucial, as correctly identifying both confined spaces and the conditions or potential conditions that would make a confined space a permit-required confined space determines how the employer and employees will perform in and around the space thereafter. Though the general industry rule at § 1910.146(c)(1) does not explicitly identify the two steps, they are implicit in § 1910.146(c)(1) because an employer cannot evaluate the hazards of a confined space without first evaluating whether there are confined spaces on the worksite, as well as the location of these confined spaces. This clarification that an employer must first consider whether there are confined spaces at a worksite also was in proposed § 1926.1204(b). The Agency believes that making this requirement explicit is necessary to ensure that employers correctly assess the spaces so that they can adequately protect employees from the hazards present in the confined spaces.

One commenter requested that OSHA clarify which employer has the responsibility to evaluate hazards in confined spaces (ID–086, p. 4). Final § 1926.1203(a) clarifies the requirement by specifying that each employer that directs employees who *may* work in a confined space must perform the requisite evaluation. As in both the general industry standard and the proposed rule, this evaluation provision applies to a group of employers larger than just entry employers. The general industry standard requires each employer to evaluate the workspace and determine if any confined spaces are permit spaces (§ 1910.146(c)(1)). On a construction worksite, there typically are many more employers than at general industry worksites. Therefore, under final § 1926.1203(a), each employer that directs employees who may work in a confined space must identify all such spaces, and also identify each space that is a permit space. The term "may work" means that this requirement applies to any employer (not just entry employers) at a construction worksite who should

reasonably anticipate employee exposure to confined spaces; the focus is on whether the employee might enter the space, with the assumption that entry would constitute "work." Accordingly, these employers must determine whether employees they direct could foreseeably work in areas at a worksite having confined spaces and whether any of these confined spaces are permit spaces.

Employers may cooperate in identifying the confined spaces and permit-required confined spaces on a worksite, but each employer remains responsible for identifying spaces that could affect employees it directs, including temporary workers. For example, several different employers could work with a single competent person designated by one of them, or by the controlling contractor, to identify the confined and permit spaces on a site, but each employer must still ensure compliance with the requirements of this standard.

The commenter who requested clarification about evaluating hazards also asked why the controlling contractor or host employer did not have the responsibility to evaluate the confined spaces, and asserted that entry employers did not have the information necessary to classify a space (ID–086, p. [illegible]). The final rule follows the general industry standard, which assigns employers the responsibility to evaluate the spaces, and it is appropriate that the employers who direct employees who may be exposed to the hazards of permit spaces are responsible for classifying the space. Further, prior to entry into a permit space, controlling contractors and entry employers have duties under final §§ 1926.1203(h) and (i) to exchange information about the permit space.

Some commenters also suggested requiring a competent person to perform additional duties specified by this standard, such as monitoring or calibration of equipment (ID–025, p. 3; –028, pp. 3–4; –150, p. 2). However, final § 1926.1204(h) requires employers to properly train employees who perform these duties during entry operations. This final standard also includes training and knowledge requirements for entry supervisors, attendants, and other specific positions set forth in this standard to ensure that the employees filling those positions have the knowledge and capabilities to perform the specified duties once a permit space is identified (see final §§ 1926.1207–1210). The initial evaluation of spaces under final § 1926.1203(a) includes a competent-person requirement because of the critical need to identify confined and permit spaces early in the work at the site, and because the requirement to evaluate spaces also applies to employers who are not entry employers and who are, thus, not covered under the permit-space requirements of this final rule.

One commenter suggested that OSHA add a note in the standard to inform the regulated community that Material Safety Data sheets (now called Safety Data sheets) may be helpful in evaluating confined space hazards (ID–140, p. 4). OSHA agrees that this is useful information, but observes that a note under the definition of "hazardous atmosphere" in final § 1926.1202 provides similar information and achieves the commenter's stated result.

The same commenter also expressed concern that an employer, when identifying confined space hazards, does not have to consider the work it plans on performing inside the confined space, which may create a hazard (*e.g.*, welding or painting) (ID–140, p. 5). The commenter based this assertion on proposed § 1926.1204(b)(1), which provided that an employer must identify confined space hazards without entering the space and, thus, without first performing the work that could potentially create a hazard. OSHA drafted final § 1926.1203(a) broadly, so it is not as specific as proposed § 1926.1204(b)(1). An employer who is planning to conduct entry operations must develop and implement a written permit-space program under final rule § 1926.1203(d). Furthermore, under final § 1926.1205(c)(1), these employers must specify acceptable entry conditions. Taken together, these provisions require an employer that will conduct entry operations to consider the work it is planning to perform and the hazards that may result from this work when conducting the initial evaluation under final § 1926.1203(a).

One commenter asserted that the proposed prohibition on the use of mechanical ventilation or changing the space's natural ventilation during atmospheric testing would make some confined space work dangerous (ID–077, p. 1). This commenter asserted that when an employer is performing abrasive blasting on a tank interior, it is unsafe to perform the abrasive blasting with the dust collector turned off just to get a baseline reading. This commenter misunderstands the purpose of this requirement. Under final § 1926.1203(a), an employer's evaluation is the first step for any confined space work. This evaluation must occur before the employer performs either ventilation or construction in the confined space (see § 1203(a) and § 1204(e)(1) (allows an exception for spaces where it is infeasible to isolate the space). Only after the employer completes this initial evaluation, and the other required steps of its permit-space program, may it perform the construction work permitted under the rest of this final rule (*e.g.*, abrasive blasting with the dust collector turned on); however, the employer must consider this work and the types of hazards it might create when conducting the initial evaluation and when developing its permit-space program.

Paragraph (b). Final § 1926.1203(b) requires an employer that identifies one or more permit spaces on a worksite to inform exposed employees, employees' authorized representatives, and controlling contractors of the existence and location of those permit spaces and the known dangers inside. This duty applies to the employer that identifies a permit space under final § 1926.1203(a), as opposed to the general industry language, which refers to "the employer." One of the keys to protecting employees from PRCS hazards is for both employers and employees to know the location of the PRCSs at the job site, the characteristics of the hazards, and their associated dangers. The provisions in this paragraph will achieve this goal.

The introductory language in paragraph (b) follows the general industry standard except that the new rule specifies that the employer's duty is triggered when the workplace has "one or more" permit spaces, whereas the general industry standard just refers to "spaces" in the plural. A single permit space triggers the employer's duty under both the general industry standard and this final rule, and OSHA is making this point explicit in the new rule.

Paragraph (b)(1). Final § 1926.1203(b)(1) requires the employer to inform exposed employees of the existence and location of, and the danger posed by, the permit spaces by posting danger signs or by any other equally effective means. Final § 1926.1203(b)(1) is similar to both the general industry rule at § 1910.146(c)(2) and proposed § 1926.1209(a)(2). As OSHA noted in the preamble to the general industry standard, many confined space accidents occur when an employee fails to recognize the hazards present when entering a permit-required confined space that the employer failed to mark as such. (58 FR 4462, 4483 (Dec. 17, 1993)). Therefore, OSHA determined that it is important to identify permit spaces and to inform exposed employees of their presence and the hazards involved. The Agency believes that employees need this information to

understand the seriousness of potential hazards in PRCSs. To recognize all methods of informing employees and to clarify the purpose of the rule, OSHA is adopting a performance-oriented requirement in the final rule. Accordingly, the employer must post a danger sign at or near PRCS entrances, which the Agency believes is an effective way to ensure that employees receive proper warning of the hazards in a PRCS, or adequately inform exposed employees through another equally effective means. Compliance with this requirement will ensure that exposed employees who are not authorized entrants receive the information necessary to prevent them from entering the spaces. Whatever method the employer uses, the standard requires the employer to inform employees exposed to the hazards posed by permit-required confined spaces of the existence, location, and danger of those spaces. Everyone at the construction site benefits from this information even if they do not engage in construction activity (*e.g.*, designers or architects).

However, OSHA notes that only employees who work in PRCSs need to know the details about the potential hazards. Final § 1926.1205(c) provides that employers post the entry permit, which contains information about the hazards of the PRCS and the measures used to address those hazards, at the entry portal or make this information available by any other equally effective means at the time of entry. Final § 1926.1212 provides that employers must make available to each affected employee and his/her authorized representatives all information required by this standard. Therefore, final § 1926.1203(b) does not require employers to list specific PRCS hazards on each sign.

In enforcing this provision, OSHA will make determinations about whether methods other than warning signs used by employers to notify employees about the spaces are truly as effective in imparting the required information to employees. Such methods must go beyond just the generic training required by this standard, for example, since generic training would not identify the location of permit spaces at a specific worksite. Therefore, an equally effective means would identify the PRCS locations so that employees at the job site who may work near the PRCSs would be aware of these locations and would understand the importance of not entering them. The final rule places on employers, not employees, the burden of using an effective means of identifying the spaces and controlling the associated hazards.

If an employer uses a warning sign, the sign must convey that entering the space is dangerous and that only authorized employees may enter the space. In this final provision, OSHA included the note from § 1910.146(c)(2) that a sign reading "DANGER—PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or similar language would satisfy the requirement for a sign.[13] This language is familiar to employers and employees under the general industry standard, and is a clear warning not to enter the space. The Agency believes that, when properly warned, employees who are not authorized to enter the space would avoid entering the PRCS, thereby preventing harm that could result from the PRCS hazards.

Proposed § 1926.1209(a) specified a two-step process that involved notifying employees who would be in or near the permit space, and then posting a sign. One commenter asserted that limiting notification to employees who the entry employer anticipates will be in or near the PRCS, as provided in proposed § 1926.1209(a)(1), would allow entry employers to avoid this requirement by claiming they did not anticipate a particular employee was going to be in or near the PRCS (ID–086, p. 5). Final § 1926.1203(b)(1) requires notification to exposed employees, which addresses this commenter's concern.

Other commenters argued that notifying employees near a PRCS, or employees on the jobsite, was burdensome, and that posting a warning sign would be sufficient to notify employees of the PRCSs and their hazards (ID–124, pp. 6–7; ID–133, p. 2). At least one other commenter argued that the barriers required by proposed § 1926.1209(b) would not always be feasible, and that posting warning signs would be sufficient (ID–104, p. 3). OSHA agrees with these commenters, and drafted final § 1926.1203(b)(1) to specify that notification by posting a warning sign would provide adequate notice to employees of the existence, location, and hazards of the PRCSs.

Another commenter was unsure whether the posting requirement applies when employers physically barricade the space (ID–099, p. 3). It does. Final § 1926.1203(b)(1) requires posting a warning sign or using another equally effective means of informing exposed employer about the hazards of the permit space, and final § 1926.1203(c) requires an employer to comply with final § 1926.1203(b)(1) when the employer prohibits entry into a confined space. Barricading the confined space in a manner that prevents easy entry by unauthorized employees (for example, by using a barricade that requires a key to gain entry) would be an equally effective means of informing employees under § 1926.1203(b)(1), provided the employer ensures that all affected employees receive information about such spaces and know that they must not enter the spaces without authorization and without taking proper precautions This means of compliance is consistent with the general industry standard. See OSHA Directive CPL 02–00–100: Application of the Permit-Required Confined Spaces (PRCS) Standard, Appendix E, Section (c)(4), and July 22, 1998, letter to Mr. Black.

This commenter, as well as another, asked which employer has the responsibility to post the warning sign if the space is a pre-existing one or there are multiple entry employers (ID–099, p. 3; –133, p. 2). Each employer that identifies that space, or receives notice of it, has a duty to inform exposed employees about a permit space (see § 1926.1203(b) and (c)). Each employer also has a responsibility to identify permit spaces in which one or more of employees it directs may work (see § 1926.1203(a)). However, if there already is a warning sign posted at the permit space, then the employer does not need to post an additional sign. Rather, an employer that relies on a preexisting sign to identify a space must ensure that the sign remains posted for the duration of the potential exposure to the permit space of employees it directs.

One of those commenters also asserted that the controlling contractor or host employer should post the warning sign because of their responsibility to ensure safe confined space entry operations. Final § 1926.1203(b)(1) requires the "employer who identifies a permit space" to post the warning sign. For the purposes of this standard, such employers include the controlling contractor, the host employer, and the entry employer if these employers have employees who could be exposed to permit-space hazards. The standard merely requires that an employer post the sign, thereby retaining flexibility among these entities to determine which employer is in the best position to post the sign. When multiple employers will be working in the same space, each employer has a separate duty to post the warning sign. If an employer decides to enter the space, then this subject must be resolved between the controlling contractor and the entry employers as part of the coordination discussion required by final § 1926.1203(h)(4).

[13] OSHA's requirements for accident prevention signs in § 1926.200 also apply.

Paragraph (b)(2). Final § 1926.1203(b)(2) requires each employer to notify its employees' representatives and the controlling contractor, in a manner other than posting, of the hazards of permit spaces and the location of those spaces. This requirement follows proposed § 1926.1209(a)(1). The primary purpose of this provision is to ensure that the employer who identifies a permit space conveys the location and general characteristics of the space to the designated recipients as soon as possible. Later, in accordance with § 1926.1203(h)(3), the entry employer must provide to the controlling contractor a more thorough assessment of the space, the hazards it expects to encounter, and the permit program measures it intends to use to address those hazards. It is important for employers to provide the controlling contractor with this information because the controlling contractor is in the best position to convey the employer's information to other employers at the site, and later share this information with entry employers under final § 1926.1203(h). Final § 1926.1203(b)(2) is also important because it applies to employers who identify a permit space, even if they choose not to allow their employees to enter it, thereby ensuring that the location of all permit spaces will be conveyed to the controlling contractor. Otherwise, the information exchange in § 1926.1203(h)(3) would only apply if the employer chooses to enter the space and become an "entry employer."

One commenter questioned the necessity of notifying authorized representatives, particularly if no such representatives are on the project site (ID–099, p. 2). Both the general industry standard and this final standard typically require information sharing between employers and employees and the employees' authorized representatives (see, *e.g.*, § 1910.146(l) and the discussion of § 1926.1212 later in this document). OSHA believes that notifying employees and their authorized representatives of the presence of confined spaces on a worksite will contribute to the successful implementation of safe entry operations, and the prevention of unauthorized entry, by ensuring that they have knowledge of the hazards present in the confined space. Sharing this information with employees' authorized representatives provides an additional way to ensure that this information reaches the employer's employees, and alerts the authorized representatives that there is the potential for permit entry operations. Final § 1926.1203(b)(2) also will facilitate the effective sharing of this important information among other employers at the site whose activities may impact the PRCS, as well as the employees of those other employers.

In some cases, an authorized representative of employees may have more extensive knowledge than the employee about particular hazards, or may be in a better position than the employee to assess the safety of the project site based on past experience at similar sites; therefore, OSHA sees no reason to deviate from the accepted general industry practice of information sharing with the employee's authorized representatives. Final § 1926.1203(b)(2) limits this notification requirement to only the representatives of the employer's employees. Also, while employers must notify these representatives in a timely manner to ensure that the information is available to the employee representatives and controlling contractor in sufficient time for it to be useful, this notification may be by any means normally used for communication with the employee representative or agreed upon in advance, including telephonic or electronic communication. If there are no authorized representatives of employees, the employer must still notify employees under final § 1926.1203(b)(1), and the controlling contractor under final § 1926.1203(b)(2).

Another commenter asserted that notifying the controlling contractor of the existence of every PRCS was unnecessary because posting would provide adequate notification (ID–090, p. 2). With respect to employees exposed to confined space hazards, OSHA agrees with this commenter that posting will provide these employees with adequate notification because of the proximity of the danger sign to the PRCS. Therefore, final § 1926.1203(b)(1) requires only posting to notify employees of confined space hazards, similar to the general industry standard at § 1910.146(c)(2). However, with respect to the controlling contractor and the employees' authorized representatives, a separate notification requirement is necessary to ensure a timely and efficient information exchange, rather than relying on the controlling contractor and employees' authorized representatives to explore the worksite and discover each danger sign.

Paragraph (c). Final § 1926.1203(c), which is similar to § 1910.146(c)(3), requires an employer that identifies, or has notification of, a permit space to take measures that are effective in prohibiting entry when that employer decides employees it directs will not enter permit spaces, and to comply with the rest of the standard as applicable. This provision applies to all employers that: Identify permit spaces under final § 1926.1203(a); receive notification from the controlling contractor of the presence of a permit space under final § 1926.1203(h)(2); receive notification of the permit space from a danger sign posted at a permit space; or receive notification of the permit space from any other means. While proposed § 1926.1209(b) required employers not conducting confined space operations to take specific steps to prohibit entry by employees, final § 1926.1203(c) follows the performance-oriented language of the general industry rule.

The effective measures to prohibit entry could include permanently closing the space and providing barriers, supplemented by training employees and the posted danger signs required under § 1926.1203(b). In any event, the steps taken by the employer must be effective in preventing employee entry into permit spaces. In OSHA's experience, posting signs without barriers is generally less effective than with barriers, so employers who choose the former method must take special care to ensure that employees they direct recognize and understand permit-space warning signs, that they are knowledgeable regarding the hazards associated with these spaces, and that they understand that entry into the spaces is not authorized. This reinforces the employer's existing obligation under § 1926.21(b)(2) to instruct each employee in the recognition and avoidance of unsafe conditions. OSHA believes that these provisions in the final rule will protect employees from unauthorized entry into permit spaces.

Final § 1926.1203(c) also requires employers covered by this provision to comply with the rest of the confined spaces in construction standard, as applicable. The parallel provision in the general industry standard requires employers to comply with specific provisions of that standard, which correspond to the following provisions in this final rule: § 1926.1203(a), relating to identification of permit spaces in the workplace; § 1926.1203(b)(1), relating to informing employees of the presence of permit spaces; § 1926.1203(f), relating to changes in confined spaces; and § 1926.1203(h), relating to the controlling contractor's information exchange with employers. Employers must comply with those provisions that are applicable. For example, under final § 1926.1203(h)(2) and (h)(4), controlling contractors must inform and coordinate

with employers that direct employees (including employees not involved directly in the confined space operations) whose activities could, either alone or in conjunction with the activities performed in the confined space, foreseeably result in a hazard to employees in the confined space. Additional provisions of this standard may apply as well, depending on the activities of the employer in question. For these reasons, in final § 1926.1203(c), OSHA used the general language "all other applicable requirements" rather than specifying different sections of the final standard that may be applicable.

Paragraph (d). Final § 1926.1203(d) requires any employer that has employees who will enter a confined space to have and implement a written permit-space program that meets the requirements of this final standard, and to make the program available for inspection by employees and their representatives. Final § 1926.1203(d) is similar to the corresponding provision for general industry confined spaces at § 1910.146(c)(4), with slight modifications. OSHA modified the language of this final provision slightly to clarify that entry employers do not necessarily have to develop a separate written program for each individual entry. Rather, an entry employer may reuse a program it developed previously, or a program developed by another employer, an industry association, or other entity, so long as the program is appropriate for the specific entry operations and the type of work involved, and that the program meets the requirements set forth in final § 1926.1204. OSHA anticipates that in most cases employers will be able to use or modify an existing program and will not need to develop an entirely new program.

Although the final rule requires the permit program to meet the requirements of final § 1926.1204, OSHA will allow employers to fulfill this obligation through a combination of the permit program and the entry permit itself. In a 2006 interpretation of the general industry standard, the Agency noted that employers could use the same permit program to cover multiple spaces:

> If employees will enter a permit space, an employer must develop and implement the means, procedures and practices necessary for safe permit space entry operations in accordance with § 1910.146(d)(3). Before a specific permit space is entered, the employer must document the completion of the measures required by § 1910.146(d)(3) by preparing an entry permit. A specific permit must be completed prior to each entry. However, if there are several similar tanks, with the same conditions and hazards, the same means, procedures and practices could be used for this similar group of tanks.

September 21, 2006, letter to Fred Rubel. OSHA anticipates that, in practice, some employers in construction may operate with a general permit-space program that covers numerous types of permit spaces and hazards, along with a specific permit that includes the unique hazards and practices applicable to each of those spaces. The Agency has no objection to this approach, provided the permit conveys all of the applicable information to employees at the required times, this information is readily available to the employees for reference during entry operations, and employees receive the training necessary for them to refer to the appropriate document for the required information. Therefore, for this purpose, OSHA allows employers to treat the permit as part of the written permit space program required by this section.

The proposed rule did not require an employer to have a written confined space program. Instead, in proposed § 1926.1219(a), the proposed rule provided that the employer could keep either a copy of the standard on the worksite or a copy of a program that incorporated the requirements of the standard. At least one commenter recommended that OSHA revise proposed § 1926.1219(a) so that the provision required employers to have a written copy of the final rule on site, regardless of whether the employer had a written copy of its confined spaces program (ID–108, p. 4). Several other commenters disagreed with OSHA's approach in the proposal, and urged OSHA to require a written confined space program as the general industry standard does. One commenter stated, "For a confined space program to be effective, it must be easy to understand and implement. . . . Providing employees with the generic terms of the standard—even if they read it—would not provide that kind of clarity. Instead, they need information specific to working at the particular worksite [which a program provides]" (ID–220, p. 28–29). Another commenter asserted, "Having a written program gives everyone a clear idea of what is required and their roles and responsibilities. It also is an important reference document. Construction contractors commonly have written safety programs, and many already have written confined space programs as well, so compliance should not be difficult" (ID–150, p. 3). Another commenter asserted that the written program in the general industry standard contributed to employee safety, and that the lack of a written program in the proposal diminished employee safety and also weakened training because "the vision of what is expected can not be focused" (ID–129, p. 3). A different commenter stated that requiring a written plan was the most important provision of the standard because it ensures that employers plan the permit space entry carefully and are familiar with the hazard analysis; it also provides an important reference document (ID–130, p. 1). The latter two commenters also noted that the lack of a written program in the proposal was a step backwards from the general industry rule.

OSHA wrote this final standard in performance-based language to be consistent with the general industry rule; consequently, this final standard does not provide the specific classification system and detailed step-by-step procedures for employers to follow found in the proposed rule. Therefore, this final rule is less suitable as a replacement for a written permit program than was the proposed rule. Accordingly, OSHA does not believe that maintaining a copy of this final rule on site, in lieu of having a written permit-space program, will ensure that an employer's confined space procedures will provide adequate employee protection. OSHA agrees with the commenters who supported a written program.

The Agency believes that final § 1926.1203(d) will effectively prevent unauthorized entry into PRCSs, and so protect employees from encountering PRCS hazards. The Agency also believes that it is necessary for employers to have a written confined space program at the worksite as a reference for employees involved in implementing safe entry procedures. A written program provides the basis for any permit-space entry operation, as well as a reference for guiding and directing supervisors and employees alike. A written program also will serve to assign accountability for all functions related to permit-space entry, and will aid in avoiding mistakes and misunderstandings. Additionally, because of the compliance flexibility and discretion that the standard provides to the employer, a written plan is essential to demonstrate that the employer took all aspects of permit-space entry into consideration. For these reasons, OSHA decided to specify in the final rule that the permit-space program be in writing. The written plan must, in combination with the permit itself, address the employer's particular facts

and circumstances to ensure that the procedures will protect employees' safety. For all of the reasons above, requiring an employer to have and implement a written permit-space program, rather than simply relying on a copy this final rule, will enhance the protection afforded to employees from confined space hazards.

Final § 1926.1203(d) explicitly requires employers to implement their written permit-space program at the jobsite. A program that is drafted but not implemented at the jobsite will not protect employees from the hazards of permit-space entry. This requirement is implicit in the general industry standard, but OSHA has made it explicit in this final rule. Additionally, this final provision requires employers to make the written program available for inspection by employees and their authorized representatives. The Agency believes that such access is essential for the successful implementation of a permit-space entry program. Finally, final § 1926.1203(d) clarifies that the employer must make the program available to employees prior to, and during, entry operations, which are the periods that the written program is most important. During these periods, employees must understand the program to ensure their safety. The general industry rule requires that the program be available, and this final rule simply clarifies that it must be available during these critical periods.

Paragraph (e). Final § 1926.1203(e) authorizes an employer to use alternate procedures for permit-space operations under limited circumstances. The standard permits these alternative procedures when an employer can demonstrate that it eliminated or isolated all physical hazards through engineering controls and controls atmospheric hazards through continuous forced-air ventilation. OSHA notes that continuous ventilation is a control method, and not a method suitable for eliminating or isolating an atmospheric hazard, so final § 1926.1203(e) spaces remain permit-required spaces, but can be entered without a permit program under the alternate procedures specified in this final section. OSHA believes that in the context of construction work, these alternative procedures provide adequate safety measures while being more efficient, and less costly to implement, than complying with the full permit-program requirements specified by final rule § 1926.1204. The requirements for the alternate procedures allowed under the final construction rule are similar to the corresponding provisions of the general industry confined spaces standard at § 1910.146(c)(5), but contain some substantive modifications explained in the following paragraphs. OSHA also added the word "only" to the introductory provision to clarify that an employer cannot use these alternate procedures under any other circumstances. In addition, final § 1926.1203(e) is similar to proposed § 1926.1216.

Paragraph (e)(1). Final § 1926.1203(e)(1), which is substantively identical to § 1910.146(c)(5)(i), sets forth the six conditions that an employer must meet before employees can enter a permit space under the alternative procedures specified in paragraph (e)(2). OSHA modified final § 1926.1203(e)(1) slightly from the general industry rule to state explicitly that employers must meet *all* of the conditions listed in final § 1926.1203(e)(1) before using the alternate procedures specified by final § 1926.1203(e). If employers meet all of these conditions, the employer need not comply with final §§ 1926.1204–1206 (addressing permits and permit programs) or final §§ 1926.1208–1211 (setting forth specific duties for permit-required confined spaces). Employers in permit spaces qualified to use the alternate procedures, however, still must comply with final § 1926.1207 (training requirements), final §§ 1926.1212–1213 (Employee participation and provision of documents to the Secretary), and the other provisions of final § 1926.1203, including the information exchange requirements in final § 1926.1203(h).

One commenter asserted that any space that requires ventilation to protect employees should have an attendant to monitor conditions in the space (ID–060, p. 3). The general industry standard does not require an attendant for entry under its parallel alternative entry procedures, and OSHA disagrees with this commenter, who offered no explanation for this assertion. Employers are only eligible to use the alternate procedures in final § 1926.1203(e) when the employer can demonstrate that the only hazard posed by the permit space is an actual or potential hazardous atmosphere, can demonstrate that continuous forced-air ventilation alone provides adequate safety, and the employer continuously monitors the space during entry. These requirements make the eligible spaces safe for employee entry. The more extensive requirements of final § 1926.1204 apply to those permit spaces with hazards that employers cannot isolate by engineering controls, or that the employer cannot control by ventilation. The Agency notes that the alternative entry procedures are only available for as long as the physical hazards remain isolated and the atmospheric hazards controlled. Employers must take care to ensure that physical hazards remain isolated and must exit the space and implement a full permit program if there is any indication that workers might be exposed.

Another commenter requested that the final rule clarify that employers need not provide attendants and rescue services for final § 1926.1203(e) spaces (ID–099, p. 3). Final § 1926.1203(e)(1) clarifies that spaces qualifying for the alternate procedures under § 1926.1203(e) do not need to comply with final §§ 1926.1204–1206 (addressing permits and permit programs) and §§ 1926.1208–1211 (setting forth specific duties for permit-required confined spaces).

Paragraph (e)(1)(i). Final § 1926.1203(e)(1)(i), which is similar to the general industry standard at § 1910.146(c)(5)(i)(A), sets out the first condition that employers must meet before using the alternative procedures. It provides that an employer may use these alternate procedures only when the employer can demonstrate that it eliminated or isolated all physical hazards using engineering controls, and that the only hazard posed by the space is an actual or potential hazardous atmosphere. OSHA modified this provision from the general industry rule by adding language that an employer can use the alternative procedures when it can demonstrate that all physical hazards are "eliminated or isolated" by engineering controls within a confined space, rather than just "eliminated." OSHA adopted this change from proposed § 1926.1216(a), which provided that employers could use the equivalent provisions when they could demonstrate the isolation of physical hazards.

One commenter supported the proposed rule's provisions for entry into "controlled-atmosphere confined spaces" in proposed § 1926.1216, which the commenter described as requiring the elimination of all physical hazards (ID–220, p. 6). Proposed § 1926.1216 did not, however, specify that physical hazards must be eliminated before an employer could use the alternative ventilation-only procedures in that section; it required the employer to "determine and implement an isolation method" for each of the physical hazards identified (see proposed § 1926.1216(a)(1); see also proposed § 1926.1216(a)(3), which required the documentation of the method for "isolating" each physical hazard). The

final rule, which defines "isolate or isolation" in final § 1926.1202 to allow employers to isolate physical hazards within a confined space like the proposed rule, and provides for isolation using the same methods specified in the proposed definition, which include the elimination or removal of hazards. (See the discussion of this definition earlier in this preamble.)

Another commenter expressed concern that, in construction work, employers would almost never be able to use these alternate procedures because the complete elimination of all physical hazards, such as an iron angle at head level, from such a space would, in many cases, not be feasible or necessary (ID–061, p. 6). OSHA believes that isolating physical hazards using methods such as wrapping a low-hanging pipe with foam or locking out pieces of equipment (see the definition of "isolate or isolation" in final § 1926.1202) can be sufficient to prevent injury from those hazards. Thus, the Agency decided that isolating or eliminating physical hazards is the most appropriate approach in the construction context where potentially isolated physical hazards are likely to be more prevalent because of the nature of construction, and adopted the proposed requirement accordingly.[14]

Paragraph (e)(1)(ii). Final § 1926.1203(e)(1)(ii), which corresponds to the general industry standard at § 1910.146(c)(5)(i)(B), sets out the second condition required for employees to use the alternative procedures: An employer must be able to demonstrate that continuous forced-air ventilation alone provides adequate safety from hazardous atmospheres and that entrants can safely exit the space in the event the ventilation system stops working. For the space to be safe under this final provision, the mechanical ventilation must control the hazardous atmosphere at levels that are below the levels at which they are harmful to entrants so that, if the ventilation shuts down for any reason (such as loss of power), the employees will have sufficient time to recognize the hazard and exit the space. Employers have a responsibility to specify a hazard level that is adequate for employees to escape the confined space before the hazard reaches unsafe levels. As with the general industry standard, employers must account for the introduction of additional hazards from the work conducted in the permit space, such as additional gases generated by painting or application of coating, and ensure that the ventilation is adequate to account for the introduced hazards (see 58 FR 4462, 4488 (Jan. 14, 1993)). In addition, certain types of work are inherently unsuitable for entries under § 1926.1203(e). In the preamble to § 1910.146(c)(5) of the general industry standard, OSHA explained that "work with hazardous quantities of flammable or toxic substances and hot work are not permitted" because they would "introduce hazards beyond those accounted for by the determination that the permit space can be maintained safe for entry" through mechanical ventilation alone (*id*). For the same reasons, OSHA does not permit this work for entries under § 1926.1203(e).

Final § 1926.1203(e)(1)(ii) also requires that the employer be able to demonstrate that in the event the ventilation system stops working, entrants can exit the space safely. OSHA based this requirement on proposed § 1926.1216(a)(2)(ii) which would have required employers to document their determination that monitoring procedures would give sufficient warning to allow entrants to exit. In the final rule, OSHA moved the monitoring requirement to 1926.1203(e)(2)(vi). However, the Agency retained the determination requirement in (e)(1)(ii) to make clear that safe exit time must be factored into the selection of monitoring procedures, intervals, and detection levels, including the levels at which monitoring alarms are triggered. Safe exit time is a precondition for reliance on alternative procedures.

One commenter asserted that determining what is a sufficient time to exit, as required by the proposed rule, would require an industrial hygienist (ID–114, p. 2). OSHA does not believe an industrial hygienist is the only person capable of making this determination because the final rule bases the time required for a safe exit on the physical attributes of the space. Any person trained in confined-space operations under final § 1926.1207 should be able to use these attributes to determine the time needed by entrants to safely exit the confined space as required by § 1926.1203(e)(1)(ii). For example, if the employer is unsure how quickly the atmosphere would return to a hazardous atmosphere following a ventilation failure, the employer can run a test by shutting off the ventilation when no one is in the space to determine the amount of time before the continuous monitor alarm sounds. The rest of the calculation would depend on the amount of time necessary for employees to exit the space from their work locations inside the permit space, which could also be tested, factoring in an appropriate safety buffer of time.

Several commenters asserted that OSHA should allow an employer to use natural ventilation alone, or suction, to control a hazard under the alternate procedures specified by final § 1926.1203(e). OSHA addressed these comments in the earlier discussion of the definition of "ventilate or ventilation" in this preamble.

There was a considerable amount of discussion in the record about whether the alternative procedures should be available for isolated spaces in sewers and other continuous spaces (see, *e.g.*, ID–75.1, p. 4; –210, Tr. pp. 176–177, 185–93, 206–208; –211, Tr. pp. 144–159). For an employer to apply final § 1926.1203(e) to a sewer, the employer would have to demonstrate total isolation of the section of the sewer from other potential sources of hazards (*e.g.*, the sewer distribution system) to guard against the introduction of new hazards into the space; the employer then must demonstrate that the ventilation system is maintaining the space sufficiently below the trigger limits for the atmospheric hazard (*e.g.*, below 10 percent LFL or an applicable PEL) so that employees would have time to escape if the ventilation failed. Total isolation of sewer manholes or selected sections of piping may not be practical or feasible to prevent hazards (*e.g.*, flammable gases) from entering the space because employers normally perform entries with the system in service. See Aug. 15, 1996, letter to Larry Brown. Final § 1926.1203(e)(1)(ii) includes a clear requirement that an employer that relies on continuous forced-air ventilation to maintain spaces safe for entry must be able to establish that other measures are not necessary to protect entrants. For additional information about isolating spaces within sewers and other continuous confined spaces, see the discussion of § 1926.1204(c)(3).

Paragraph (e)(1)(iii). Final § 1926.1203(e)(1)(iii), which is identical to the general industry standard at § 1910.146(c)(5)(i)(C), is the third condition required before an employer may use the alternative procedures. It also is substantively similar to proposed § 1926.1216(a)(2) and (a)(3), which provided that employers must test the atmosphere and document the results; this final provision, however, is less detailed than the proposed provisions. This final provision requires the

[14] The general industry standard does not allow employers to use the alternative entry procedures in § 1910.146(c)(5)(ii) if any physical hazard remains in the space, even if that hazard is temporarily "removed" or "isolated" in accordance with the standard. See October 12, 1995, memorandum to Linda Anku. OSHA does not adopt that interpretation for this construction rule.

employer to develop monitoring and inspection data that supports the demonstrations required by paragraphs (e)(1)(i) and (e)(1)(ii), *i.e.*, the elimination or isolation of physical hazards such that the only hazard in the space is an actual or potential hazardous atmosphere, and that continuous forced-air ventilation is sufficient to maintain the space safe for entry. The atmospheric-monitoring data must show that ventilation will keep the atmosphere inside the permit space safe for entry. In this context, the final rule uses "monitoring" to match the general industry language, but the term encompasses both the initial testing of atmosphere and the subsequent measurements. The data required by paragraph (e)(1)(iii) are essential for the employer and employees, as well as OSHA, to determine whether the employer can maintain the space safe for entry with the use of ventilation alone.

Paragraph (e)(1)(iv). Final § 1926.1203(e)(1)(iv), which is identical to the general industry standard at § 1910.146(c)(5)(i)(D), is the fourth criterion employers must meet to use the alternative procedures. This provision also is similar to proposed § 1926.1204(b)(2). This final provisions specifies that, if an initial entry into the permit space is necessary to obtain the data required by paragraph (e)(1)(iv), the employer must perform the entry in compliance with final §§ 1926.1204–1211 (*i.e.*, the full permit-space program).[15] This entry requirement, which was in the proposed rule, is necessary to protect employees from hazards that the employer did not fully identify or assess. The rule requires employers to obtain monitoring and inspection data without entry when feasible, but acknowledges that in many instances it will be necessary to perform an initial entry into the space to make the necessary determinations. This requirement will ensure that the initial entry is safe.

Paragraph (e)(1)(v). Final § 1926.1203(e)(1)(v), which is identical to the general industry standard at § 1910.146(c)(5)(i)(E), sets out the fifth criterion for using the alternate procedures. It also is similar to proposed § 1926.1216(a)(3), though less detailed. This final provision mandates that employers document the determinations and supporting data required by paragraphs (e)(1)(i) through (e)(1)(iii) of this final rule, and make this documentation available to employees who enter the spaces under the terms of final § 1926.1203(e), or to their authorized representatives. This documentation will enable the employer, employees, their authorized representatives, and OSHA to evaluate the validity of the determinations made under final § 1926.1203(e) for a particular permit space.

Paragraph (e)(1)(vi). Final § 1926.1203(e)(1)(vi), which is identical to the general industry standard at § 1910.146(c)(5)(i)(F), is the final condition that employers must meet to use the alternate procedures. The section does not correspond to any section of the proposed rule due to the different organization of the proposal. It requires that employers perform entry under the alternate procedures specified by final § 1926.1203(e) in accordance with the specific procedures required by final § 1926.1203(e)(2).

Paragraph (e)(2). Final § 1926.1203(e)(2), which is similar to § 1910.146(c)(5)(ii), sets forth the procedures that employers must follow for permit-space entries made under final § 1926.1203(e)(1). The introductory paragraph in § 1926.1203(e)(2) is identical to the introductory paragraph in the general industry standard. This introductory paragraph does not correspond to any section of the proposed rule due to the different organization of the proposal.

Paragraph (e)(2)(i). Final § 1926.1203(e)(2)(i), which is identical to the general industry standard at § 1910.146(c)(5)(ii)(A), requires that employers must, before removing an entrance cover, eliminate any conditions that make it unsafe to do so. It also is similar to proposed § 1926.1216(c)(1). Some conditions in a permit space may make it hazardous to remove a cover from the space. For example, if the atmospheric hazards within the space cause high pressure in the space, the cover may blow off in the process of removing it. To protect employees from such hazards, employers must make a determination as to whether it is safe to remove the cover. Such a determination requires the employer to examine the conditions expected to be in the permit space. Under high-pressure conditions, employers must check the cover to determine if it is hot; if so, the employer must loosen a cover fastened in place gradually to release any residual pressure. The employer also must determine whether conditions at the site could cause a hazardous atmosphere to accumulate in the space, which would make it unsafe for employees to remove the cover. The employer must not remove the cover until it is safe to do so.

Paragraph (e)(2)(ii). Final § 1926.1203(e)(2)(ii), which is nearly identical to the general industry standard at § 1910.146(c)(5)(ii)(B), requires employers to guard openings to permit spaces after removing entrance covers to protect employees from falling into the space and to protect employees in the permit space from injuries caused by objects entering the space. It also is similar to proposed § 1926.1216(c)(2), though less specific than the proposed provision. The guard could be in the form of a railing, a temporary cover, or any other temporary barrier that provides the required protection. If the opening to the space would not allow employees and objects to fall into the space, then no additional guarding is necessary. Final § 1926.1203(e)(2)(ii) differs from § 1910.146(c)(5)(ii)(B) in that it requires the opening to be "immediately" guarded by a railing, temporary cover, or other temporary barrier. The general industry rule requires employers to provide the guarding promptly. The Agency made this change to clarify that the guarding must happen as soon as possible.

Paragraph (e)(2)(iii). Final § 1926.1203(e)(2)(iii), which is substantively identical to the general industry standard at § 1910.146(c)(5)(ii)(C), requires the employer to test the internal atmosphere of the permit space with a calibrated, direct-reading instrument before any employee enters the space. This provision also is similar to proposed §§ 1926.1216(d)(2) and 1926.1205(a)(1), though not as detailed as the testing required by proposed § 1926.1205(a). If the employer can demonstrate that testing prior to entry is infeasible, then the employer must at a minimum comply with permit program requirements during the testing process in accordance with § 1926.1203(e)(1)(iv).

The employer must test the atmosphere, in sequence, for oxygen content, flammable gases and vapors, and potential toxic gases and vapors. Employers must first perform a test for oxygen because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen-deficient atmosphere. Employers must test for combustible

[15] OSHA recognizes that compliance with final § 1926.1204(e)(1) requires employers to test conditions in the permit space to determine if acceptable entry conditions exist before entry is authorized to begin. An employer will be in compliance if the employer can demonstrate that initial entry is necessary to gather the data to comply with § 1926.1203(e)(1)(iii), and enters under a permit program that complies with all other provisions except the pre-entry testing in § 1926.1204(e)(1). Note that the alternative entry procedures are not available if the work space is part of a continuous system and has not been effectively isolated.

gases next because, in most cases, the threat of fire or explosion is both more immediate and more life threatening than exposure to toxic gases. The testing must be appropriate for the space; for example, if there is a stratified atmosphere where gases of different densities layer within a confined space, the employer must perform testing at different depths.

This testing is necessary to determine whether ventilation alone will maintain the space safe for entry. The results of this testing must be within the expected range for the space, based on the employer's determination under paragraph (e)(1)(ii), or the employer may not enter under the alternative procedure.

Paragraph (e)(2)(iv). Final § 1926.1203(e)(2)(iv), which is identical to the general industry standard at § 1910.146(c)(5)(ii)(D), prohibits employees from occupying the space when a hazardous atmosphere is present in the space. This provision has the same purpose as proposed § 1926.1216(e)(2)—namely, to ensure that there is no hazardous atmosphere in an alternate procedures space during entry. However, due to the different organization of the proposed and final rules, the language and organization of these two provisions are different. To ensure that there is no hazardous atmosphere in a permit space when an employer enters using the alternate procedures, final § 1926.1203(e)(2)(iv) requires employers conducting any entry into a permit space containing a hazardous atmosphere to comply with the full permit-space program requirements in final §§ 1926.1204–1211. See also the discussion of final § 1926.1203(e)(2)(vii)(A) below.

Paragraph (e)(2)(v). Final § 1926.1203(e)(2)(v), which is identical to the general industry standard at § 1910.146(c)(5)(ii)(E), sets out requirements for using continuous forced-air ventilation to maintain the permit space safe for entry. Final § 1926.1203(e)(2)(v)(A) also is identical to § 1910.146(c)(5)(ii)(E)(*1*) and similar to proposed § 1926.1216(d)(3). It requires that no employee may enter the space until the forced-air ventilation eliminates any hazardous atmosphere in the space. Final § 1926.1203(e)(2)(v)(B) is identical to § 1910.146(c)(5)(ii)(E)(*2*), and shares the purpose of proposed § 1926.1216(e)(2) to ensure that the ventilation will continue to control the atmospheric hazards while the employer is conducting entry operations. It requires the employer to direct the ventilation so as to ventilate the immediate areas where an employee is, or will be, present in the space, and requires the ventilation to continue until all employees leave the space. Final § 1926.1203(e)(2)(v)(C) is identical to § 1910.146(c)(5)(ii)(E)(*3*), and has no corresponding section in the proposed rule. It requires that the air supply for the ventilation must be from a clean source, and must not increase the hazards in the space. These provisions ensure that the atmosphere in the permit space will remain safe during the entire entry operation.

Paragraph (e)(2)(vi). Final § 1926.1203(e)(2)(vi), which is similar to the general industry standard at § 1910.146(c)(5)(ii)(F), requires entry employers to continuously monitor the atmosphere in the permit space. Employers may use periodic monitoring, rather than continuous monitoring, only if the employer can demonstrate that the equipment for continuous monitoring is not commercially available or that periodic monitoring is sufficient to ensure that the conditions in the PRCS remain within planned limits. This final provision also clarifies that employers must use some form of monitoring during confined space operations, and that they must use periodic monitoring if continuous monitoring is not used to ensure that there is always monitoring of the space occurring.

OSHA retained in this final rule the requirement in the proposal that employers use continuous monitoring (see proposed § 1926.1216(e)(2)). This requirement for continuous monitoring differs from the general industry rule, which requires "periodic testing." In the typical PRCS found at construction sites, it is often difficult for the employer to predict with reasonable certainty the levels of hazardous atmospheres in a PRCS. In many instances, the employer will have little or no past experience with the particular PRCS, and will lack reliable historical data on hazardous atmosphere levels. Also, conditions in a PRCS may vary as construction work progresses, causing unexpected increases in hazardous atmosphere levels. For example, alterations to the wall of a PRCS may allow a hazardous gas to enter the PRCS, thereby increasing the level of the hazardous gas in the PRCS from the level measured before altering the wall. In addition, construction equipment in the space may not operate as expected, resulting in a discharge of hazardous gasses into the space at a higher rate than anticipated. In short, construction work tends to follow a somewhat unpredictable course and, thus, requires frequent atmospheric monitoring. Because of this high level of unpredictability, OSHA believes that continuous monitoring is necessary to ensure that affected employees, especially entrants, receive adequate protection. Continuous monitoring enables employers to quickly recognize deteriorating conditions, including the introduction of new atmospheric hazards into the confined space, and then to take timely actions to protect employees. For additional discussion of the need for continuous monitoring and its implementation, see the discussion of final § 1926.1204(e)(2) (discussion of continuous monitoring of permit spaces entered under a full permit program, rather than the alternative procedures).

Final § 1926.1203(e)(2)(vi) also requires the continuous-monitoring equipment to have a functional alarm that will notify all entrants when an atmospheric hazard reaches a specified threshold designed to give entrants an opportunity to escape before a "hazardous atmosphere" develops, or check the monitor with sufficient frequency to alert other entrants when an atmospheric hazard reaches that specified threshold. The purpose of continuous monitoring is to protect entrants by ensuring that the atmospheric hazards remain at or below levels specified by final § 1926.1203(e)(1)(ii), and having an alarm will immediately warn entrants when the atmospheric hazards reach those levels. The monitoring equipment serves no purpose if the employer does not convey the monitoring results to entrants in a timely manner. Requiring employers to check the monitor "with sufficient frequency" is a performance measure that means that the employer must demonstrate that the permit space is monitored such that a change in atmosphere or other potential hazard will be identified in time to allow entrants to exit the permit space safely. Checking the monitor regularly also will alert entrants if the monitor malfunctions.

Several commenters supported the requirement for continuous monitoring (ID–106, p. 2; –220, p. 7; –211, Tr. pp. 44–45). However, some of these commenters also urged the Agency to require continuous monitoring without exception (ID–106, p. 3; –220, p. 7). The Agency recognizes that in some PRCSs, especially when an employer conducts numerous entry operations in the same PRCS and finds through repeated monitoring that the atmosphere in the PRCS is stable, the employer may be able to show that periodic monitoring is sufficient to ensure that the conditions in the PRCS remain within planned limits. Nevertheless, when the employer uses periodic monitoring, it must be of sufficient frequency to ensure the

control of atmospheric hazards as planned and must be able to detect new hazards in time to protect employees. In some cases, continuous monitoring may not be possible; for example, continuous monitoring may not be available when the atmospheric hazard is a particulate. Therefore, when the employer shows that periodic monitoring is adequate, or demonstrates that the technology for continuous monitoring is not available, this final provision permits the employer to use effective periodic monitoring instead of continuous monitoring. The proposed rule contained the same exceptions.

The Agency also retained the language from the general industry rule that the monitoring must ensure that the continuous forced-air ventilation is preventing the accumulation of a hazardous atmosphere. The monitoring required by final § 1926.1203(e)(2)(vi), in combination with the continuous forced-air ventilation required by final § 1926.1203(e)(2)(v), ensure that entrants remain protected the entire time they are present within the permit space.

Finally, final § 1926.1203(e)(2)(vi) specifies that the employer must provide any entrant, or his or her authorized representative, with the opportunity to observe the monitoring required by this paragraph. This paragraph does not require employees and their authorized representatives to observe the monitoring; however, it provides employees and their authorized representatives with the option of observing should they choose to do so. OSHA believes that allowing employees and their authorized representatives to participate in this manner will contribute to the successful implementation of safe entry operations by enhancing their awareness of the status of the hazards in the confined space.

Paragraph (e)(2)(vii). Final § 1926.1203(e)(2)(vii), which is similar to the general industry standard at § 1910.146(c)(5)(ii)(G), specifies what an employer must do if it detects a hazard in a space regulated by the § 1926.1203(e) alternate procedures during entry. Final § 1926.1203(e)(2)(vii) differs from the general industry rule in that it expressly applies to any hazard, not just a hazardous atmosphere. This final provision is similar to proposed § 1926.1216(f), which also referred to physical, as well as atmospheric, hazards. The Agency made this change to ensure that this paragraph was consistent with final § 1926.1203(e)(1)(i), which allows employers to use the alternate procedures of final § 1926.1203(e) after eliminating or isolating all physical hazards in the space. Thus, the employer must implement the requirements of this final paragraph when there is a new physical hazard, a previously recognized physical hazard no longer remains isolated, or there is a hazardous atmosphere present.

Paragraphs (e)(2)(vii)(A)–(C). Final §§ 1926.1203(e)(2)(vii)(A)–(C), which are similar to general industry §§ 1910.146(c)(5)(ii)(G)(*1*)–(*3*), set the requirements for what an employer must do after detecting a hazard in a space regulated by § 1926.1203(e) during entry. Final § 1926.1203(e)(2)(vii)(A) is identical to the general industry standard at § 1910.146(c)(5)(ii)(G)(*1*), and requires employees to exit the permit space immediately after detecting a hazard. Final § 1926.1203(e)(2)(vii)(B) is similar to the general industry standard at § 1910.146(c)(5)(ii)(G)(*2*), except that it applies to all hazards, not just atmospheric hazards as the general industry requirement does. The final rule requires the employer to evaluate the permit space to determine how the hazard developed. Final § 1926.1203(e)(2)(vii)(C) is similar to the general industry standard at § 1910.146(c)(5)(ii)(G)(*3*), though it too refers to all hazards (physical and atmospheric). It requires the employer to implement measures to protect employees from the hazard before reentering the space under the alternate procedures specified by final § 1926.1203(e). Detecting a hazardous atmosphere during entry indicates that the employer did not maintain the permit space safe for entry, so before authorizing any subsequent entries into the space under final § 1926.1203(e), the employer must determine what went wrong and take whatever measures are necessary to prevent a recurrence.

Paragraph (e)(2)(viii). Final § 1926.1203(e)(2)(viii) requires an employer to provide a safe means of access and egress during confined space entries under final § 1926.1203(e). For example, when employees are working in an underground vault, the employer must provide, and ensure the use of, a safe means of entry into and exit from the underground vault, and ensure that the method complies with applicable OSHA requirements (*e.g.*, 29 CFR part 1926, subpart X—Stairways and Ladders). Providing proper entry and exit equipment such as ladders is critical under emergency-egress conditions to ensure that employees exit a PRCS in a timely and safe manner. Proposed § 1926.1216(c)(3) required that employers provide a safe method of entry and exit, and that this method comply with applicable OSHA requirements. This final provision retains the proposed requirement for a safe means of entry and exit, but did not retain the language requiring compliance with other "applicable OSHA requirements" because it is unnecessary: Such requirements apply regardless of whether this statement is included in the final rule. If another OSHA standard covers the means of entry and exit, the employer must comply with that applicable standard.

One commenter supported the proposed rule's requirement for safe entry and exit (ID–220, p. 8). Two others commenters agreed that assuring safe entry and exit is necessary, but asserted that it is often infeasible to use stairways that meet the requirements for stairways or ladders that comply with 29 CFR part 1926, subpart X's 4:1 ratio because of the configuration of these spaces (ID–075, p. 10; ID–124, p. 9). Subpart X contains many requirements for safe stairways and ladders, including the spacing between steps and rungs, the condition of the ladders, and the ratio of 4:1 for the vertical angle of portable non-self-supporting ladders relative to the structures supporting the ladders (see 29 CFR 1926.1050 *et seq.*). These comments seem to be requesting a blanket exemption from these OSHA requirements, but this request is overly broad. Even these commenters did not argue that all requirements of subpart X would be infeasible, or that the requirements in question are always infeasible. Employers may assert on a case-by-case basis under this standard, as they could under any other OSHA standard, that a requirement is infeasible in a particular situation. In such a situation, the employer has the burden of proving infeasibility. The employer also must make every effort to abate the hazard caused by having the ladder at a steeper angle than permitted, possibly by securing the top and bottom of the ladder while it is in use so it will not slip, and by training employees on climbing at a steeper angle.

Final § 1926.1203(e)(2)(viii) also requires that an employer use hoisting systems designed and manufactured specifically for personnel hoisting. This provision includes an exception to this requirement that allows for the use of job-made hoisting systems if a registered professional engineer approves these systems for personnel hoisting prior to use in entry operations regulated by § 1926.1203(e). Unlike the proposed rule, the final rule requires engineer's approval to be in writing to ensure that the specifications and limitations of use are conveyed accurately to the employees implementing the job-made

hoist, and that the approval can be verified. However, the final rule prohibits the use of commercial hoisting systems not designed and manufactured specifically for personnel hoisting because OSHA believes that employers cannot use such hoisting systems safely for this purpose. The requirements of final § 1926.1203(e)(2)(viii) for hoisting systems will eliminate further injuries and deaths of employees that could occur from the use of a hoisting system not designed specifically for personnel hoisting. This final rule provides employers with flexibility in choosing personnel hoisting systems by allowing a registered professional engineer to approve a job-made system. OSHA believes that either option ensures that the personnel hoisting system will meet the design specifications needed for employees to safely access a space. This final provision ensures that authorized entrants will always have a safe and effective means of entering and exiting the space, including escaping during an emergency.

There is no corresponding general industry provision that has requirements similar to final § 1926.1203(e)(2)(viii) for the alternative entries regulated under § 1910.146(c)(5). Section 1910.146(d)(4)(vii) requires safe access and egress, but that provision does not explicitly apply to the alternate procedures used under § 1910.146(c)(5). However, hazardous conditions may still arise in these spaces, particularly if the ventilation system stops functioning, thus making safe exit of entrants necessary. None of the comments OSHA received on proposed § 1926.1216(c)(3) provided a reason to exclude these requirements from the final standard. The same reasons provided in this preamble for requiring safe access and egress during permit-space operations governed by final § 1926.1204 also apply to the spaces regulated under final § 1926.1203(e) and, therefore, OSHA adopted the proposed requirement in this final rule.

Paragraph (e)(2)(ix). Final § 1926.1203(e)(2)(ix), which is identical to general industry § 1910.146(c)(5)(ii)(H), requires the employer to verify that the permit space is safe for entry and that the employer took the measures required by final § 1926.1203(e)(2). This provision also is similar to proposed § 1926.1216(d)(4), though it is less detailed than that proposed provision. The verification must be in the form of a certification that contains the date, the location of the space, and the signature of the certifying individual; the employer must make the certification available to entrants. The certification, in combination with the documentation required under final § 1926.1203(e)(1)(v), will document the employer's efforts to comply with final § 1926.1203(e)(2), enable OSHA and the employer to evaluate compliance with the standard, and, if permit-space incidents occur, assist OSHA and the employer in ascertaining the causes of those incidents.

One commenter supported the more detailed documentation requirements specified by the proposed rule, and the requirement in proposed § 1926.1216(a)(3) and (d)(1) to verify prior to entry that physical hazards remain isolated (ID–220, pp. 6–7). The commenter noted that these requirements serve as an "important check that measures that may have been taken in weeks, days, or . . . a previous work shift are still in place and effective" (id.). This final rule preserves the important check function because it also requires documentation of the isolation or elimination of physical hazards, in final § 1926.1203(e)(1)(v), and provides that entry under final § 1926.1203(e)(2) can occur only under the conditions set forth in final § 1926.1203(e)(1). This final rule, however, does so with the flexibility of the more performance-orientated language of the general industry standard.

Final § 1926.1203(e)(2)(ix) also requires that the employer date the certification and make it available to entrants. This requirement ensures that the certification provides information to the entrants about the latest conditions in the space the entrants will soon be entering. One commenter complained that requiring the name and signature of the individual who completed the isolation work, as the proposed rule did, could cause unspecified logistical problems (ID–114, p. 2). OSHA believes that requiring the signature only of the individual who provides the certification, as required by the general industry standard, will resolve any logistical problems.

Another commenter noted that using the term "verification document" in the proposed rule for spaces equivalent to the spaces regulated by final § 1926.1203(e), while using the term "entry permits" for other permit spaces in the proposed rule, was confusing (ID–099, p. 3). The documentation requirement in proposed § 1926.1216 was more detailed than the documentation requirement in this final rule and, thus, more similar to an entry permit. Final § 1926.1203(e)(2)(ix) uses the term "certification," and this certification contains much less information than the entry permits required for other permit spaces and, therefore, is distinct (see final § 1926.1206). The general industry standard also uses this terminology, and, given the differences in documentation for the two types of spaces in the final rule, the Agency believes that the terminology is clear.

Paragraph (f). Final § 1926.1203(f), which is nearly identical to the general industry standard at § 1910.146(c)(6), addresses the reevaluation of confined spaces. This final provision requires each entry employer to reevaluate non-permit required confined spaces when there is a change in use or configuration that may increase the hazards to entrants, and to reclassify the space as a permit space if necessary. The Agency believes this requirement is necessary because conditions around and in confined spaces may change, especially when multiple employers are performing various construction activities around or in the space. Consequently, when indications of changes in the previous conditions arise that may increase the likelihood for a hazard to develop, the employer must reevaluate the confined space to ensure adequate employee protection. Final § 1926.1203(f) differs from the general industry rule in that it refers to "each entry employer" rather than "the employer" to emphasize that reevaluation is the responsibility of each employer that conducts entry operations in a confined space.

Several commenters were unsure what type of new information would trigger reevaluation under final § 1926.1203(f) (ID–098, p. 1; ID–124, p. 8). These commenters asked, for example, whether working with gasoline equipment near a confined space or driving a vehicle near a confined space would trigger reevaluation. Whether these conditions would trigger a reevaluation depends on whether it is foreseeable that the operation of the equipment or vehicle could increase the hazards in the space, such as by creating emissions that could enter the space or sparks that could ignite a fire in the space. Indications of a need for reevaluation may include, but are not limited to: (1) A change in the configuration or use of, or in the type of work conducted or materials used in, the confined space; (2) new information regarding a hazard in or near a confined space; and (3) when an employee or authorized employee representative provides a reasonable basis for believing that a hazard determination is inadequate (see also § 1926.1204(e)(5)). OSHA does not expect employers to reevaluate spaces when trivial changes occur that do not affect the

characteristics of the space or the work performed in the space.

One commenter suggested that OSHA clude the time lapse since the initial aluation as an indication of the need for a reevaluation (ID–013, p. 4). This commenter seems to be addressing situations in which several days or weeks could elapse between entries into a confined space, during which changes in environmental conditions and other conditions could occur that may increase hazards in the confined space. For example, a container of coating chemicals left slightly ajar in a space, or a substance that is leaching slowly through the soil into a new construction space, might release fumes at a slow rate so that they would not become concentrated or hazardous over the course of a single day if the space has some ventilation, but could create a hazardous atmosphere if left in a closed and non-ventilated confined space for a longer period of time. OSHA agrees that employers should consider elapsed time since the last evaluation in determining when to reevaluate a confined space because of the possibility that hazards may increase during this period. Unlike proposed § 1926.1207, which listed conditions that would require reassessment, this final provision uses the more performance-oriented language the general industry rule. Therefore, this final provision does not list all the conditions that could trigger a reevaluation of the space because the circumstances that could increase the hazards in a space and prompt a reevaluation are too numerous to list.

One commenter was unsure how the entry employer would be able to detect whether changing conditions would require reevaluation (ID–086, p. 5). According to this commenter, the language of proposed § 1926.1204(b) did not require the employer to obtain information necessary to classify a space. The commenter's reading of the proposed rule is incorrect, and would also be incorrect of the final rule. Final § 1926.1203(a) requires each employer that has employees who may work in a confined space to ensure that a competent person identifies all confined spaces on the site, and to determine, through initial testing as necessary, which of these spaces are permit spaces, and to consider and evaluate other elements of the confined space. Therefore, under § 1926.1203(f) of this final rule, the entry employer must also ensure that a competent person compile e information necessary to determine whether a reevaluation is necessary, and conduct the reevaluation when necessary.

Paragraph (g). Final § 1926.1203(g), which is similar to the general industry standard at § 1910.146(c)(7), allows an employer to reclassify a permit space as a non-permit confined space only under the limited circumstances set forth in final § 1926.1203(g)(1)–(4). Final § 1926.1203(g) is substantively similar to proposed § 1926.1217(a). When there is no actual or potential hazardous atmosphere present in the space, and the employer eliminates all physical hazards in a space, this section allows an employer to reclassify the space as a non-permit confined space. The Agency believes that, in some instances, the procedures specified by final § 1926.1203(g) will be more efficient and less costly to implement than permit-space requirements. The Agency made three non-substantive changes from § 1910.146(c)(7) in the introductory paragraph of final § 1926.1203(g). First, OSHA added the word "only" to the provision. Second, OSHA changed "under the following procedures" to "when all of the applicable requirements in paragraphs (g)(1) through (g)(4) have been met." OSHA made these non-substantive changes to clarify that an employer may use only these procedures to reclassify a permit space under this rule, and that the employer must comply with each of the provisions under final § 1926.1203(g) to reclassify a permit space. Third, to provide consistency with the requirement that an employer use a competent person to conduct the initial evaluation of the space, the final rule specifies that a competent person must also conduct the reevaluation and reclassification of the space.

One commenter requested that OSHA clarify whether employers must provide attendants or retrieval systems for spaces when final § 1926.1203(g) applies (ID–099, p. 4). Another commenter asserted that OSHA should require attendants for spaces regulated by final § 1926.1203(g) (ID–060, p. 3). Final § 1926.1203(g) does not require compliance with the attendant or rescue provisions of this final rule once the space has been reclassified as a non-permit space. Prior to the reclassification, however, the full permit program requirements apply. In general, such requirements are unnecessary for a space that has been reclassified as a non-permit space under § 1926.1203(g) because, to qualify as a non-permit space, there can be no actual or potential hazards in the space. However, an employer may elect to comply with the PRCS requirements, including the attendant and rescue provisions, even if the employer reclassifies the space as a non-permit space under final § 1926.1203(g).

Paragraph (g)(1). Final § 1926.1203(g)(1), which is identical to general industry § 1910.146(c)(7)(i), ensures that an employer may only reclassify a PRCS as a non-permit space if no actual or potential atmospheric hazards are present and the employer eliminates all other hazards in the space. This final provision also is similar to proposed § 1926.1217(a)(1) and (d)(1). OSHA expects that this provision will apply primarily to spaces where the employer eliminated or isolated the physical hazards. While this final provision would allow employers flexibility in the methods and procedures they use to identify and eliminate physical hazards, it would not relieve them from conducting a thorough assessment of the space and identifying hazards that include: Existing or potential liquids, solid materials, and electricity associated with processes; the use of equipment, ductwork, and conduits with exposed valves or that terminate in the confined space; exposed and energized electrical conduits; connected rooms and reservoirs that present engulfment hazards; and any other recognized hazards covered by OSHA construction standards or the general duty clause, 29 U.S.C. 654(a)(1). OSHA believes that eliminating or isolating all physical hazards in the space protects employees who perform construction work in the space. For additional information about isolating spaces within sewers and other continuous confined spaces, see the discussion of § 1926.1204(c)(3).

Paragraph (g)(2). Final § 1926.1203(g)(2), which is similar to the general industry standard at § 1910.146(c)(7)(ii), requires an entry employer considering reclassification to eliminate or isolate confined space hazards, when possible, without entering the space. This requirement parallels the requirement in final § 1926.1203(e)(1)(iv), and OSHA is including the requirement here for the same reasons, although it applies to different spaces. If it is not possible for an entry employer to eliminate or isolate confined space hazards without entering the space, then final § 1926.1203(g)(2) requires the entry employer to comply with all PRCS procedures in final §§ 1926.1204–1211 until elimination or isolation of the hazards is complete.

Final § 1926.1203(g)(2) differs slightly from the general industry requirement in that it contains a new first sentence clarifying that the entry employer must eliminate or isolate the hazards without entering the space unless it is infeasible to do so. This slight revision, which

OSHA based on proposed § 1926.1217(a)(3), improves employee protection by reducing unnecessary entry into permit spaces for classification purposes. OSHA received no comments on the parallel provision in the proposed rule.

In the final rule, OSHA also allows employers to isolate physical hazards, rather than eliminate them entirely. The effect must be the same—employees must be effectively protected from any potential exposure to any hazard—and it is therefore substantively similar to the general industry rule. OSHA included the isolation option, however, in response to comments indicating that full permit program requirements were not necessary when employers can use engineering controls to prevent employee exposure to physical hazards, even if the item causing the hazard is not totally removed from the space (see, *e.g.*, ID–210, Tr. pp. 56, 308–309, 327–328).

For the purpose of reclassifying a permit-required confined space that has potential energy sources in it, the methods the employer must use depend on the types of energies requiring elimination or isolation. OSHA's lockout/tagout requirements address electro-mechanical hazards, but lockout/tagout will not eliminate hazards associated with flowable materials such as steam, natural gas, and other substances that can cause hazardous atmospheres or engulfment hazards in a confined space. See OSHA Directive CPL 02–00–147: The Control of Hazardous Energy—Enforcement Policy and Inspection Procedures, at pp. 3–10 (Feb. 11, 2008). Employers can isolate these hazards by using the techniques described in the definition of the terms "isolate" or "isolation": blanking, blinding, misaligning or removing sections of lines or pipes, and a double-block and bleed system. See also August 25, 1995, letter to William K. Principe.

"Elimination" means no on-going measures are necessary to keep the space free of a hazard; if continued operation of ventilation is required to address a hazard, for example, then the hazard is controlled, not eliminated. See, *e.g.*, September 19, 1994, letter to Edward Donoghue. If the employer uses ventilation to eliminate an atmospheric hazard from a space (as opposed to controlling the hazard), the employer must perform verification monitoring with the ventilation system off to establish the elimination of any atmospheric hazards before reclassifying the space. See November 11, 1993, letter to Trey Mayfield. Employers usually may not reclassify some confined spaces, such as tank containers, as non-permit spaces because residues may persist, resulting in potential atmospheric hazards. For example, the tank shell could oxidize, former contents could leach after absorption into the tank coating or lining, and contents trapped between the lining and the tank shell could leak. See September 20, 1994, letter to J.B. Saunders.

OSHA notes that the elimination of a hazard as required by final rule § 1926.1203(g)(2) will not necessarily result in the re-classification of the space as a non-permit space. The employer must still ensure that a competent person performs a full reevaluation of the permit space before reclassifying the space. For example, if an employer completes an initial evaluation of a space and determines that there is a single electrical hazard that can be locked out, but no atmospheric hazards, the employer must lock out the electrical hazard, entering the permit space under the full permit program requirements of § 1926.1204 if entry is necessary. Because the person who locks out the energy hazard may or may not be focused on the evaluation of the entire permit space, that employer's competent person must still verify that that the hazard is properly isolated, and that no other hazards are present, before the employer may re-classify the space as a non-permit space.

Final § 1926.1203(g)(2) also includes the note from the general industry standard stating that control of atmospheric hazards through forced-air ventilation does not constitute elimination of the hazards. Final § 1926.1203(e), not § 1926.1203(g), covers permit-space entry when the employer can demonstrate that the forced-air ventilation alone will *control* any atmospheric hazards within in the space. Final 1926.1203(g) requires the complete elimination of such hazards.

OSHA revised "hazards" to "atmospheric hazards" in the second sentence to reflect the change in final § 1926.1203(e)(1)(i), which will permit employers to use the alternative procedures if they isolate or eliminate all physical hazards. Employers may reclassify the space as a non-permit space under final § 1926.1203(g) even if a physical hazard remains, so long as the hazard is completely isolated such that employees cannot be exposed to it. OSHA does not view this as a substantive change from the general industry standard, which allowed employers to treat isolation of physical hazards as elimination of those hazards for purposes of reclassifying a permit space. See October 12, 1995, memorandum to Linda Anku.

OSHA refers to "atmospheric hazards" in the note to § 1926.1203(g), rather than using the term "hazardous atmosphere" as in § 1926.1203(e), to emphasize the distinction between control and elimination of airborne hazards. A "hazardous atmosphere" requires certain levels of contaminants in the air (*e.g.*, a flammable gas over 10 percent of its LFL or a concentration of a substance exceeding its PEL). The alternative procedures in final § 1926.1203(e) may be used when the employer eliminates any "hazardous atmosphere" even if the employer anticipates some presence in the air of a hazardous substance that must be controlled through practices to keep the substance at safe levels. Therefore a § 1926.1203(e) space remains a permit-required space that can be entered without a permit so long as the controls remain effective. Final § 1926.1203(g), in contrast, requires the total elimination of "atmospheric hazards" prior to entry, which means that the breathing atmosphere contains no potentially hazardous substance that would make it a potentially hazardous atmosphere; therefore, the employer has no need to maintain practices to control it (hence, it is not a permit-required space). For example, an employer can eliminate a "hazardous atmosphere" of methane by reducing the concentration of methane in the space from 12 percent of its LFL to 9 percent. However, the methane is still an "atmospheric hazard" at the lower 9 percent concentration because, without the alternative procedures that include ventilation, the level of methane could rise and injure or kill the workers inside the space. To eliminate the "atmospheric hazard" caused by methane, the employer must eliminate all of the methane from the space, and maintain this condition without forced-air ventilation or other practices.

Paragraph (g)(3). Final § 1926.1203(g)(3), which is nearly identical to the general industry rule at § 1910.146(c)(7)(iii), requires an entry employer seeking to reclassify a permit space to document the basis for determining that it eliminated all permit-space hazards through a certification that contains the date, the location of the space, and the signature of the certifying individual. In addition, the employer must make the certification available to each employee entering the space or his or her authorized representative. The employer must substantiate all determinations so that employers, employees, and the Agency have the means necessary to evaluate those determinations and

ensure compliance with the conditions that would enable the employer to conduct entry operations using the alternate procedures following reclassification.

This final provision is necessary to protect employees from physical or atmospheric hazards on initial entry into the space under final § 1926.1203(g), and to ensure that the space remains safe during entry operations. The requirement to make the certification available to employees or their authorized representatives ensures that entrants have the information necessary to detect developing hazards while they are working in the space.

Proposed § 1926.1219(d) provided that the employer must maintain an equivalent verification document until the work in the confined space is complete. One commenter asserted that OSHA should require employers to maintain records of these determinations for years to aid OSHA and the National Institute for Occupational Safety and Health (NIOSH), and to protect a company from potential litigation in the future; the commenter, however, did not specify exactly how OSHA and NIOSH would use these records (ID–060, p. 2). Another commenter stated that employers only need to maintain the certification until the completion of the project (*i.e.*, as long as there are entrants, the certification must be available to those entrants) (ID–108, p. 3). Nevertheless, the Agency recognizes that confined spaces not classified as PRCSs do not involve hazards as defined in this standard. Therefore, unlike permit-space entry permits, the Agency believes that it is not necessary for entry employers to maintain the certification required under final § 1926.1203(g)(3) for review and evaluation after completion of the work. The Agency agrees with the latter commenter that the purpose of certification is to allow employees and employers to detect any changes from the original entry conditions during confined space operations, and believes that the minimal useful information gained from these records likely would not justify the burden of maintaining them. Furthermore, no provision in this final rule prohibits an entry employer from maintaining this information for a period longer than the period required by the final rule.

Paragraph (g)(4). Final § 1926.1203(g)(4), which is similar to § 1910.146(c)(7)(iv), requires that whenever a hazard arises in a space reclassified under final § 1926.1203(g), employees must evacuate the space, and the entry employer must reevaluate the space. This final provision also is similar to proposed § 1926.1217(e)(2). The Agency believes that this final provision is necessary to protect entrants when conditions around and in confined spaces change, especially when performing construction activities around or in the space. Having a hazard arise in a reclassified space indicates that the previous evaluation was insufficient or that there has been a significant departure from the previous conditions; therefore, a thorough reevaluation of the entire space is critical.

This provision indicates clearly that entry employers retain responsibility for the safety of employees who enter spaces after they reclassify the spaces as non-permit confined spaces. The employer must determine if it is still appropriate, under the circumstances identified through the reevaluation, to classify the space where the hazard arose as a non-permit confined space. A reevaluation aimed at reestablishing compliance with final § 1926.1203(g) will involve the demonstrations, testing, inspection, and documentation required in paragraphs (g)(1) through (g)(3) of this final rule. OSHA anticipates that some employers will seek to reestablish compliance with final § 1926.1203(g), while others will choose to conduct the remainder of its entries in that space in accordance with the full permit-space program requirements specified by final §§ 1926.1204–1211. The Agency's concern is that the approach chosen must adequately protect employees who enter the spaces.

In some cases employers might need to require their employees to exit the space temporarily during a limited event where the hazard is already known and temporary, such as when an employer temporarily removes workers from an underground confined space while other work is conducted above the underground confined space. In this situation, the employer can allow employees to re-enter without re-classifying the space as a permit space after completing a reevaluation of the structural integrity of the space to make sure that the work above the underground confined space did not affect that space. In other cases, however, a new unanticipated hazard in the space means that the status of the space reverts to a permit-required confined space until the employer can identify and address the hazard and reclassify the space as a non-permit space under § 1926.1203(g). As a result, all of the provisions of this standard applying to a permit space apply, and entry must be conducted in accordance with the permit program requirements of § 1926.1204 and permitting requirements of § 1926.1205. The fact that the spaces addressed in § 1926.1203(g) were previously permit spaces before reclassification as non-permit spaces means that it is imperative for the entry employer to proceed with caution whenever a new hazard emerges.

Section 1926.1203(h) and (i)—Information Sharing and Coordination Duties at Multi-Employer Worksites

The discussion of paragraphs (h) and (i) has three parts:

(1) An overview of host employers and controlling contractor responsibilities;

(2) OSHA's authority to require host employers and controlling contractors to share information to protect the employees of others; and

(3) A paragraph-by-paragraph explanation of § 1203(h) and (i).

(1) Overview of Host Employers and Controlling Contractor Responsibilities

Timely information exchanges and coordination of work activities can be critical in safeguarding employees performing confined-space work, particularly on multi-employer worksites where one employer's actions can affect the health and safety of another employer's employees. As OSHA noted in its explanation of the proposed rule, there are a number of contractors and subcontractors performing jobs on most construction worksites, and there may be employees of different employers performing work within the same confined space. In many instances, employees of one subcontractor will enter a confined space after another subcontractor's employees complete their work within the space.

OSHA recognizes that both the controlling contractor and the host employer may have crucial information about confined spaces at a construction worksite. Therefore, in the proposed standard, OSHA adopted the information-sharing duties specified for the host employer in the general industry standard (§ 1910.146(c)(8)) and proposed applying them to both the host employer and the controlling contractor. As one labor organization noted, based on the experience of its members in both general industry and construction settings, worker safety is affected by timely information sharing in both general industry work and construction:

> [T]he problem posed by contracting out work in both situations is nonetheless the same—how to ensure that subcontractors that are in a work location for a limited period of time have the best possible information to

identify the location of confined spaces, assess their hazards, and ensure that their employees can perform their assigned duties safely.

20.2, pg. 10.)

The same commenter also explained that information sharing may be even more critical in the construction setting because different workers may perform many different activities in the same space at different times, which can result in hidden dangers:

> Many chemical substances used in the construction industry, once in place, are neither detectable nor hazardous until exposed to a particular work process. For example, surface coatings such as paints and epoxies are seemingly stable—and are generally undetectable through air monitoring—once applied and dried. However, these same substances may create significant safety and health hazards to employees who perform welding and other processes involving heat while working in a confined space. A contractor that performs the routine assessment of physical and atmospheric hazards required by the standard would not necessarily identify these potential hazards.

(ID–213.1, pg. 1.) Similarly, polyurethane is often used for spray foam insulation. When welding or heating in a confined space is performed near spray foam insulation that contains polyurethanes, the heat could cause the polyurethanes to break down and produce hazardous fumes. A contractor may not recognize this hazard during a routine assessment of the space, and would rely on information from a host employer or controlling contract about the potential hazard.

Hidden dangers may also arise while working with equipment in confined spaces. For example, operating internal combustion engines, such as air compressors, pressure washers, and generators in a confined space could lead to carbon monoxide exposure. Because carbon monoxide is a colorless, odorless gas, it is difficult to detect without a monitor or testing equipment. A host employer, controlling contractor, or subsequent entry employer may not realize that carbon monoxide levels in a confined space have changed without communicating with the employer who operated the engine in the space. Similarly, when working with live circuits, an entry employer may reenergize a once de-energized circuit to perform work in a confined space. Communication about reenergized circuits will give the host employer, controlling contractor, and any subsequent entry employer's indication that conditions within the confined space may have changed.

In this final rule, as in the proposed rule, OSHA requires communication and coordination among controlling contractors and subcontractors, and between host employers and controlling contractors. The coordination and information-exchange duties in the final rule are largely the same as the duties required by the proposed rule, although the final rule makes communication with entry contractors the responsibility of the controlling contractor rather than the host employer, and does not contain the proposed rule's additional requirements for identifying the separate classifications of spaces. (See proposed § 1926.1204.)

Based on the record as a whole, OSHA finds that the information-sharing and coordination responsibilities of host employers and controlling contractors required by this final standard are critical means of identifying hidden or latent dangers in permit spaces and for preventing the actions of one employer from exposing another's employees to hazards in a permit space. These provisions will enhance the safety of workers in confined spaces by ensuring that all employers have the previously identified information at their disposal before entry to avoid hidden hazards and to make adequate preparations to protect employees entering permit spaces.

The rule places controlling contractors at the center of this process. Before any employer enters a permit space, the final rule requires controlling contractors to obtain relevant information about confined spaces on the worksite from the host employer, and then to relay that information, along with any other relevant information, to each contractor that will enter the confined space or that will be performing work that could foreseeably result in a hazard within that confined space. (See § 1926.1203(h)(1) and (h)(2).) The controlling contractor is also responsible for coordinating work in and around confined spaces so that no contractor working at the site will create a hazard inside the confined space. (See § 1926.1203(h)(4).) After the entry employer performs entry operations, the controlling contractor must debrief the entry employer to gather information that the controlling contractor then must share with the host employer and other contractors who enter the space later. (See § 1926.1203(h)(5).) Section 1926.1203(i) assigns the role of the controlling contractor to a particular employer in the event there is no controlling contractor for the project. Please see the discussion of § 1926.1203(i), below.

Some commenters expressed concern that the final rule imposes a duty on controlling contractors or host employers to verify the accuracy of the information they receive from other employers (ID–117, pg. 21; ID–078, pg. 1; ID–098, pg. 1). Consequently, one commenter predicted that this duty would cause controlling contractors and host employers to spend too much time and money overseeing their subcontractors' work (ID–120, pg. 2). Two different commenters, however, indicated that a controlling contractor should have even more responsibility, particularly when multiple employers will be working in the same area. The latter commenters argued that the controlling contractor should "share in" the "responsibility" and costs of permit space entries, including verifying the training of subcontractor employees and communications among employers, particularly when multiple employers enter and work in the permit spaces at the same time (ID–108, pg. 4; ID–210, pg. 60). One of these latter commenters expressed concern that, without controlling contractor verification, "untrained or unqualified persons would be likely to enter the spaces where a self-declaring system of monitoring is employed" (ID–108, pg. 4).

The final rule does not require the controlling contractor or host employer to verify entry-employer information (testing, monitoring, etc.) or to have its own employees enter any confined space or take other direct actions to discover new information; requiring controlling contractor employees to enter permit spaces might *increase* exposure of unqualified persons to the hazards of permit spaces. Unless the controlling or host employer allows its own employees into a permit space, the final rule only requires the controlling contractor or host employer to share information that is already in its possession or that it receives from other employers. OSHA agrees that it is important to prevent untrained or unqualified persons from entering the space. The type of information that the controlling contractor must share with subcontractors, and that the host employer must share with the controlling contractor, is identical to the type of information that the host employer must share with contractors under the general industry standard. (See § 1910.146(c)(8).) Separately, controlling contractors still have the same duty they have always had to exercise reasonable care to ensure compliance with the requirements of other applicable standards (*e.g.*, welding standard, respirator standard) in accordance with OSHA's multi-

employer citation policy. The specific communication and coordination requirements imposed by this rule are discussed in the paragraph-by-paragraph explanation of § 1926.1203(h) that follows the discussion of OSHA's authority for these requirements.

(2) OSHA's Authority To Require Host Employers and Controlling Contractors To Share Information To Protect the Employees of Others

Two commenters argued that OSHA lacks the authority to impose any requirements on host employers or controlling contractors except with respect to their own employees. (112.1, p. 14–15; and 117.1, pg. 7–12.) One of these commenters stated that a "controlling contractor . . . may not be cited if it did not create a cited hazard and it has no employees exposed to the hazard," explaining that the "legal analysis supporting this point is set forth well" in the Occupational Safety and Health Review Commission (OSHRC) decision in *Secretary of Labor* v. *Summit Contractors, Inc.*, 21 BNA OSHC 2020 (No. 03–1622, 2007). (112.1, p. 15.) OSHA notes that both the reviewing federal court and the Commission itself subsequently rejected that view in *Solis* v. *Summit Contractors, Inc.*, 558 F.3d 815 (8th Cir. 2009) and *Secretary of Labor* v. *Summit Contractors, Inc.*, 23 BNA OSHC 1196, 1202–03 (No. 05–0839, 2010).

OSHA has clear authority to require host employers and controlling contractors to comply with the information-sharing and coordination provisions in the final rule. The preamble to the proposed rule discussed in detail OSHA's authority to impose the duties in this standard (see 72 FR 67358–67360, Nov. 28, 2007), and the Agency reasserts the same basis with respect to this final rule, along with the 2009 and 2010 *Summit* decisions. First, the plain language of the OSH Act and its underlying purpose support OSHA's authority to place requirements on employers that are necessary to protect the employees of others. As explained later in this section of the preamble, the overall sharing of information that will occur in accordance with the final host-contractor provisions will help protect the employees of both host employers and contract employers. Second, congressional action subsequent to passage of the OSH Act recognizes this authority. Third, OSHA consistently interprets its statutory authority as permitting it to impose obligations on employers that extend beyond their own employees, as evidenced by the numerous standards (including several construction standards) that OSHA promulgated previously with multiemployer provisions. OSHA provided several examples of these standards in the preamble to the proposed rule, and OSHA subsequently promulgated additional rules requiring controlling entities and utilities to take steps to protect other employers' employees during crane operations. (See 29 CFR 1926.1402(c), 1926.1402(e), 1926.1407(e), 1926.1408(c), and 1926.1424(b).) Finally, numerous courts of appeal and the OSHRC have upheld OSHA's authority to place obligations on employers that reach beyond their own employees. In addition to the authorities listed in the preamble to the proposed rule, the Third Circuit upheld the information-sharing requirements in the Asbestos Standard for the construction industry, noting: "We are not convinced that the Secretary is powerless to regulate in this [way], especially given the findings she has made regarding the importance of building owners in the discovery and communication of asbestos hazards." *Secretary of Labor* v. *Trinity Indus., Inc.* (*Trinity*), 504 F.3d 397, 402 (3d Cir. 2007).

(3) Paragraph-by-Paragraph Explanation of § 1926.1203(h) and (i)

Final § 1926.1203(h) is substantively similar to the corresponding provision for general industry confined spaces at § 1910.146(c)(8), but modified to include requirements for controlling contractors that were included in the proposed rule. The type of information that the controlling contractor must share with entry contractors, and that the host employer must share with the controlling contractor, is identical to the type of information that the host employer must share with contractors under the general industry standard. The primary difference in this area between this rule and the general industry standard is that this rule makes the controlling contractor the central point of the information exchange, while the host employer is the central point in the general industry standard. The final rule also structures the requirements in chronological order to make them easier to follow, setting out the information sharing and coordination duties prior to entry, and then setting out the duties during and after the entry. These requirements are an efficient and necessary way to ensure that all employers have important information about the confined-space hazards so each employer can provide adequate protection to employees it directs.

OSHA is designating the controlling contractor, rather than the host employer, as the information hub for confined-spaces information-sharing and coordination because the controlling contractor's function at a construction site makes it better situated than the host employer (assuming the host employer is not also the controlling contractor) to contribute to, and to facilitate, a timely and accurate information exchange among all employers that have employees involved in confined-space work. General industry worksites, such as a refinery or factory, are likely to be stable, and owned and under the control of the host employer for a substantial length of time. The host employer is well suited in that scenario to facilitate information sharing because the host employer is most likely to have control of the site and information about it before another employer performs confined space work there. On a construction worksite, the controlling contractor has overall authority for the site and is best situated to receive and disseminate information about the previous and current work performed there. Evidence introduced at the hearing indicated that the controlling contractor communicates with entry employers more frequently than the host employer does (ID–210, pg. 315–320). In contrast, the record shows that host employers are not always directly involved in the construction process and, therefore, are often less well situated than controlling contractors to facilitate information-sharing (ID–220, pg. 14–15).

The final rule is substantively similar to the proposed rule, except that the proposal would have required the host employers to communicate directly with entry employers. For the reasons discussed in the prior paragraph, OSHA assigned the controlling contractor that function in this final rule, giving only limited information-exchange requirements to the host employer. In the final rule, OSHA also clarified the scope of the information exchanges by requiring the controlling contractor to coordinate and share information with entities whose activities could foreseeably result in a hazard in the confined space, as opposed to all contractors "near" the permit space. Most other differences between these requirements in the proposed rule and the final rule are stylistic in nature and intended to bring it closer to the text of general industry rule.

In the following, more detailed discussion, paragraph (h)(1) contains the pre-entry duties of host employers, (h)(2) the pre-entry duties of controlling employers, and (h)(3) the pre-entry duties of entry employers. Paragraph

(h)(4) then describes the coordinating responsibilities of controlling and entry employers, and (h)(5) explains their duties during and after entry. Finally, paragraph (i) explains requirements when there is no controlling employer.

Paragraph (h)(1)—Pre-entry duties of host employer. The host employer serves an important role in providing information because the host employer is likely to be the employer most familiar with the property and the most likely to retain, between separate construction projects, information about permit spaces on the property, particularly in construction involving existing facilities. (ID–141, pg. 3.) As a result, the host employer may have information about hidden dangers or other information that can help reduce employee exposure to hazards in permit spaces.

Final § 1926.1203(h)(1) requires the host employer to share information it has about the location of known permit spaces, and any previous steps that it took, or that other employers took, to protect workers from the hazards in those spaces. Telling other employers about each known permit space on the worksite is essential to achieving the purpose of the information-exchange requirements, which is to ensure that contractors with employees entering confined-spaces are aware of the type and degree of these hazards and can take necessary safety precautions. Having information about the previously identified hazards in a space, and the previous efforts to address them, will assist the entry employer in ascertaining if those hazards still exist, and help the entry employer avoid problems addressing the hazards that previous entry employers encountered. Final paragraph (h)(1) is similar to the corresponding provision for general industry confined spaces and to proposed § 1926.1204(a), although the host employer must share the information with the controlling contractor instead of the entrants. The controlling contractor then shares it with the entry employers. OSHA did not receive any comments specifically opposing the inclusion of this information in the information-exchange requirements.

The proposed rule provided that host employers had to share the information about known hazards only "if they have it," and to identify confined spaces when the host employer or controlling contractor "actually knows" that they are confined spaces. (See 72 FR 67407.) The purpose of including these phrases in the proposed rule was to clarify that the controlling contractor and host employer need not engage in extensive and burdensome investigations of the history of the worksite, and, most importantly, that these employers "are not required to enter a confined space to collect the relevant information." (See 72 FR 47933.) OSHA is retaining the same approach in the final rule, but refers to "known" permit spaces instead of the more awkward "space that the host actually knows is a confined space." The final rule also narrows the requirement by focusing specifically on known *permit* spaces, rather than to all confined spaces, because these spaces pose the greatest hazards to employees. Narrowing the requirement also reduces the number of information exchanges and matches the type of information that the host employer must share, which is linked to the nature of the space as a permit space, *i.e.*, information about the hazards that make the space a permit space, and the previous efforts to address those hazards. This narrowed approach will appropriately focus the exchanges on those spaces with known hazards. In the event that an employer is both a host employer and the controlling contractor, the employer has the information that complies with the provisions of final § 1926.1203(h)(1), (h)(2), (h)(4), and (h)(5).

For example, a host employer hires a controlling contractor to build an underground storage facility and discovers during that process that there is an underground stream below the property. Years later the host employer hires a different controlling contractor to expand the underground storage facility in a manner that will include several confined spaces. In this example, the host employer must share the plans for the existing storage facility and identify the location of the underground stream so that the controlling contractor and the relevant subcontractors can develop a permit-space program appropriate to address potential engulfment hazards. The host employer also would be responsible for disclosing the storage of any potentially hazardous chemicals or other substances in the existing storage facility. However, the final rule would not require the host employer to drill for additional undiscovered underground rivers, conduct soil tests, or test the air in the existing storage facilities.

Paragraph (h)(2)—Pre-entry information-sharing duties of controlling contractors. In paragraph (h)(2), OSHA requires controlling contractors to obtain the information specified in paragraph (h)(1) from the host employer (*i.e.*, the location of permit spaces, the known hazards in those spaces, measures employed previously to protect employees in that space). Then, before permit space entry, it must relay that information to any entity entering the permit space and to any entity whose activities could foreseeably result in a hazard in the confined space. (See § 1926.1203(h)(2)(ii).) The controlling contractor must also share any other information that it has gathered about the permit space, such as information received from prior entrants.

The final rule varies slightly from the proposal in requiring controlling contractors to share the information with any "entity," rather than other contractors or employers, to ensure that the controlling contractors also share this information with independent contractors who are not "employers" under the OSH Act. These contractors pose the same issues as do employers when working in or around permit spaces, *i.e.*, they may increase hazards for others working in or around the space if they do not comply with the provisions of this standard. OSHA concludes that it is equally important for controlling contractors to pass along information about permit space hazards to independent contractors, and to coordinate their activities as required in this standard. Although OSHA is not directly requiring independent contractors to share information in accordance with the standard, OSHA expects that controlling contractors will be able to obtain the necessary information as a result of their control over the worksite.

OSHA requires the controlling contractor to obtain the information from the host employer before entry operations begin so that the controlling contractor can share the information with the entities specified in § 1926.1203(h)(2)(ii) in time to minimize potential employee exposure to hazards in the confined spaces. This provision was not in the proposal; the proposal required both the host employer and controlling contractor to share information directly with the entry employer. (See proposed § 1926.1204(a).) OSHA added this provision to the final rule to conform to the final rule requirement that the host employer share information with the controlling contractor rather than the entry employer. The final standard makes it explicit that the controlling contractor and host employer have separate duties with respect to the same information: the controlling contractor must obtain it under final § 1926.1203(h)(2)(i) and the host employer must share it under final § 1926.1203(h)(1).

These complementary duties also address the concerns of some

commenters that host employers are often state or local government entities not subject to the OSH Act. (ID–78, p. ID–141, pg. 3.) The commenters expressed concern that it might be difficult for the controlling contractor to obtain the information from a government entity not subject to § 1926.1203(h)(1), and that the host's failure to provide the information could subject the controlling contractor to heightened liability. In such cases, OSHA expects the controlling contractor to exercise due diligence in attempting to obtain the information from the host employer, and believes that most hosts will provide it when the controlling contractor explains that it needs the information in order to perform the job safely and in accord with law.

Final § 1926.1203(h)(2) is similar to the corresponding provisions for general industry confined spaces with a few distinctions. General industry § 1910.146(c)(8)(i) requires the host employer to share the specified information with "the contractor." This final rule requires an exchange of the same information, but § 1926.1203(h)(2) requires the controlling contractor to exchange that information with both the entity entering the permit space and with other contractors working around the permit space.

The general industry rule requires the host employer to inform other employers that they can conduct permit-space entry only by complying with a permit-space program meeting the requirements of the standard (see § 1910.146(c)(8)(i)). There was no specific parallel in the proposed construction rule. This final rule also does not contain a specific parallel requirement because the entry employer's duty to use a valid permit program is explicit in § 1926.1203(d).

OSHA has clarified the requirements for communication with entities whose activities outside a confined space may affect workers inside the space. Many commenters found the terminology of the general industry rule (referring to work "in or near permit spaces" in § 1910.146(c)(8)(iii)) and the proposed rule (referring to "employers" in proposed § 1926.1209(b)(3).) confusing in the context of a construction worksite.[16] Therefore in this final rule, OSHA refines this requirement by requiring the controlling contractor to provide the information to other entities on the worksite when the activities of these other entities could foreseeably result in a hazard within the confined space. This information-exchange requirement also is similar to the information-exchange requirement in § 1926.65(b)(1)(iv) (Hazardous waste operations and emergency response). Both rules require employers to inform contractors and subcontractors about hazards of the work the contractor will be performing, including hazards of the worksite.

OSHA designed this requirement to protect authorized entrants and others who are part of the permit-space entry process (*e.g.*, the attendant) from a wide variety of potential activities, including those that may be beyond the scope of the permitting process. Therefore, the information-exchange requirement applies to activities outside the permit space that could foreseeably result in a hazard within the permit space, either alone or in conjunction with the activities inside the space. Examples include use of a heavy gas that could enter the space and cause oxygen deficiency or sparks from a welding operation outside the space that could ignite flammable gas inside a confined space. To prevent the creation of confined-space hazards, final § 1926.1203(h)(4) supplements this requirement by requiring the controlling contractor to coordinate the activities of entities either entering the permit space or engaged in actions that could foreseeably result in a hazard within the space.

Paragraph (h)(2)(i). As noted above, final § 1926.1203(h)(2)(i) requires the controlling contractor to obtain from the host employer, before permit-space entry, the host's information regarding permit-space hazards and previous entry operations. OSHA included this provision in the final rule as part of the change to limit the host employer's involvement in the information-exchange process, and to centralize the role of the controlling contractor. The controlling contractor needs this information for dissemination to entities entering permit spaces (final § 1926.1203(h)(2)(ii)), and to fulfill its duty to coordinate permit-entry activities with other work occurring in and around the permit space (see final § 1926.1203(h)(4)).

Paragraph (h)(2)(ii). The final rule requires the controlling contractor to pass along the information it received from the host employer about the permit spaces on the worksite. The controlling contractor is at the hub of the information exchanges in the final rule, so this step is critical to ensuring that the host employer's information reaches the entities entering the permit space and others whose work may create hazards inside the permit space. The parallel provision of the proposed rule, § 1926.1204(a)(1), was potentially duplicative and ambiguous because it required the controlling contractor *and* host employer to provide the same information to the same entities.

Final § 1926.1203(h)(2)(ii)(A) and (B) require the controlling contractor to share with the entities entering the permit space, and any other entity at the worksite whose activities could foreseeably result in a hazard in the permit space, the information that the controlling contractor received from the host employer, as well as any additional information the controlling contractor has about the topics listed in paragraphs (h)(1)(i) through (iii) (*i.e.*, the location of permit spaces, the hazards in those spaces, and any previous efforts to address those hazards). These paragraphs are substantively similar to the general industry requirements at § 1910.146(c)(8)(ii) and (iii). Having information about the previously identified hazards in a space will help the entry employer ascertain whether those hazards still exist.

For employers or other entities whose activities could foreseeably result in a hazard in the confined space, this information will improve their ability to assess whether those activities will create such a hazard, to avoid creating the hazard or to minimize any hazard they create, to prevent their employees' unauthorized entry into a permit space, and to help them prepare for coordination of their activities under final § 1926.1203(h)(4).

Final § 1926.1203(h)(2)(ii)(C) is similar to the general industry standard at § 1910.146(c)(8)(iii) in that it requires the controlling contractor to share with each specified entity any precautions or procedures that the host employer, controlling contractor, or any entry employer implemented earlier for the protection of employees working in permit spaces. This provision also is similar to the proposed standard at § 1926.1204(a)(2)(iii). This final provision requires the controlling contractor to notify the specified entity of the procedures currently used, or previously used, at the permit space, thereby alerting each new entering entity to information that it can use to improve its entry plans and permit program. This provision does not require the controlling contractor to develop entry programs for its contractors.

One commenter urged OSHA to alter the information-exchange requirements in proposed § 1926.1204(a) by requiring the controlling contractor to share all information about precautions or procedures implemented by any employer within a given permit space,

[16] For a discussion of the term "near" see the overview of § 1926.1205 in this preamble.

not merely the precautions and procedures the host employer or controlling contractor implemented for that space (ID–220, pg. 16). OSHA agrees, and the final rule requires controlling contractors to share this information because it is likely to be helpful to subsequent entry employers as they assess the spaces and develop their own procedures. This information may also reduce the amount of time it takes subsequent entry employers to develop their own entry procedures. The controlling contractor's experience with a permit space includes information gathered from other entry employers and other sources; the controlling contractor will share this information with subsequent entry employers. If the information about previous procedures came from an entry employer who worked on projects before the controlling contractor became involved, then the controlling contractor would obtain that information from the host employer. If the previous procedures came from an entry employer who worked under the controlling contractor, then the controlling contractor would have obtained the information pursuant to other provisions of this rule.

Examples of Pre-Entry Information-Exchange Duties of Host Employers and Controlling Contractors

Example 1. A controlling contractor is walking the worksite and notices a significant amount of water pooling so that it might enter an underground permit space. The controlling contractor must alert the subcontractor working in that space of the potential for water entering the space or weakening the structure, and must also inform other entities in the area whose activities could foreseeably result in a hazard inside the confined space (*e.g.*, entities whose activities may be contributing to the pooling water, may convey an electric charge through the water into the confined space, or may weaken the structure around the confined space to allow the water to enter the space).

Example 2. The controlling contractor hires a subcontractor to apply a flammable epoxy coating to the walls of a confined space; the subcontractor does so under a permit program, and then cancels the permit in compliance with this final rule. The controlling contractor must inform subsequent employers entering the space about the application of that epoxy and the procedures used to address hazards in the space.

Example 3. If a host employer stored hazardous chemicals in a confined space during a period when leaching of the chemicals could occur, the host employer must disclose that previous use of the space.

Example 4. The controlling contractor hires a welder to weld a new structure inside a fully-enclosed above-ground permit-required confined space. The welder sets up a ventilation system that complies with all applicable OSHA requirements. The controlling contractor also hires a different subcontractor to perform unrelated excavation work 75 yards away from the permit space. The controlling contractor must alert the excavation contractor to the fact that a welder is working in the confined space, that the space has been designated a permit space and must not be entered by any of the excavation contractor's employees, and that the welder is relying on a ventilation system that must not be impacted by the excavation contractor's activities, such as by blocking the ventilation system or by operating heavy machinery, generators, etc. in such a way that their fumes could enter the confined space. In this example it is foreseeable that the excavator might otherwise place dirt from the excavation (the "spoil pile") in a location that could interfere with the welder's ventilation system, or add fumes into the confined space. Either action would foreseeably result in a hazard in the permit space. However, absent some other abnormal condition such as an underground gas pipeline running between the excavation site and the permit space, the controlling contractor would not need to ensure any coordination between the excavating activities and the welding activities because the excavation itself (aside from the placement of the spoil pile) is 75 yards away and would not foreseeably result in a hazard in the permit space.

In example 1, the entry employer might not be aware of the hazard from the pooling water or of other hazards that could arise from the activities of others outside the site in conjunction with the pooling water. In examples 2 and 3, both types of information could be critical to employers performing subsequent welding or other tasks that might ignite remaining fumes or release vapors inadvertently.

These information exchanges, in combination with separate OSHA requirements that entry employers share specific information about the permit spaces with controlling contractors, will ensure that each "downstream" employer (the employer performing the permit-space entry) receives important information about the relevant permit space in time to address hazards that could endanger employees it directs.

One commenter questioned whether the information duties would apply to all information—both written and oral—the host employer or controlling contractor may receive, rather than merely information that is readily available (ID–153, pg. 18). The obligations in this final rule apply to all information, including both written and oral information the host employer or controlling contractor receives about hazards or potential hazards in a permit space. It is the responsibility of the host employer and controlling contractor to retain this information, which protects employees who are performing permit-space work, and to communicate this information to entry employers and the others identified in the standard.

A different commenter asserted that employers will have difficulty managing and recording the information they are required to communicate (ID–078, pg. 2). However, the record indicates that many construction employers already are following the general industry confined spaces standard, which requires host employers to share similar information (see § 1910.146(c)(8)(ii) and (c)(8)(iii)). This final rule also does not prescribe how employers are to gather, record, or maintain this information. This commenter urged OSHA to provide a database of relevant information that all employers could access; however, such an action is beyond the scope of this rulemaking.

The National Association of Home Builders asserted that the information-exchange requirements would not be beneficial in the context of residential construction because conditions change too rapidly (making it likely that the information will be inaccurate when exchanged), and that the "small likelihood that the provision would ever be of any use to employee safety" should not outweigh the "burden of compliance" in residential construction (ID–117, pg. 20). This comment misses the point: this is an important safety issue because the information exchange protects workers from exposure to harmful conditions. The rapidly changing confined-space conditions on residential construction sites is a major reason OSHA is requiring these information exchanges. Moreover, only the presence of a permit-required confined space triggers the information-sharing requirements, and every entry into a permit-required confined space, by definition, exposes the entrants to a hazardous atmosphere or other serious hazard absent the measures implemented through the permit program. The commenter offers no support for the assertion that sharing information to help entry employers identify these hazards as quickly as possible, and before employee exposure occurs, would not be of "any use to employee safety." In light of the record as a whole, OSHA believes that there will be an important safety benefit, and, therefore, does not find the commenter's argument persuasive.

The same commenter offers another reason for objecting to the information-sharing requirement: On large commercial construction projects, it is common to exchange information at the start of the project, but this information

may be incomplete or partial (ID–117, pg. 20). In some cases, as construction progresses, the controlling contractor obtains more information as it becomes available. Consequently, this commenter asserted that the controlling contractor or host employer will exchange information with the entry contractor in a piecemeal fashion unless OSHA requires the entry employer to request all of the information available (See also ID–219.2, pg. 37 (marked as pg. 34)). The commenter's suggested approach to avoiding piecemeal information exchanges is to have the controlling contractor or host employer withhold relevant information if the contractor does not request it. This approach is contrary to the purpose of this paragraph: To ensure that employers have as much information as possible, and in a timely manner, when preparing to work safely in a confined space. Subcontractors are not likely to be aware of hidden dangers, and are, therefore, unlikely to request information about them. To protect their employees working inside a confined space, subcontractors would likely submit a *pro forma* request for information to the controlling contractor and host when they initially begin work at any site, but it is not clear that such a process would be substantively different from the approach specified in this final rule, except that it would be involve an extra step.

In any event, OSHA has specified when the controlling contractor must share the information: "before entry operations begin." The controlling contractor must share the information obtained from the host employer, and any other information that the controlling contractor gathered from other sources (*e.g.*, previous entries into the same space as part of the same construction project), with the entry employer before entry. If such permit-space work is to occur near the midpoint of a project, a single conversation shortly before the evaluation and entry may fulfill the requirements of the final rule. There is no reason the controlling contractor cannot send all of the information at once rather than sending updated information in a piecemeal fashion as the commenter noted, as long as the information is shared with the entry employer prior to entry. The key parts of the provision are that the controlling contractor remains informed, and ensures that the information is conveyed to the entrants. Therefore, employers involved in permit-space entry on construction worksites have flexibility to decide the manner in which to exchange this information (*e.g.*, whether orally or in writing, whether the entry employer or controlling contractor initiates the exchange); however, they all have a duty to ensure that they share the information.

Paragraph (h)(3)—Pre-entry information-sharing duties of entry employers.

This provision, which sets forth the information-exchange requirements for entry employers, is similar to the proposed provision and to the corresponding provision for general industry confined spaces standard at § 1910.146(c)(9), although it uses slightly different terminology. Here, OSHA uses the term "entry employer" to clarify that the paragraph applies to employers who perform permit-space entry operations. And as in the rest of this section, the controlling contractor, rather than the host employer, is the focal point of the information exchange. OSHA believes that these requirements will contribute significantly to the increased safety and health of the employees of entry employers involved in permit-space entry operations.

Paragraph (h)(3)(i). This provision requires an entry employer to obtain information about the permit-space entry operations from the controlling contractor, and works with final § 1926.1203(h)(2), which requires the controlling contractor to share information about permit-space entry operations with the entry employer. OSHA believes that the reciprocal obligations in this final rule, which are consistent with the general industry standard, will increase the effectiveness of the information exchange by placing the duty to share this information on both parties. Both employers will now have the duty to exchange information, although they will likely accomplish their duties in a single interaction. The information exchange will ensure that the entry employer understands the type of space it will be evaluating, and will allow it to anticipate the permit-space hazards that may be present during entry.

Paragraph (h)(3)(ii). The final rule requires an entry employer to inform the controlling contractor of the permit-space program that the entry employer will follow, including information about any hazards likely to be confronted or created in each permit space. This exchange must take place prior to entry to ensure that the controlling contractor is informed of all the hazards in a timely manner and can take action, if needed, to prevent an accident or injury before entry operations begin. OSHA expects this exchange to occur after the employer has completed its assessment of the permit space, which is generally necessary to identify the hazards in the space and ensure that a proper permit-space program is selected. Consistent with the approach in the proposed rule, separating this pre-entry exchange from the subsequent entry report required by § 1926.1203(h)(5)(ii) clarifies that these two information exchanges must take place at two distinct stages of permit-entry operations.

One commenter objected to the proposed requirement that the entry employer inform both the controlling contractor and host employer of the procedures the entry employer planned to use in the permit space. The commenter asserted that the proposed provision was "an unnecessary burden [that] in some cases may be infeasible" (ID–124, pg. 6). This final rule eliminates the requirement that the entry employer share this information with the host employer, eliminating any difficulties an entry employer may have communicating with a host employer, and is consistent with the rule's overall designation of the controlling contractor as the focal point of the information-exchange process. As explained elsewhere, the controlling contractor needs this information to coordinate entry as necessary, and the exchange provides the controlling contractor with another opportunity to inform the entry employer about the hazards of the permit space as required by § 1926.1203(h)(2).

Paragraph (h)(4)—Coordination duties of controlling contractors and entry employers. Final § 1926.1203(h)(4) requires controlling contractors and entry employers to coordinate permit-space entry operations in two circumstances: (1) When more than one entity performs entry operations at the same time, or (2) when permit-space entry is performed at the same time any activities that could foreseeably result in a hazard in the permit space are performed. The controlling contractor and each entry employer have separate duties under this provision, and each can be cited for failing to perform its part of the coordination. Similar obligations were included in the proposal, but were not stated as clearly as they are here, and also are present in the general industry standard. Minor differences between this final rule and the general industry and proposed rules are matters of terminology or reflect the key role of the controlling contractor in this construction rule.

There is a need to coordinate entry operations whenever multiple entities are performing work simultaneously in or around a permit-space because of the

possibility that one entity's activity might create a hazard for workers employed by a different entity (*e.g.*, welding next to the application of a flammable coating). The purpose of this provision is to protect employees from foreseeable hazards that could result from a lack of coordination between entry entities in the permit space, or with entities outside the space whose activities could create hazards inside the permit space. This paragraph works in concert with the requirement that entry employers inform the controlling contractor of the permit-space program that the employer will use and the hazards they are likely to encounter in the space, including hazards created after entry. The controlling contractor can use this information to coordinate the entry operations to ensure safety for all workers in the space.

It is important for the controlling contractor to participate in each coordination effort because construction worksites are constantly evolving, with multiple employers performing work. Consequently, the controlling contractor, as the employer with overall responsibility on the worksite, is in the best position to coordinate the entry operations. This provision also requires the entry employer to coordinate entry with the controlling contractor because it is the entry employer who evaluates a confined space, who will have employees it directs entering the space, and who may have the most current information about the space.

For example, a properly informed controlling contractor will be aware of excavation work on a site directly above an underground permit space, and will coordinate work to ensure that no employees are in the permit space when the excavation work could foreseeably cause part of the underground space to collapse. Similarly, the controlling contractor must ensure that, when an employer is using a crane in the vicinity of a permit space, lifts are planned and implemented so that the crane would not be carrying its load over an occupied permit space or its entry/exit. In those scenarios, the entry employer would be responsible for informing the controlling contractor when it plans to have employees inside the permit space. Coordination would typically involve the controlling contractor scheduling the activities appropriately, working with all of the employers involved to ensure that they adhere to the schedule, implementing a plan to remove the employees from the permit space at the appropriate times, and designating locations to keep the employees clear of the load during the lifting operation.

This coordination requirement responds to a concern that proposed § 1926.1204(d) did not account for the fact that work taking place near a permit space can create hazards that could harm other employers' employees inside the space (ID–210, pg. 317–18). The commenter raising this concern provided an example of an employer that uses gas that is heavier than air near a confined space; such a gas could create an atmospheric hazard in the space by displacing oxygen.

OSHA agrees with this comment and the final standard requires the type of coordination that will address this concern. It specifically requires the controlling contractor to coordinate entry operations of any entities whose activities could foreseeably result in a hazard in the confined space. This requirement is consistent with the requirements of final §§ 1926.1204(k) and 1926.1210(f). Final § 1926.1204(k) requires an entry employer to account for such coordination as part of its permit program, while final § 1926.1210(f) requires the entry supervisor to determine, on transferring responsibility for permit operations, that entry operations remain consistent with the terms of the entry permit and that entry conditions are acceptable.

Other commenters objected that controlling contractors are not in the best position to coordinate because they often are not on the site to provide coordination, do not have the knowledge or experience to correctly identify the hazards of a permit space, and may not know of the planned entry (ID–117, pg. 21; ID–075, pg. 6). These commenters also argued that if the final standard requires coordination, such coordination should be between the involved host employer and entry employer(s), as is the case under the general industry standard (ID–117, pg. 22; ID–075, pg. 6).

OSHA disagrees with these comments. An employer that meets the standard's definition of controlling contractor has "overall responsibility for construction at the worksite." As noted earlier, other commenters agreed that controlling contractors were better suited than host employers to serve at the center of this process in construction activities. (ID–210, pg. 315–20; ID–220.2, pg. 14–15). By virtue of their responsibility for the entire worksite, controlling contractors schedule and coordinate activities among different subcontractors to ensure that they perform construction tasks in the correct sequence, in the proper manner, and with minimal delay between the steps on a project. The vague hypothetical scenarios presented by the commenters do not persuade the Agency that the coordination required by this final rule is a significant departure from the type of coordination required on a regular basis under existing work practices. Accordingly, OSHA concludes that controlling contractors, as the entities actually managing construction activities at a worksite, are better able than host employers to coordinate the activities of the other employers whose employees work in or around a permit space. Coordination of entry operations under final § 1926.1203(h)(4) is a critical component of this standard.

Nevertheless, OSHA has structured the coordination provision in the final rule to minimize additional responsibilities and provide appropriate flexibility for controlling contractors. If the controlling contractor's employees will not enter the permit space, the controlling contractor may fulfill its coordination duty by relying on information provided by entry employers. The controlling contractor does not necessarily have to be on the site at all times or have expertise on permit space hazards to coordinate entry operations, just as the controlling contractor does not need to be on site at all times to coordinate material deliveries or subcontractor assignments. In addition, the final rule does not specify how the controlling contractor and entry employers must coordinate entry operations. Controlling contractors and entry employers may coordinate entry operations using any method that is effective, and this coordination need not involve a lengthy process.

One commenter expressed a concern that the coordination requirements would impose strict liability on controlling contractors for safe permit-space entry operations, meaning that the controlling contractor would be liable for another employer's breach of safety policy (ID–141, pg. 2). The final rule does not impose strict liability or any responsibility to ensure other contractors' compliance with the standard. Controlling contractors who are not entry employers have information sharing and coordination duties.

Another commenter asserted that, in an effort to comply with this coordination duty, the controlling contractor may impose redundant and unnecessary safety measures on other employers to protect the controlling contractor from liability (ID–120, pg. 2). This comment is speculative and unsupported by specific examples, so it is difficult for the Agency to respond to it other than to note that the final rule does not impose duplicative

requirements on employers, nor does the final rule require the controlling contractor to do so. OSHA believes that the final rule provides employers with sufficient flexibility in discharging their coordination duties. This flexibility should reduce duplication of effort and any associated costs.

Lastly, this commenter asserted that it would be difficult for a controlling contractor to fulfill the coordination duties absent explicit contractual authority to do so. *Id.* But under this final rule, controlling contractors are the only employers at a worksite that "have overall responsibility" for the site, so they are in the best position to coordinate the work schedule. If controlling contractors prefer to augment their authority through contractual provisions with subcontractors or host employers, this final rule does not prevent them from doing so.

Paragraph (h)(5)—Post-entry duties of controlling contractors and entry employers. This paragraph, which imposes obligations similar to those in the general industry standard, requires the controlling contractor to debrief an entry employer at the end of entry operations about the permit-space program followed and any hazards confronted or created during entry operations, and then relay appropriate information to the host employer. It also requires the entry employer to share the same information with the controlling contractor. These requirements serve three purposes. First, they ensure that the controlling contractor requests the information. Second, they establish an affirmative duty for the entry employer to provide this information. Third, they ensure that the host employer will receive information relevant to future permit-space entries. The intent is for entry employers to identify and share information about additional hazards, new procedures, or other new information not previously identified in the required pre-entry information exchange.

OSHA believes it is appropriate to place the duty on the entry employer to provide this information, as well as to require the controlling contractor to request it. The entry employer, by virtue of performing permit-space entry operations, will be the first employer to have access to new information. If the entry employer fails to communicate the information to the controlling contractor during the course of entry operations, the information transfer will occur during the entry employer debriefing.

There were no comments indicating the debriefing is unworkable or overly burdensome. OSHA made this duty reciprocal in the final rule, and removed the duty for the entry employer to provide information to the host employer to keep the rule internally consistent and consistent with the general industry standard, and to increase the effectiveness of the information exchange by placing the duty to share this information on both parties to the exchange, thereby ensuring that both the controlling contractor and entry supervisor exchange the specified information. Accordingly, § 1926.1203(h)(5)(i) requires the controlling contractor to retrieve the information, and § 1926.1203(h)(5)(ii) requires the entry employer to provide the information. OSHA does not view this as a significant change from the proposed rule because the proposal also required the same debriefing to occur, and it required the parties to share the same information (see proposed rule § 1926.1204(c)(2)). If no new hazards arose during entry and the entry employer's program did not change, the information exchange can be brief, just confirming that the original program was followed.

The final rule contains a new requirement for the controlling contractor to notify the host employer of any information it receives from debriefing the entry employer. OSHA added this provision to close a potential gap in the information-exchange process that could result because the final rule makes the controlling employer the hub of the information and exchange and does not require entry employers to provide information directly to the host employers, as the proposed rule did (see proposed rule § 1926.1204(c)(2)). As discussed above, OSHA has determined that the controlling contractor is in the best position to coordinate the exchange of this information. Therefore, the final rule shifts the duty to the controlling contractor. The host employer will still receive the information, but from the controlling contractor. OSHA expects that in many cases there will be no need for a separate exchange because the controlling contractor can relay this information as part of its regular communications with the host employer.

One commenter objected to the debriefing requirement, stating that it was unnecessary if other employers were not already scheduled to enter the space. If another employer does eventually enter the space, the commenter asserted, the subsequent employer's independent hazard assessment should suffice (ID–124, pg. 6). OSHA disagrees. The subsequent employer must make an independent hazard assessment, but the rationale for requiring information exchanges in the final rule still applies: that assessment may not reveal previously identified hidden or latent dangers or conditions, and the new entry employer would be less prepared to protect its employees than if it obtained the information that the controlling contractor received from debriefing the previous entrant.

A different commenter asserted that host employers have no need for information about newly constructed confined spaces, and that the requirement to provide information to the host employer is an unnecessary paperwork burden (ID–017, pg. 2). OSHA disagrees. It is important for the controlling contractor to notify the host employer of information about the host's property, particularly any new hazards identified during the entry. In many cases, the same controlling contractor may not be present for future construction activities involving the space, so the host employer's information will helpful for future entries.

Note to § 1926.1203(h)—host employer and controlling contractor not required to enter a confined space. The final standard also includes the note from proposed § 1926.1204(a) explaining that, unless a controlling contractor or host employer has, or will have, employees in a confined space, neither of these employers need to enter any confined space to collect the information specified in paragraph (h) of this section. This note applies to all of paragraph (h). This protects the employees of the controlling contractor and the host employer because entering confined spaces could expose those employees unnecessarily to the hazards of that space. Controlling contractors and host employers should not conduct such an entry unless there is a purpose to the entry other than just gathering information.

Paragraph (i)—Absence of a controlling contractor. Final § 1926.1203(i) provides that, in the event no employer meets the definition of a controlling contractor on a particular worksite, the host employer or other employer that arranges for permit-space entry work must fulfill the information-exchange and coordination duties of a controlling contractor. The general industry rule does not have any requirements for a controlling contractor and, therefore, has no corresponding provision dealing with the absence of a controlling contractor. OSHA added this requirement in response to a comment noting that some construction worksites do not have an employer that meets the definition of a controlling contractor (ID–124, pg. 6). Because the controlling contractor is at the hub of the information-exchange and coordination requirements, failing to address this

issue would leave a serious gap in a critical provision of the standard. When no employer on a worksite meets the definition of controlling contractor, it is still necessary for one employer to be responsible for information exchange and coordination, thereby ensuring that entry employers are aware of the known hazards associated with the space, and that different entities do not create new hazards to each other.

The employer that has the duty specified under final § 1926.1203(i) can be any employer that arranges for permit-space entry. It could be the host employer, a different contractor, or an entry employer that arranges for another entry employer to conduct entry operations. It is possible that the employer that has this duty will change based on the stage of construction. For example, if there is no controlling contractor for the project, but a contractor on the site arranges for entry employer A to enter a permit space, the final rule requires the contractor to share the information identified in final § 1926.1203(h) with entry employer A and to fulfill the controlling contractor's coordination and other information sharing duties in the standard. If entry employer A, after completing its entry operations and cancelling its permit, arranges for entry employer B to enter the permit space, then entry employer A assumes the controlling contractor duties with respect to entry employer B's confined space activities.

Requirements in § 1926.1203(h) and (i) do not alter contractual relationships between host employers or controlling contractors and subcontractors. One commenter noted that subcontractors often perform confined-space work because of their expertise in working in those spaces, and asserted that OSHA should not "force general contractors to interject themselves into the work tasks of their sub-contractors" in a way that would "disregard . . . both specific contractual responsibilities and the expertise of sub-contractors." (124.1, pg. 3.) OSHA agrees, and crafted this rule to ensure that subcontractors have the information necessary to perform their work safely, particularly information about hidden or latent hazards that the subcontractor may not be able to discover quickly without endangering its entrants. A subcontractor may have expertise in welding inside a confined space, but that expertise will not help it avoid an invisible hazard it has no reason to suspect. (See ID–213.1, pg. 1, *supra*, for example of hidden dangers.) In this case, the host employer and controlling contractor need not develop welding expertise; instead, they must share information about hazards that they, or other employers with the appropriate expertise, previously identified.

Several commenters asserted that "OSHA is attempting to force certain employers to assume a sufficient degree of control over confined space entry" to "substantially expand" the tort law exposure of those employers (ID–078, pg. 2; ID–120, pg. 2–3; 153, pgs. 19–20). OSHA does not agree, and notes that comments urging OSHA to reduce potential employer liability in private rights of action are not relevant to OSHA's statutorily mandated obligations to promote worker safety.

Congress enacted the OSH Act to "assure so far as possible every working man and woman in the Nation safe and healthful working conditions." 29 U.S.C. 651(b). Congress gave the Secretary of Labor the authority to promulgate mandatory occupational safety and health standards to achieve that goal.[17] *Id.* section 655. As OSHA explained in an October 23, 2006, letter to U.S. Congressman Cass Ballenger,

> nothing in health or safety standards issued by OSHA . . . determines the tort remedies available to injured workers. That matter is determined by the laws of the individual states. It is not our role at OSHA either to foster or to foil the efforts of plaintiffs' lawyers in state court proceedings. It is our responsibility, however, to undertake reasonable efforts " . . . to assure so far as possible every working man and woman in the Nation safe and healthful working conditions," and OSHA's standards are therefore focused on addressing workplace hazards." In general, tort law remedies present entirely separate bodies of law that are available at common law, or as the result of state action, to anyone in the general public (including workers) who might be harmed by a wrongful act; they are not aimed specifically at correcting workplace hazards.

The OSH Act does not contain any private right of action allowing employees to recover for injuries or illnesses caused by hazardous work conditions. Instead, Section 4(b)(4) of the OSH Act makes clear that any effect of OSHA standards on state tort law is limited: "Nothing in [the OSH] Act shall be construed to . . . enlarge or diminish or affect in any other manner the common law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the course of, employment." (29 U.S.C. 653(b)(4).) The plain language of section 4(b)(4) thus indicates that any standard OSHA promulgates generally has no effect on, and certainly cannot "substantially expand," employees' rights under the state tort system with respect to workplace injuries and illnesses. See, for example, *Crane* v. *Conoco, Inc.*, 41 F.3d 547 (9th Cir. 1994) ("OSHA violations do not themselves constitute a private cause of action"); *Atlas Roofing Co., Inc.* v. *OSHRC*, 430 U.S. 442, 445 (1977) ("existing state statutory and common-law remedies for actual injury and death remain unaffected" by the OSH Act); *Frohlick Crane Serv, Inc.*, v. *OSHRC*, 521 F.2d 628, 631 (10th Cir. 1975) ("It would appear that by this particular provision [section 4(b)(4)] Congress simply intended to preserve the existing private rights of an injured employee, which rights were to be unaffected by the various sections of the Act itself."); *Jeter* v. *St. Regis Paper Co.*, 507 F.2d 973, 977 (5th Cir. 1975) ("It seems clear that Congress did not intend [the OSH Act] to create a new private cause of action, but, on the contrary, intended private rights to be unaffected thereby.") .

OSHA recognizes that state courts in some circumstances use OSHA standards, including these final host-employer and controlling-contractor provisions, as evidence in a negligence action. (See, for example, *Knight* v. *Burns, Kirkley & Williams Constr. Co.*, 331 So.2d 651 (Ala. 1976).) But when they do so, any effect on tort law is a function of these state court decisions and is not in any way dictated by OSHA's standard. See *Summit Contractors, Inc.* v. *Sec'y of Labor*, 442 Fed.Appx. 570, 572 (D.C. Cir. 2011) (rejecting arguments that OSHA's multi-employer duties would increase common law liability for general contractors because "such liability would arise only from a court's (hypothetical) later action under state law—not from the OSH Act itself").

Other commenters submitted a variety of objections about the information-exchange provisions, including that the controlling contractor and host employer information-sharing requirements "do not reflect an appropriate application of responsibilities, and expand the duties of general contractors in the residential construction industry" (117.1, pg. 7), thereby requiring the host employer to maintain extensive files about each confined space located on its property, which "would be impractical and infeasible in today's business context" (153, pgs. 18–19). Commenters also complained that the coordination requirements were "unworkable" (219.2, pg. 40 (marked as pg. 37)). However, another commenter responded:

[17] The Secretary delegated those responsibilities to the Assistant Secretary for Occupational Safety and Health, who heads OSHA. See 77 FR 3912 (Jan. 25, 2012).

Throughout the hearings, participants argued, on the one hand, that OSHA should simply extend the general industry standard to construction and, on the other, that the proposed standard would impose unprecedented and unwarranted burdens on controlling contractors, which would expose them to substantial liability. . . . [T]here is, in fact, little new in the proposed multi-employer provisions. And, there is nothing in the record that . . . suggested that the information-sharing requirements under § 1910.146 have proven to be either burdensome or unnecessary. . . . [Based on the record,] the provisions requiring information sharing between the entity that has the greatest familiarity with the worksite and contractors coming into the worksite for brief, discrete periods of times have proven to be effective means of assuring that employees can work safely in confined spaces without imposing notable burdens or liability on the host employers.

(220.2, pg. 13–14.) OSHA agrees with this comment. There are not many substantive differences between the new standard and the general industry standard, and employers have not raised significant obstacles to compliance with the general industry standard during the two decades following OSHA's promulgation of that standard. OSHA is confident that the new construction standard will also be workable.

Section 1926.1204—Permit-Required Confined Space Program

The permit-required confined space program is a critical component of new subpart AA. Except for ventilation-only entries conducted in accordance with § 1926.1203(e), the Agency requires each employer with employees who will enter a permit space to implement a written permit-space program that meets the requirements set out in this section (see final § 1926.1203(d)). Final § 1926.1204 is, therefore, specifically tailored to work activities conducted inside a space that meets the definition of a "permit-required confined space" ("permit space") in final § 1926.1202. Technically, final § 1926.1204 sets out information and actions that must be included in the permit program, and the requirement to implement these steps is in final § 1926.1203(d), but employers should view § 1926.1204 as the main set of requirements for protecting their employees when entering a permit space.

In the preamble to the general industry confined spaces standard, the Agency observed that "an employer who waits until the last minute before entry operations begin to develop a permit space program is unlikely to have properly trained and equipped personnel available" (58 FR 4495 (Jan. 14, 1993)). Accordingly, OSHA designed final § 1926.1204, which is similar to § 1910.146(d), to require entry employers to plan the entry, and to implement the entry in accordance with that plan, to avoid endangering employees during the entry.

For the reasons identified in the Background section, above, OSHA is conforming the language of the permit-required confined space provisions in § 1926.1204 of the final rule to the corresponding provisions for general industry confined spaces at § 1910.146(d). The substance of this section generally is the same as the general industry standard. OSHA explains below the differences between the other paragraphs of the final rule and the general industry standard, and the significant differences between the final rule and similar provisions in the proposed rule. There is no discrete section of the proposed rule that corresponds directly to this section of the final rule, but OSHA also included most of the duties imposed by this final rule in the proposed rule. See, *e.g.*, proposed §§ 1926.1205 (atmospheric monitoring and testing); 1926.1209(c) (limiting entry) and (f) (safe termination procedures); 1926.1210(f) (attendant required); 1926.1210(j) (equipment); 1926.1212(a) (safe termination procedures); and 1926.1218 (equipment).

One commenter noted that a particular provision in the proposed rule (§ 1926.1218(a)(4)) referred to "confined space operations," and suggested OSHA change that reference to "confined space *entry* operations" (ID–025, p. 4). The regulatory text in § 1910.146 refers to both "permit space operations" (§ 1910.146(g)(2)(iii)) and "permit space *entry* operations" (§ 1910.146(d)(3)) [emphasis added]. In this final rule, OSHA changed all references to confined space operations and permit-space operations to confined space *entry* operations or permit-space *entry* operations to maintain consistency. The terms "confined space entry operations" or "permit-space entry operations" refer to both actual entry into a space, and any planning or preparation made for the entry (*i.e.*, an employer can be engaged in "entry operations" before actually entering a confined space).

The introductory language in final § 1926.1204 provides that the entry employer must perform the procedures set forth in that section. OSHA simplified the introductory language from the language in § 1910.146(d), and edited the language to reflect this final standard's use of the term "entry employer" when discussing an employer who decides that employees it directs will enter a permit space. OSHA made this change to clarify which employers must comply with these procedures on a multi-employer worksite.

Paragraph (a). Final § 1926.1204(a), which is identical to § 1910.146(d)(1), requires an employer to implement an effective means of preventing all unauthorized entry into a permit space. These measures are necessary to prevent unauthorized entry into PRCSs, and to protect employees from encountering PRCS hazards. Under the final rule, it is the entry employer's responsibility to ensure that all unauthorized persons stay out of the established permit space, regardless of who employs them. Any unauthorized employer who enters a permit space could pose a danger not only to themselves, but also to workers already inside the space. The entry employer's duty to prevent unauthorized entry also extends to the prevention of unintentional entry, such as a person falling into a space or accidently entering a permit space because of confusion about where an entrance to a space leads. The duty also extends to members of the public passing near the construction site (*e.g.*, a sewer manhole) in order to protect the employees in the permit space.

This final provision makes no substantive change from the proposed rule. Proposed § 1926.1209(c)(1)(i) provided that employers use barriers or high-visibility physical restrictions, such as a high-visibility warning lines, to prevent unauthorized entry into a space. One commenter asserted that circumstances arise that make it unsafe to use the physical restrictions specified in proposed § 1926.1209(c)(1)(i) (ID–104, p. 3). For example, when employees perform work to rehabilitate or install a protective coating in a sewer, the employer must use devices such as cables and hoses that run from a compressor to the airless spray pump, and then into the manhole to the spray gun, resulting in a tripping hazard that could cause someone to fall into the manhole. In such situations, this commenter suggested that OSHA require only that the employer post danger signs. OSHA expects that signs by themselves will generally be inadequate to prevent an inadvertent fall into a manhole. Even if the employer has full control of the entrance to the permit space to and can guard against members of the public who cannot see the signs or read them, there are too many activities on a typical construction site for an employer to ensure that workers would not be distracted and fail to see the sign or the manhole. Manholes, like other fall hazards at a typical worksite, must be

guarded in a manner that meets the requirements of this standard and the applicable specifications of 29 CFR part 1926, subpart G—Signs, Signals, and Barricades and subpart M—Fall Protection.

Because OSHA is duplicating the general industry standard in this portion of the final rule, it does not specify the particular means of compliance. This approach provides employers with flexibility in complying with this provision by not limiting the measures required under this provision to physical restrictions only. The employers' means of preventing entry will be evaluated based on its effectiveness at accomplishing that task. The same explanation that OSHA provided for the general industry rule applies in the construction context as well:

> [I]f the workplace is so configured as to prevent access of unauthorized entrants into areas containing permit spaces, training, alone or in combination with signs, may prevent the unauthorized access to the spaces. Otherwise, covers, guardrails, fences, or locks will be necessary. It is the employer[']s responsibility to use whatever measures are necessary to prevent unauthorized entry.

58 FR 4495.

Paragraph (b). In final § 1926.1203(a), OSHA requires employers to identify and evaluate the hazards of permit spaces that employees will enter. Final § 1926.1204(b), which is identical to § 1910.146(d)(2), requires an employer that authorizes employees to enter a permit space to first conduct a thorough evaluation of that permit space to identify the presence and location of all hazards within the permit space. This hazard evaluation is necessary to ensure that the spaces are correctly assessed to make the permit-space program as effective in protecting employees as possible. This evaluation may be combined with the initial evaluation required by final § 1926.1203(a), or it may be conducted separately. OSHA anticipates that most employers who intend to enter a space will conduct a single evaluation that complies with the requirements of both §§ 1926.1203(a) and 1926.1204(b).

Paragraph (c). Final § 1926.1204(c), which is similar to § 1910.146(d)(3), requires an employer to develop procedures needed to facilitate safe entry operations into most permit spaces. The paragraph lists eight measures that employers must take. However, this list is not comprehensive: Some spaces may include unique hazards, locations, or configurations that require additional steps to ensure the safety of entrants. The subparagraphs in final § 1926.1204(c) provide specific elements of these required procedures.

Paragraph (c)(1). Final § 1926.1204(c)(1), which is identical to § 1910.146(d)(3)(i), requires an employer to identify the entry conditions that employers must meet to initiate and conduct the entry safely. For example, when an atmospheric hazard exists in the space and an employer must use personal protective equipment (PPE) to protect employees from the hazard, the employer must include in the acceptable entry conditions the type of PPE employees are to use (such as type of respirator) and the exposure levels at which the PPE would protect the employees from the atmospheric hazard. If the permit space contains physical hazards, the entry employer must ensure that the acceptable entry conditions include the methods used to protect employees from the physical hazards. If the employer does not satisfy the conditions specified in either example, or in any list of acceptable conditions, then the result is a prohibited condition, meaning that employees must not enter the space and must evacuate if they are already in the space.

When determining the acceptable entry conditions, the employer must consider the work employees will perform and the hazards that may result from that work. For example, an employer that plans to weld inside a confined space must account for the hazard resulting from the welding fumes and gases when identifying acceptable entry conditions. As another example, an employer who plans to introduce gases into a space to inert potentially flammable gases must take into consideration the effect of the inerting gases on the atmosphere because that process will generally result in an IDLH atmosphere.

Paragraph (c)(2). Final § 1926.1204(c)(2), which is identical to § 1910.146(d)(3)(ii), requires an employer to provide each authorized entrant or that employee's authorized representative an opportunity to observe any monitoring or testing performed in a permit space. Final § 1926.1204(c)(2) does not require employees and their authorized representatives to observe the specified activities; however, it provides employees and their authorized representatives with the option to observe should they choose to do so. OSHA added this requirement to § 1910.146 in 1998, along with several other employee participation requirements. The Agency explained that those requirements would "function to provide a 'check' on human error in those cases where monitoring was improperly performed, and the Agency pointed to data demonstrating that human error in monitoring of a hazardous atmosphere was a critical element in many deaths in confined spaces (63 FR 66032 (Dec. 1, 1998)). OSHA also noted that its record indicated that many entrants would not choose to request to observe the monitoring, but stated "it is reasonable to assume that allowing authorized entrants or their designated representatives to observe the testing of spaces will prevent a substantial portion of the accidents attributed . . . to human error" (*id*). OSHA believes that this will also be the case under the final rule.

OSHA also believes that allowing employees and their authorized representatives to participate in this manner will contribute to the successful implementation of safe entry operations by enhancing their awareness of the hazards present in the confined space. Moreover, as OSHA noted when it added these observation requirements to the general industry standard, the employee participation requirements are consistent congressional intent and with a number of OSHA health standards that provide employees with the opportunity to participate actively in protecting their own safety and health and that of their co-workers (see discussion at 63 FR 66020–66021).

Paragraph (c)(3). Final § 1926.1204(c)(3), which is similar to § 1910.146(d)(3)(iii), requires an employer to include measures in the permit program to isolate a permit space or, where applicable, a physical hazard within the permit space (such as isolating mechanical hazards through lock out). The general industry standard refers only to "isolating the permit space," while the new final rule also addresses isolating physical hazards within the permit space, such as by placing a physical barrier inside the permit space to eliminate the potential for employee contact with a physical hazard inside that space, for the reasons provided in the explanation of § 1926.1203(e)(1)(i) and (g)(1). It is important to isolate the entrants from the hazards that may exist in the continuous space, or may enter into the continuous space and eventually migrate to engulf the entrants. For example, if an entry employer has not isolated a particular area of a continuous system such as sewer system, then the entire continuous system is a confined space. If any part of that system contains material that has the potential for engulfing an entrant then the entire system is a permit space.

If an employer is able to isolate all of the physical hazards, then the employer might be able to reclassify the space as non-permit space or enter under the alternative procedures in § 1926.1203(e). However, employers may still choose to enter under a permit program or may be required to do so if, for example, they isolate a physical hazard but cannot control an atmospheric hazard and must enter using respirators. The requirement to include the isolation measures in the permit program is critical to employee safety in those situations, as well when the employer is relying on isolation to prevent hazards from entering a space. Requiring the listing of the isolation method as part of the permit program is also useful to remind employers that if they are relying on the isolation to enter a confined space under the alternative procedures in § 1926.1203(e) or the reclassification under § 1926.1203(g), they must maintain that isolation or the permit program requirements will apply immediately.

If the employer is using isolation to protect the employees during the entry, then paragraph (c)(3) requires that the program include a method to ensure that the hazards remain isolated for the duration of the entry. Isolation methods provide the highest degree of assurance that the hazard will be kept away from the employees in the space, because isolation does not generally depend on the continued, proper operation of machinery (such as ventilation equipment) or PPE (such as respirators). If the space is such that the employer can demonstrate that it is infeasible to isolate the hazards, the employer need not include isolation measures in the permit program, but must eliminate or control the hazards in accordance with final § 1926.1204(c)(4) and § 1926.1204(e) (see final § 1926.1204(e)(1)). If the employer cannot maintain isolation or control the hazards, then the employer must terminate entry operations immediately.

Three commenters provided examples of how they believed it was possible to isolate portions of a confined space from other portions of the space. The first commenter addressed a scenario in which the employer is applying a protective coating to a sewer (ID–104, pp. 2–3). The commenter, an association representing members who apply protective coatings in sewers, asserted that the employer can isolate the permit space from the other sections of the sewer by running a bypass line upstream with pneumatic pipe plugs installed that provide a tight seal to prevent passage of air and liquids.

The second commenter, an association representing utility contractors who work regularly in sewers, noted that employers can sometimes block the flow of effluent into one part of a sewer system from a larger confined space by using pipe plugs upstream from where employers will conduct the work (ID–210, Tr. p. 187). In some cases, employers also use plugs to block off a portion of the sewer downstream from where an employer will conduct the work, and then purge and clean the workspace in between the plugs (ID–210, Tr. p. 188). In either scenario, the commenter stated that an employer can block the flow of air and effluent through the line by properly fitting pipe plugs to a pipe, pressurizing them with a few pounds of air, and either blocking in the plugs so they cannot fall out or using a "double plug" system (inserting two plugs into the same pipe "so if one slips you will have a backup") (ID–210, Tr. pp. 187, 189, and 199). The commenter acknowledged that there had been "failures" where the plugs exploded or did not function correctly and "killed and injured workers," but characterized such incidents as occurring "rarely" and only as a result of incorrect installation or procedures (ID–210, Tr. p. 208). The commenter agreed that the proper procedures would normally include installing a bypass line upstream of the pipe plug to redirect any effluent and ensure that pressure does not build behind the pipe plug (ID–210, Tr. p. 208).

A third commenter, a different sewer-services association, also agreed that, in many cases, employers can use pipe plugs along with bypass lines and "gate valves" to prevent effluents from entering a section of a sewer system, but indicated that employers rarely use pipe plugs on pipes greater than 10 inches in diameter for significant periods of time (ID–211, Tr. p. 156).[18]

OSHA finds that the record is not conclusive as to whether pipe plugs, with or without bypass systems, are a reliable and effective means of isolating a sewer space to protect workers from engulfment and atmospheric hazards moving through a continuous system. The record, which also includes a number of fatalities and injuries associated with the use of pipe plugs (see the Final Economic Analysis), indicates that these plugs may fail as a result of improper installation and may not be appropriate for extended use in larger pipes, and that bypass systems are sometimes required to relieve the buildup of pressure that could dislodge the plugs. There is no evidence that the pipe-plug failures that occurred, even if the failures were purely the result of improper installation, would not occur again in the future for the same reason. Moreover, it is not clear from the record that a significant force such as a storm surge could not dislodge the pipe plugs, or that the failure of a bypass system could not lead to pressure building behind a pipe plug and dislodging it. Isolation through a bypass system, unlike the other examples of methods used to isolate hazards listed in the general industry standard and this final rule, would depend on the continuous operation of machinery. The pipe plugs and bypass systems may, therefore, merely be a means of controlling the hazards, rather than isolating them, because it is not clear that they would completely protect workers from exposure to these hazards.[19]

Paragraph (c)(4). Final § 1926.1204(c)(4), which is identical to § 1910.146(d)(3)(iv), applies to permit spaces with hazardous atmospheres and requires an employer to purge, inert, flush, or ventilate the permit space to eliminate or control the hazardous atmosphere before entry. The purpose of

[18] The same commenter also stated that most sewer manholes do not present an engulfment hazard because "80 to 85 percent of all of the sewer manholes have pipe diameters of eight and ten inches or smaller entering them," and that it would take hours for engulfment to occur under these conditions because the Environmental Protection Agency engineering standards "require that those pipes be sized to flow at 50 percent of maximum capacity during high flow periods" (ID–211, Tr. p. 156). OSHA does not agree that limiting flow rate and capacity will eliminate the engulfment hazard; the engulfment would just take longer. These conditions do not isolate or eliminate the hazard, and the effluent could engulf or drown an employee who is unconscious or otherwise unable to leave the space before it fills the manhole, particularly if the employee is not able to keep his or her head above the floor. Therefore, the full permit-program protections in § 1926.1204 apply under these conditions unless the employer isolates or eliminates the hazard. However, if an employer can demonstrate that it can limit the rate and capacity of the flow, the employer could factor the potential time for engulfment or drowning resulting from this procedure into determining the type and location of an early-warning system that would provide adequate time for employees to exit a space.

[19] OSHA is leaving open the possibility that an employer could demonstrate that using pipe plugs in conjunction with bypass systems is an effective means of isolating a permit-required workspace from a continuous system. To do so, the employer must ensure that the procedure is appropriate for the conditions and use properly installed pipe plugs in conjunction with a bypass system to effectively isolate a workspace in a sewer system. Accordingly, the employer must ensure that the procedure isolates the workspace in fact from any engulfment hazard; OSHA would not view failure of the pipe plug or bypass system as an unforeseeable outcome. One of the commenters recommended using continuous air monitoring even if the space appears to be isolated (ID–210; Tr. pg. 202 (Kennedy)). OSHA agrees, and recommends that employers use continuous air monitoring under these conditions to provide early detection of any problems with the seal of the pipe plug.

this provision is to reduce employee exposure to atmosphere hazards in the permit space. Reducing exposure to hazards in the permit space through engineering practices, rather than relying on PPE as the primary protection for employees, is the most direct and effective means to reduce risk to the employee, whether the airborne substances pose a health risk of inhalation or a safety risk of fire or explosion.[20]

In § 1926.1204(c), OSHA requires these means of reducing exposure levels—purging, inerting, flushing, or ventilating—"as necessary" to eliminate or control atmospheric hazards. With respect to the actions in paragraph (c)(4), "as necessary" means that an employer must take at least one of these actions if the permit space has a hazardous atmosphere. The only permit spaces where these actions are not necessary are those in which the space does not have a hazardous atmosphere, as defined in § 1926.1201, but is designated as a permit space because it contains another hazard, such as an engulfment hazard, inwardly converging walls, or other recognized serious safety or health hazard.

The means used to reduce risk must be appropriate to the characteristics of the hazardous atmosphere and it must also "eliminate or control" the hazard to produce "safe permit space entry operations (§ 1926.1204(c)). For example, inerting a space that already has an oxygen-deficient atmosphere would be an inappropriate action, whereas ventilating with additional outside air would help to increase oxygen levels.

The Agency notes that it previously issued letters responding to questions about the conditions under which the general industry standard permitted employers to work in a space with flammable gas in concentrations greater than 10 percent of the LFL. See August 15, 1996, letter to Larry Brown, and September 4, 1996, letter to Macon Jones. OSHA subsequently clarified its position on those issues in a 2011 response to the U.S. Chemical Safety and Hazard Investigation Board, stating that the general industry standard "prohibits entry into atmospheres greater than 10 percent of the [LFL], unless the flammable/explosive hazard has been controlled through inerting of the space to reduce the oxygen content below that needed to support combustion." (ID–223, p.3).

OSHA takes the same approach with respect to this construction standard. While employers may use a variety of means to reduce the LFL to 10 percent or below, thus avoiding an LFL hazardous atmosphere as defined in § 1926.1202, OSHA reiterates that this new final rule for confined spaces in construction prohibits employees from working in any atmosphere above 10 percent LFL *except* when the employer successfully inerts the space so as to effectively remove the hazard of an explosion. See discussion of paragraph (1) of the definition of "hazardous atmosphere" in § 1926.1202 of this final rule. Even when the space is successfully inerted, an oxygen-deficient atmosphere generally results such that employers must prohibit entry unless they provide appropriate PPE or other equipment that is capable of protecting the employee from the oxygen-deficient atmosphere. See definition of "prohibited condition" in final § 1926.1202 and § 1926.1204(c)(7). As of the promulgation date of this final rule, OSHA is unaware of PPE that could provide sufficient protection to an employee from an explosion involving a flammable atmosphere. OSHA notes that some practices such as the use of static electricity capture, non-static footwear, non-sparking tools, explosion-proof lighting, a nitrogen blanket, or misting may reduce the likelihood of igniting an explosion, but none of these practices would eliminate the possibility of ignition. Another example of a practice that would not provide protection from a spark, fire, or explosion in an LFL atmosphere is using fire watch personnel who have the responsibility of looking for a spark, fire, or explosion and then responding under emergency procedures. It is unlikely that fire watch personnel could react quickly enough to ensure that employees would not be exposed to an explosion. Therefore, the employer must not rely on these methods in a permit program to protect employees working in a hazardous atmosphere in excess of 10 percent LFL. A permit program must identify the means of reducing the atmosphere to or below the 10 percent LFL or provide for inerting and all necessary PPE. OSHA added a note to § 1926.1204(c)(4) to make explicit the requirement for an employer to inert a space and provide appropriate PPE if employees will work in a space where less than 10 percent LFL cannot be achieved.

Paragraph (c)(5). Final § 1926.1204(c)(5) requires an employer to determine that monitoring devices will detect an increased atmospheric hazard level in the event that the ventilation system malfunctions, and to do so in adequate time for employees to safely exit the space. This requirement is from proposed § 1926.1208(b). There is no corresponding provision specified in § 1910.146 that mirrors final § 1926.1204(c)(5) with respect to the use of ventilation to control atmospheric hazards as part of a permit program; however, the preamble to the alternative "ventilation only" procedures in § 1910.146(c)(5)(i)(B) noted a similar requirement as a condition of using the "ventilation only" approach instead of the full permit program requirements:

> In order for the space to be considered safe, the atmosphere within the space after ventilation may not be expected to approach a hazardous atmosphere. This is necessary so that, if the ventilation shuts down for any reason (such as loss of power), the employees will have enough time to recognize the hazard and either exit the space or restore the ventilation.

58 FR 4488. OSHA is including that requirement in the final rule as a condition of the "ventilation only" alternative procedures in final § 1926.1203(e), and OSHA is applying the same requirement to the use of ventilation to control atmospheric hazards under a full permit program because the atmospheric hazards that could be present in a PRCS are the same as the atmospheric hazards present in a final § 1926.1203(e) alternate-procedures space. Therefore, the need to plan for ventilation failure is the same: employers must have a system in place that quickly detects an increased atmospheric hazard in the event that the ventilation system stops so that employees can escape safely whether the entry is conducted under the permit program requirements of § 1926.1204 or the alternative "ventilation only" procedure allowed by § 1926.1203(e). As with the general industry standard (see explanation of § 1910.146(c)(5)(i)(B) above), compliance with this requirement means that employers must ensure that the mechanical ventilation will control the atmospheric hazards at levels that are *below* the levels at which they are harmful to entrants so that if the ventilation fails (for example, because of a loss of power) the employees will have sufficient time to escape without exposure between detection of an increase in atmospheric level and exit.

[20] This approach is consistent with longstanding industry safety practice and OSHA policy. Under its "hierarchy of controls" policy reflected in a number of standards, OSHA only allows employers to rely on respirators or other PPE to the extent that engineering controls to eliminate the hazard are not feasible. See, *e.g.*, §§ 1910.134(a) (respiratory protection) and 1926.103 (respiratory protection); 1910.1000(e) (air contaminants); 1910.95(b) (occupational noise exposure) and 1926.101 (hearing protection).

Proposed § 1926.1208(b)(2) contained provisions similar to those in final § 1926.1204(c)(5). One commenter requested that OSHA provide more detail as to how an employer can comply with this requirement, suggesting that employers take into consideration "levels of detection by the monitoring system" and "increases in atmospheric hazards as workers are evacuating" (ID–140, p. 5 (labeled p. 4)). The provision is performance-based, which allows each employer the flexibility to determine how it will use monitoring to comply with the requirement. As OSHA stated in the preamble to the proposed rule, monitoring is the primary method for detecting an increase in atmospheric hazard levels. OSHA therefore requires monitoring under this final standard to detect ventilation system failure. In addition, employers should be aware of other indicators of increasing atmospheric hazard levels, in addition to monitoring, that may be useful in supplementing monitoring to provide faster detection of ventilation failures, including changes in noise levels, air flow, or pressure, as well as signs, symptoms, and characteristic effects of exposure to the atmospheric hazard (72 FR 67365 (Nov. 28, 2007)).

Paragraph (c)(6). Final § 1926.1204(c)(6), which is identical to § 1910.146(d)(3)(v), requires an employer to provide entrants protection against external hazards. This requirement is in addition to the provision in paragraph (c)(2) of this section that an employer must provide barriers as necessary to prevent unauthorized entry. This requirement will protect employees in and around the PRCS, such as attendants, or employees entering or exiting the permit space, from being struck by individuals or objects outside the PRCS that may fall into the space, or that could injure the employees when they are near the PRCS. In some scenarios, employers must use guardrails, covers, signs, barricades, or other protective measures to achieve this purpose. Each of these measures must comply with the applicable specifications of 29 CFR part 1926, subpart G—Signs, Signals, and Barricades) and subpart M—Fall Protection.[21] For example, as stated in the preamble for the general industry rule, "If entrants face a substantial risk of injury due to unauthorized entry, due to objects falling into the space, or due to vehicular hazards during entry into and exit from the space, then barriers would be required" (58 FR 4997).

Paragraph (c)(7). Final § 1926.1204(c)(7), the first clause of which is identical to § 1910.146(d)(3)(vi), requires an employer to ensure that conditions remain acceptable for entry for the full duration of an authorized entry. The employer will often discharge this duty by complying with the entry-supervisor provisions in § 1926.1210(c) of this final rule. By requiring the employer to have an individual on site with this authority, there is a greater likelihood that the employer will conduct the required monitoring and adhere to the acceptable entry conditions, which is critical to the successful implementation of safe PRCS procedures.

OSHA also added a clarification in paragraph (c)(7) allowing employees to work in a permit space that contains a hazardous atmosphere, but *only if:* (1) ventilating or other measures prescribed in § 1926.1204(c)(4) will not reduce the hazardous atmosphere sufficiently to allow employees to work safely within the permit-space; (2) the employer can demonstrate that use of PPE will protect the employees from that atmosphere; *and* (3) the employer ensures that the entrants use the PPE correctly. Otherwise, the entry employer must prohibit entry, or ensure that authorized entrants exit the space immediately, whenever the atmosphere inside the space meets the definition of a "hazardous atmosphere" specified in final § 1926.1202. These provisions are implicit in the general industry standard, but OSHA made them explicit here to avoid any suggestion that an employer could specify an "acceptable" condition that would include a hazardous atmosphere, absent adequate PPE.

For example, if the employer plans to have employees in a portion of a storm sewer with an oxygen-deficient atmosphere, and it is not feasible to address the oxygen deficiency through measures prescribed in § 1926.1204(c)(4), then the employer may allow employees to enter with closed-circuit respirators that would protect the employees from the oxygen-deficiency hazard. If, however, the employer is unable to protect employees from these hazards using any of these methods, then it must prevent the employees from entering the space. Likewise, if a confined space contains a flammable atmosphere exceeding 10 percent, of the LFL, and the employer cannot feasibly reduce this level to the non-hazardous level (10 percent or below), then the employer must inert the atmosphere to address potential explosion hazards (and use supplied-atmosphere respirators to protect the employees from the oxygen-deficiency hazard), or terminate entry. See also the previous discussion of final § 1926.1204(c)(4).

Paragraph (c)(8). Final § 1926.1204(c)(8) requires an employer, before removing an entrance cover, to eliminate conditions that could make it unsafe to remove the cover. Some examples of such conditions are when the cover is under pressure or when the cover is preventing exposure to an ignition source near a hazardous atmosphere. There is no corresponding general industry provision that has requirements similar to final § 1926.1204(c)(8); it is drawn from the requirements in proposed §§ 1926.1210(b), 1926.1216(c) and 1926.1217(c).

As OSHA explained in the preamble to the proposed rule, conditions such as heat and pressure within the PRCS may pose a danger to employees removing an entrance cover. In such cases, the cover may be blown off in the process of removal, or superheated steam may suddenly escape and burn the employee. Another example involves removal of a sealed cover that results in the release of toxic gases (72 FR 67368).

To protect employees from the hazards inside the PRCS as required by this provision, the employer must make a hazard assessment before removing any cover. Accordingly, the provision does not permit removal of the cover to the PRCS until the employer identifies all hazardous conditions related to the cover's removal, and then eliminates those hazards.

One commenter recommended that OSHA refer to any "hazardous" condition, rather than just a "condition," that could make it unsafe to remove the cover, and include language in the text of the final rule to address rescue personnel confronted with an entrance cover that is unsafe to open (ID–086, pp. 5–6). OSHA disagrees that adding the word "hazardous" to the provision would be helpful because the sentence already is clear that the condition at issue is such that removing the cover could be unsafe. The provisions of § 1926.1204 do not require entry employers to address in their permit programs the hazards that rescue personnel may face during rescue, nor do these provisions require the rescuers to develop separate written permit programs for rescue. However, § 1926.1211(b) requires that rescuers be informed of, and trained to recognize, hazards such as entry covers that would be unsafe to open and might affect the

[21] All additional requirements of subparts G and M remain in effect.

ability of the rescuers to perform rescues safely.

Paragraph (d). Final § 1926.1204(d), which is similar to § 1910.146(d)(4), requires each employer to provide all equipment used for confined-space operations at no cost to employees, maintain the equipment, and ensure that employees use the equipment correctly. OSHA believes that providing such equipment, and using it correctly, will prevent injuries and fatalities in permit spaces. Accordingly, the purpose of this paragraph is to ensure the availability and proper use of whatever equipment is necessary to reduce the dangers to employees posed by permit spaces.

In proposed § 1926.1218, OSHA required employers to provide several specific categories of equipment and included a catch-all "any other equipment necessary for safe confined space operations." One commenter suggested that OSHA clarify that the employer must provide this equipment to employees at no cost (ID–211, Tr. p. 46). The § 1910.146(d)(4) language OSHA is adopting for this final rule specifies that employers must provide this equipment at no cost to employees. Final § 1926.1204(d) varies from the language of the general industry standard only in that it specifies that the employer must provide the listed equipment to "each employee," whereas § 1910.146(d)(4) refers generally to "employees." Accordingly, in appropriate cases, if an employer fails to provide the necessary equipment as required, OSHA may issue separate citations with respect to each individual employee not provided with the proper equipment.

Paragraph (d)(1). Final § 1926.1204(d)(1), which is identical to § 1910.146(d)(4)(i), requires an employer to provide necessary equipment for conducting adequate testing and monitoring. This equipment is essential for protecting employees from atmospheric hazards.

Section 1926.1204(a)(4) of the NPRM proposed requiring employers to use a direct-reading instrument to perform required testing or monitoring. One commenter asserted that direct-reading instruments are not available for "airborne lead dust" or "paint that has a multitude of solvents in the formula" (ID–077, p. 1). Another commenter asserted that the final rule should permit alternatives to direct-reading instruments when such instruments are not available (ID–025, p. 3). Final § 1926.1204(d)(1) requires an employer to test or monitor for atmospheric hazards that exceed PELs set to protect against immediate injury or illness, which is not the case with lead.[22] Furthermore, OSHA disagrees with the other commenters' premise that direct-reading instruments would be unavailable to detect solvents. It is the employer's responsibility to ensure that such equipment is available in spaces where the final rule requires such monitoring, and the commenter did not indicate that is infeasible to do so. For example, employers can use photoionization detectors for detecting solvents.

Another commenter suggested that OSHA should require equipment calibration daily to avoid equipment malfunction (ID–025, p. 4). OSHA is not making this change because the provision as written in this final standard provides employers with flexibility in complying with the requirements to maintain testing and monitoring equipment, and to use it properly. For example, the employer can follow the manufacturer's instructions, or the recommendations of a qualified person, regarding the frequency of equipment calibration. The manufacturers' instructions are sufficient for this purpose because equipment manufacturers are most familiar with the components, configuration, and safe and healthful operation of their equipment; this information places them in the best position to specify the proper maintenance, calibration, and use of this equipment under these circumstances. Alternatively, an individual who meets the definition of a qualified person in final § 1926.1202 would have, through a recognized degree or professional standing or through extensive knowledge, the demonstrated ability necessary to make decisions that will ensure the proper maintenance, calibration, and use of equipment used in confined spaces.

Another commenter suggested that OSHA should provide a specific calibration standard because manufacturers are starting to distinguish between various types of calibrations, such as "bump calibration" and "field calibration" (ID–028, p. 6). OSHA is not adopting this commenter's suggestion because developing a calibration standard is beyond the scope of this rulemaking.

Paragraph (d)(2). Final § 1926.1204(d)(2), which is identical to § 1910.146(d)(4)(ii), requires an employer to provide ventilating equipment necessary to establish acceptable entry conditions. For example, the employer must provide forced-air mechanical-ventilation equipment when using such equipment to establish acceptable entry conditions for entry operations under final § 1926.1204. Use of the required equipment when appropriate is a significant factor in protecting the employees from hazardous atmospheres.

Paragraph (d)(3). Final § 1926.1204(d)(3), which is substantively identical to § 1910.146(d)(4)(iii), requires an employer to provide all communications equipment necessary to ensure that an attendant can communicate effectively with entrants in accordance with §§ 1926.1208(c) and 1209(e). Not all spaces require equipment for effective communication between the attendant and entrants, but the employer must provide it when necessary. Such equipment may be necessary, for example, if the entrants cannot hear an attendant because the permit space is sealed off.

Another example where the employer must provide such equipment is when an attendant needs audio-visual equipment to perform his or her duties under the final confined spaces in construction rule for more than one permit space at a time. Examples of such equipment include electronic audio and video tools that enable the attendant to detect what is occurring inside the multiple PRCSs without the attendant having to, simultaneously, be physically present at each PRCS entrance. If an employer chooses to require an attendant to assess entrants' status in multiple PRCSs, the employer must provide all of the equipment necessary for the attendant to fulfill the required duties. OSHA believes that expecting an attendant to be able to adequately perform these duties without the equipment necessary to accomplish the attendant's duties under this final rule will jeopardize the health and safety of the entrants.

There is no provision in § 1910.146 or the proposed rule that explicitly requires electronic communication while attending multiple permit spaces, but that standard implies that such communication is necessary for the attendant to fulfill the required duties. In the proposed rule, OSHA requested comments on the means, other than electronic equipment, for an attendant to adequately assess entrants' status in multiple PRCSs. Both of the commenters who addressed this issue agreed that electronic equipment, either wireless or hard-wire, is the only means

[22] OSHA includes identification requirements in many of its hazard-specific standards, and employers working in a confined space must still comply with those requirements absent a specific exception, but those requirements are separate from this confined-space standard and are not subject to change as part of this rulemaking.

of accomplishing this duty, and there is no contrary information elsewhere in the record (ID–108, p. 2; –116, p. 3). The one exception could be when an attendant is assessing entrants' status in two separate spaces that are immediately adjacent such that the employer can ensure assessment of both spaces with a single attendant positioned to fulfill the required duties without using observation equipment. Based on the information in the record as a whole, final § 1926.1204(d)(3) requires the employer to ensure each attendant uses electronic equipment as necessary when attending to multiple PRCSs that are not immediately adjacent to each other. This result also is consistent with final § 1926.1209—Attendant Duties.

Several commenters expressed concern that communications equipment would unnecessarily occupy limited room in a confined space when either spoken communication or line-of-sight communication would suffice (ID–033, p. 3; –061, p. 4; –077, p. 1; –101, p. 2). These comments ignore the premise of the requirement: final § 1926.1204(d)(3) explicitly states that the duty to provide communications equipment arises only when such equipment is necessary, which means that the employer must provide communications equipment only when verbal communication or line-of-sight communication are ineffective.

Another commenter asserted that radio communication is not always reliable (ID–094; p. 1). As OSHA stated in the preamble discussion of proposed rule § 1926.1210(j)(1), such equipment may consist of a variety of types (for example, cell phones, two-way hand-held radios), so long as it is effective (72 FR 67370 (Nov. 28, 2007)). If there is weak or unpredictable signal strength when using the device, the device would not comply with final § 1926.1204(d)(3) and the employer must remove the entrants until the attendant is situated to perform the required duties effectively. Effective, reliable communication equipment is essential in relaying information to attendants, entry supervisors, and other authorities regarding potentially dangerous changes in the PRCS conditions. Such information is critical to assess the hazards within the space and to provide information regarding methods appropriate for protecting or removing employees from those hazards.

Paragraph (d)(4). Final § 1926.1204(d)(4), which is identical to the general industry standard at § 1910.146(d)(4)(iv), requires an employer to provide PPE when feasible engineering and work-practice controls do not adequately protect employees. The employer must provide this equipment at no cost to the employees. When the employer uses equipment that is subject to an OSHA requirement, such as respirators or ear plugs, the employer must ensure that the equipment and its use comply with the applicable OSHA requirements. For example, failure to use the appropriate filters in a respirator can render its use ineffective, and would be a violation of the respiratory protection standard (§ 1926.103). The Note to paragraph (d)(4), which is not in the general industry standard, clarifies this point with respect to respirators because they are commonly used in confined spaces. OSHA believes that providing, using, and maintaining the appropriate PPE in accordance with OSHA requirements that address the identified hazard will protect employees from serious injury or death. However, as noted in the discussions of § 1926.1204(c)(4) and (c)(7) above, PPE cannot provide protection against some hazards such as explosions.

Paragraph (d)(5). Final § 1926.1204(d)(5), which is similar to § 1910.146(d)(4)(v), requires an employer to provide lighting equipment that complies with the illumination standard (29 CFR 1926.56) and is sufficient to allow employees to work safely and exit the space quickly in an emergency. The corresponding provision in § 1910.146(d)(4)(v) does not explicitly note that lighting equipment must meet other applicable OSHA standards; however, proposed rule § 1926.1210(j)(2) explicitly noted this requirement, and OSHA concludes that it is appropriate to include this clarification in the rule text. At least one commenter indicated that OSHA should explicitly cross-reference the applicable illumination standard (ID–011, p. 1), and OSHA did so here. OSHA also added language requiring approval of the lighting equipment for the ignitable or combustible properties of the specific, gases, vapors, dusts, or fibers present in the PRCS. OSHA took this additional language from the hazardous location requirements for the electrical equipment standard § 1926.407(b)(2)(i); a note to § 1926.407(b)(2)(i) references NFPA 70, the National Electric Code, which lists hazardous gases, vapors, and dusts by groups characterized by their ignitable or combustible properties. The additional language ensures that employees will use safe lighting equipment and wiring methods under the particular hazardous conditions present. This additional language does not increase employers' responsibilities under this final rule because the language merely reminds employers of an existing obligation they have under § 1926.407 when using lighting equipment under the specified conditions. As noted above, employers engaged in work covered by this standard must also comply with all other OSHA requirements unless specifically excluded.

OSHA believes that final paragraph (d)(5) will assist employees in conducting safe PRCS operations, including safe escape from a PRCS if necessary. OSHA notes that the provision would require an employer to provide lighting equipment that allows an employee to quickly exit a PRCS in the event of an emergency: For example, the loss of the primary power source. In this example, there are at least two ways in which an employer could fulfill this duty: (1) The employer can provide a reliable back-up power supply, or (2) the employer can provide employees with adequate flashlights, headlights, or similar hand-held lighting equipment. Providing adequate illumination for employees to exit quickly from a PRCS during such an emergency will enable employees to safely escape from a hazardous condition.

Paragraph (d)(6). Final § 1926.1204(d)(6), which is substantively identical to § 1910.146(d)(4)(vi), requires an employer to provide barriers and shields when required by this standard (see § 1926.1204(c)(6)). OSHA believes that this proposed requirement is necessary to keep unauthorized employees from entering the PRCS and to help protect employees inside the PRCS from being struck by objects and individuals falling into PRCSs. When providing this equipment, employers must ensure that it complies with other applicable OSHA requirements. For example, guardrails must meet the requirements of 29 CFR 1926.502(b) (Guardrail systems), and covers must conform to 29 CFR 1926.502(i) (Covers).

Paragraph (d)(7). Final § 1926.1204(d)(7), which is identical to § 1910.146(d)(4)(vii), requires an employer to provide equipment that facilitates safe entry to, and exit from, a PRCS. In doing so, employers must ensure that this equipment, including its use by employees, complies with the requirements of the applicable OSHA requirements (for example, 29 CFR part 1926, subpart X, for ladders and stairways, and 29 CFR part 1926, subpart L, for scaffolds). This equipment is critical under emergency-exit conditions to ensure that employees exit a PRCS in a timely and safe manner.

Paragraph (d)(8). Final § 1926.1204(d)(8), which is identical to § 1910.146(d)(4)(viii), requires an employer to provide rescue and emergency equipment as needed. Final § 1926.1204(d)(8) ensures that the proper equipment is available for rescuing authorized entrants in the event of an emergency in a PRCS, whether it is the employer's equipment or equipment belonging to a rescue service.

Paragraph (d)(9). Final § 1926.1204(d)(9), which is similar to § 1910.146(d)(4)(ix), requires an employer to provide any other equipment needed to safely enter or exit the permit space or to perform permit-space rescue. OSHA recognizes that there is a wide variety of permit spaces, and believes that the requirement to provide all additional equipment necessary to perform permit-space entry and exit ensures that the appropriate equipment is available at the job site so employees receive adequate protection from hazards present during permit-space operations. Similarly, OSHA believes the requirement to provide additional rescue equipment as needed addresses hazards that may be unique to a PRCS rescue, thereby ensuring that employees receive adequate protection from these hazards under emergency conditions. Accordingly, the employer must identify this additional equipment, if any, after conducting an assessment of the PRCS as required by the applicable sections of this final rule.

Proposed § 1926.1218(a)(4) specified that an employer provide any other equipment necessary for safe "confined space operations." For consistency, a commenter suggested replacing the term "confined space operations" with "confined space entry," which OSHA used frequently in the proposed rule (ID–025, p. 4). In response to this comment, OSHA adopted in final § 1926.1204(d)(9) the corresponding language in § 1910.146(d)(4)(ix), which uses the term "entry." OSHA added the phrase "safe exit from" to this final provision to clarify that employers must provide equipment needed for employee safety during the entire period they are involved in confined space operations, which includes ensuring that employees can exit safely from the space.

Paragraph (e). Final § 1926.1204(e), is similar to § 1910.146(d)(5), but includes language from proposed § 1926.1215—Continuous system permit spaces, as well as editorial revisions to the introductory text.

Paragraph (e)(1). Final § 1926.1204(e)(1) requires an employer to test the permit space for acceptable entry conditions. Information obtained from testing is vital to the identification of atmospheric hazards in the space. In instances when the permit space is fixed or isolated, the testing will be straightforward. Final § 1926.1204(e)(1), however, also acknowledges that accurately testing the full extent of a permit space, or even a workspace within a larger permit space, may be infeasible because the PRCS is large or is part of a continuous system. The size of the space could limit the value of the initial testing of entry conditions because the conditions in the work space could be affected by substances in the connected spaces and, therefore, subject to change. In such cases, employers must comply with the additional procedures in final § 1926.1204(e)(1)(i)–(iii), which include pre-entry testing to the extent feasible, continuous monitoring if such monitoring is commercially available, and an early warning system that monitors continuously for non-isolated engulfment hazards.

Final § 1926.1204(e)(1) is similar to the corresponding provision for general industry confined spaces at § 1910.146(d)(5)(i), with three exceptions. First, OSHA reorganized the two requirements in § 1910.146(d)(5)(i), pre-entry testing followed by continuous monitoring, into separate paragraphs in final § 1926.1204(e)(1)(i)–(ii). Second, OSHA also added the requirement for employers to provide an early warning system in final § 1926.1204(e)(1)(iii). OSHA separated the two paragraphs to emphasize that an employer performing confined-space operations under final § 1926.1204(e)(1) may be performing work under a special set of conditions in a portion of a large space a continuous system. As such, the employer must comply with the special procedures in § 1926.1204(e)(1)(i) through (iii) (testing, continuous monitoring, and an early warning system), as well as paragraphs (e)(2) through (6), to account for migrating hazards. One example of this type of confined space is a sewer in which a storm or other activity at another location could send water or hazardous materials into the space in the sewer where employees are working.

Third, OSHA added language clarifying that it is the employer's responsibility to demonstrate that isolation of the space is infeasible. This requirement is implicit in § 1910.146(d)(5)(i), so OSHA added this language to make the requirement explicit and clarify that an employer who determines that isolation of a space is infeasible is most able to provide information that supports this decision.

Paragraph (e)(1)(i). Final § 1926.1204(e)(1)(i) requires an employer to test to ensure that acceptable entry conditions exist immediately before entry occurs. The testing must occur "to the extent feasible," meaning that even if the employer makes a determination that it is infeasible to isolate the space and the test results may not accurately reflect all potential hazards in the space, that employer still has a responsibility to perform normal testing in the workspace prior to entry to ensure that a hazardous atmosphere does not already exist in that workspace.

Paragraph (e)(1)(ii). Final § 1926.1204(e)(1)(ii) requires an employer to continuously monitor a non-isolated permit space unless the employer can demonstrate that the equipment needed for continuous monitoring is not available commercially. Note that this requirement is different than the monitoring requirement for isolated spaces in § 1926.1204(e)(2) because paragraph (e)(1)(ii) does not include an option for periodic monitoring *unless* continuous monitoring is not commercially available (paragraph (e)(2) allows for periodic monitoring in certain other circumstances). Non-isolated permit spaces, relative to other PRCSs, have an enhanced risk of unexpected changes in hazardous atmosphere levels because atmospheric hazards could migrate from other areas, so OSHA only permitted periodic monitoring in non-isolated spaces in the absence of a viable alternative. By monitoring the space continuously, employers should detect rising levels of a hazardous atmosphere or the introduction of a new atmospheric hazard before it is too late to warn the authorized entrants and evacuate them from the space.

Final § 1926.1204(e)(1)(ii) is similar to the corresponding provision for general industry confined spaces at § 1910.146(d)(5)(i), except that OSHA allows for the absence of commercially available equipment that could make it infeasible to conduct continuous monitoring. In such instances, OSHA still requires periodic monitoring to increase the likelihood of identifying as quickly as possible a hazardous atmosphere migrating from another part of a continuous system. Several commenters were unsure what OSHA means by "not commercially available" (ID–106, p. 3; –129, p. 3; –152, p. 3). Typically, equipment is "commercially available" if it is offered for sale to the public or to the relevant employers. As OSHA stated in the preamble to the proposed rule, one example of when

continuous monitoring may not be commercially available involves particulate atmospheric hazards (72 FR 67381). In these cases, the employer must be able to demonstrate that periodic monitoring is of sufficient frequency to ensure that the atmospheric hazard remains at a safe level, as planned (*id*). OSHA added a cross-reference to final § 1926.1204(e)(2) to inform employers of the frequency with which to monitor periodically for hazards if continuous monitoring is not commercially available.

Several commenters asserted that OSHA should require a competent person to perform the testing and monitoring (ID–025, p. 3; –086, p. 5). OSHA agrees that the tester must be competent, but is not revising the text of the regulation to refer to a competent person because OSHA believes that the existing language, taken directly from the general industry confined-spaces standard, adequately addresses the competency of the tester. In this regard, the general industry confined-spaces standard does not use the term "competent person," but does use terms such as "attendant" and "entry supervisor" that require a level of experience and training regarding testing or monitoring equivalent to that of a "competent person," as defined in § 1926.32(f). For example, final § 1926.1208(b) and § 1910.146(h)(2) both require an authorized entrant to possess the necessary knowledge to properly test the atmosphere within a confined space (see also § 1926.1204(d)). Under the training provisions of both § 1910.146(g) and final § 1926.1207, an employer must provide specific training to an employee designated as an "authorized entrant"; this training must establish proficiency in the duties an authorized entrant must fulfill under these standards. In this respect, the scheme of both § 1910.146 and this final rule accomplish the commenters' objective, which is to design a procedure whereby the person performing the atmospheric tests has sufficient knowledge and experience to conduct the tests properly.

Different commenters asserted that OSHA should identify the specific locations for monitoring equipment in the permit space (ID–106, p. 2; –129, p. 2). For example, these commenters suggested that OSHA require an employer to place monitoring equipment at the merger point between the larger space and the non-isolated entry point. The continuous-monitoring requirement is a performance-based standard, and OSHA does not agree that it is necessary to specify particular locations for the placement of monitoring equipment, especially when technology and monitoring practices may evolve in the future. Accordingly, employers have flexibility to choose their preferred methods and equipment to monitor, so long as the monitoring equipment, when used in accordance with manufacturer requirements, detects rising levels of a hazardous atmosphere or the introduction of a new atmospheric hazard before it is too late to warn the authorized entrants and evacuate them from the space. For additional information about atmospheric monitoring, see May 12, 2009, letter to Edwin Porter, Jr.

Another commenter asserted that an employer must use more than one piece of continuous-monitoring equipment to effectively detect hazards (ID–031, p. 1). Final § 1926.1204(e)(1)(ii) does not require the use of more than one piece of continuous-monitoring equipment; however, the provision also does not specify that employers can accomplish monitoring using only one piece of equipment. The number of monitors an employer would need to ensure the isolation or control of atmospheric hazards depends on the PRCS's size, configuration, and conditions; the requirement here is that employers use whatever number of monitors is necessary to ensure the isolation or control of the atmospheric hazards. OSHA also selected the performance-oriented approach so that this standard will not become outdated through advances in monitoring technology.

Paragraph (e)(1)(iii). Final § 1926.1204(e)(1)(iii) requires an employer to provide an early warning system that will detect non-isolated engulfment hazards. OSHA included this requirement in proposed § 1926.1215(a)(2), but there is no corresponding § 1910.146 provision. As OSHA stated in the preamble to the proposed rule, this equipment addresses migrating engulfment hazards that are present in a non-isolated PRCS. For example, these hazards can result when runoff from a heavy storm upstream of a sewer flows downstream into the area in which employees are working. OSHA noted in the preamble of the proposed rule that migrating hazards, especially those hazards migrating from distant areas, are common in non-isolated spaces (72 FR 67382). Accordingly, this requirement is necessary to protect authorized entrants from the additional hazards associated with these spaces, including engulfment hazards.

One commenter suggested that the requirement for an early warning system will force employers to hire more employees for the purpose of monitoring the space (ID–059). Neither the comment nor the rest of the record provide support for this suggestion. To the contrary, employers have flexibility in determining whether to hire additional employees to comply with final § 1926.1204(e)(1)(iii). An employer may position detection and monitoring devices, without the need to hire additional employees, to provide the early warning. A full discussion of the costs of early warning systems is included in the Final Economic Analysis in this document.

One commenter appeared to assume that this provision required using equipment, not additional employees, to monitor engulfment hazards. This commenter asserted that such equipment is too expensive to maintain (ID–098, p. 1). This commenter did not provide any support for the assertion, or any specific information about problems associated with maintaining or operating such equipment. OSHA notes that the use of properly calibrated equipment to detect non-isolated engulfment hazards is a current practice by many in the industry and has been since before OSHA issued the proposed rule (see transcripts of stakeholder meetings, available at: *https://www.osha.gov/doc/reference_documents.html*). Without a specific reason why an early warning system is infeasible, OSHA retained this requirement in the final rule.

Another commenter asserted that an early warning system requirement will require an employer to evaluate and calibrate such systems for each potential hazard (ID–216). It is not clear from the comment, however, that the commenter understood that the early warning system described in the proposal (and this provision) must detect only non-isolated *engulfment* hazards, not each potential atmospheric hazard. Because engulfment hazards involve the movement of tangible substances (*e.g.*, water, mud, sand), systems may detect movement of different substances using the same methods (*e.g.*, a motion detector or other sensor triggered by the movement of water, mud, sand, or another substance through a particular area). The commenter did not provide any specific examples of equipment that would require calibration in a way that would be burdensome to the employer or diminish the effectiveness of the equipment in providing an early warning.

The same commenter suggested as an alternative requiring employers to disconnect, blind, lockout, or isolate all pumps and lines that may cause contaminants to flow into a confined space, and then continuously monitor that space. The alternative approaches

mentioned by the commenter appear to be directed at isolating the hazards. If the employer effectively isolates or eliminates all physical hazards within the entire permit space, then it might be possible for the employer to avoid the permit program altogether if employees can enter the space through the alternative procedures in § 1926.1203(e), or if there are no atmospheric hazards and the permit space is reclassified in accordance with § 1926.1203(g). OSHA anticipates, however, that in most cases employers in non-isolated spaces will need to comply with § 1926.1204(e)(1)(iii) because it may not be possible for employers to eliminate all physical hazards from a continuous system.

Other commenters asserted that the requirement to use an early warning system exposes the individuals installing the system to hazards (ID–098, p. 1; –120, p. 4). OSHA disagrees with these commenters' assertion. There are many types of early warning systems available, including flow monitors that are suspended in an upstream manhole such that no employee needs to climb down into the confined space to place or retrieve the monitor. These devices are capable of detecting engulfment hazards approaching from upstream without exposing the individuals installing them to additional hazards. Employers may also be able to lower cameras or other devices into the space, or conduct visual inspections from above the space without entering at all.

One commenter was unsure when, where, and how an employer must implement an early warning system (ID–124, p. 5). Another commenter asserted that OSHA should explicitly recognize that the use of electronic monitoring constitutes an acceptable early warning system (ID–107, p. 3). In response to these comments, OSHA notes that, once the employer determines that isolation of the space is infeasible, then the employer must implement an early warning system in accordance with final § 1926.1204(e)(1)(iii). The employer has flexibility in determining what type of system to use based on information it receives about the space and its hazards, and based on the employer's experience working in similar spaces. The system can be as simple as posting observers with communication equipment in safe locations (*e.g.*, outside an open manhole) at distances far enough upstream from the work area to timely communicate a warning to the entrants working downstream. Another method would be to use detection or monitoring devices upstream that will alert an attendant, or activate alarms at the entrants' work area, in sufficient time for the entrants to safely avoid upstream engulfment hazards moving in their direction. So long as the use of electronic monitoring alerts authorized entrants and attendants of non-isolated engulfment hazards in sufficient time to safely exit the PRCS, the employer will be in compliance with final § 1926.1204(e)(1)(iii).

Paragraph (e)(2). Final § 1926.1204(e)(2) requires an employer to continuously monitor the space unless the employer can demonstrate that the equipment for continuously monitoring a hazard is not commercially available or that periodic monitoring is sufficient to ensure the control of atmospheric hazards at safe levels. Final rule § 1926.1204(e)(2) is similar to the corresponding provision for general industry confined spaces at § 1910.146(d)(5)(ii), except that final § 1926.1204(e)(2) generally requires continuous monitoring as did the proposed rule (see proposed § 1926.1215(a)(1)). Several commenters supported the requirement to monitor permit spaces continuously (ID–105, p. 2; –106, p. 2). One of these commenters asserted that "periodic monitoring could be difficult to interpret, which could potentially lead to situations where an employer's monitoring scheme fails to adequately monitor rapidly changing atmospheric conditions that could pose risks to workers who enter a confined space" (ID–105, p. 2).

In the typical PRCS in a construction setting, it is often difficult for the employer to predict with reasonable certainty the levels of hazardous atmospheres. In many instances, the employer will have little or no past experience with the particular PRCS, and will lack reliable historical data on hazard levels. Also, the PRCS may change as construction work progresses in ways that may cause unexpected increases in hazard levels. For example, changes to the wall of a PRCS may increase the level of hazardous gasses in the PRCS (see also ID–213.1, describing examples of how construction spaces can include hidden dangers, such as paints or sealants that can release toxic fumes if triggered by welding or other sources of heat.) In addition, construction equipment in the PRCS may discharge hazardous gasses into the space at a higher rate than anticipated.

In short, construction work follows a less predictable course than work covered by the general industry standard and, thus, requires more frequent atmospheric monitoring. Because of this high level of unpredictability, OSHA believes, generally, that continuous monitoring is necessary to protect affected employees, especially the entrants. This provision enables the employer to recognize deteriorating conditions quickly, and to identify new atmospheric hazards in time to take the actions required to protect employees.

However, the Agency recognizes that, for some PRCSs, especially those PRCSs entered and monitored repeatedly over a significant period of time and found to have a stable atmosphere (such as a remote location that is not near potential sources of atmospheric hazards), the employer may be able to show that periodic monitoring will be sufficient to ensure that the conditions in the PRCS remain within acceptable entry conditions. However, when the employer uses periodic monitoring, the monitoring must be of sufficient frequency to ensure the control of atmospheric hazards at planned levels, and capable of detecting new hazards in time to protect the employees. In some cases, continuous monitoring may not be possible; for example, continuous monitoring typically is not available when the atmospheric hazard is a particulate. Therefore, when the employer can show that periodic monitoring is adequate, or can demonstrate that the technology for continuous monitoring of the atmospheric hazard is not available, OSHA will permit the employer to use effective periodic monitoring instead of continuous monitoring.

The preamble discussion of proposed § 1926.1205(a)(3) provided the following factors that OSHA will consider in determining whether an employer has used an appropriate monitoring frequency: The results of tests allowing entry; regularity of entry (*e.g.*, daily, weekly, monthly); effectiveness of previous monitoring activity; and knowledge of the hazards (72 FR 67362). One commenter suggested adding the following factors to this list: (1) The type of the work performed in the space (*i.e.*, hot versus cold work); (2) the time period the confined space remains unmonitored (*i.e.*, requiring monitoring every 20–30 minutes), and; (3) lunch breaks (ID–132, p. 3). Knowledge of the hazards from the list in the proposed rule covers the first of these suggested factors (type of work), while regularity of entry from the proposal's list covers the third suggested factor (lunch breaks). Effectiveness of previous monitoring activity from the proposal's list addresses the second suggested factor (the time period the permit space remains unmonitored). Accordingly, an employer must account for the development of hazardous atmospheres during periods when no atmospheric monitoring occurs in the space to

determine whether entry conditions remain at safe levels over these periods. For example, if the space remains unmonitored for just a few minutes prior to reentry, and previous monitoring regularly indicates that acceptable entry conditions continued to exist over this period, then an employer may conclude that it is not necessary to monitor again prior to reentering the space. However, if the space remains unmonitored for a longer time and previous monitoring indicates that atmospheric hazard levels increase over this period, then an employer must evaluate and monitor the space again before reentering it.

Some commenters asserted that OSHA must define the term "periodic monitoring" to avoid confusion among the regulated community (ID–075, p. 10; –129, p. 2;–152, p. 2). The frequency with which it is necessary to monitor a confined space differs based on the particular facts and circumstances. OSHA provided the factors listed in the previous paragraph to assist employers in determining when periodic monitoring is necessary; however, final § 1926.1204(e)(2) maintains performance-based language, which OSHA believes will provide employers with flexibility in complying with this final rule. Moreover, there was no indication in the record that the longstanding use of the term "periodic testing" in § 1910.146 is causing the level of confusion suggested by the commenters.

Paragraph (e)(3). Final § 1926.1204(e)(3), which is identical to § 1910.146(d)(5)(iii), requires an employer to test for particular substances in a pre-determined order: oxygen, then combustible gases and vapors, and finally toxic gases and vapors. The preamble to the general industry confined-spaces standard noted that this procedure represents generally accepted safe work practices, and explained the specified order as follows:

> A test for oxygen must be performed first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere. In fact, the Johnson Wax Company (Ex. 14–222) stated that 'there is [a] specific (sensor dependent) oxygen level below which the combustible gas sensor will *not* respond at all [emphasis was supplied in original].' Combustible gases are tested for next because the threat of fire or explosion is both more immediate and more life threatening, in most cases, than exposure to toxic gases.

(58 FR 4499). OSHA also included this same requirement in the proposed § 1926.1205(a)(1), and received no comments challenging the validity of this approach. OSHA remains convinced that the priority assigned to testing or monitoring atmospheric hazards by final § 1926.1204(e)(3) remains valid, and believes that this requirement is critical to the health and safety of employees involved in confined-space entry.

OSHA notes that final § 1926.1204(e)(3), like the proposed rule, does not require an employer to test for combustible dust. There currently are technological limitations on testing for airborne combustible dust in a timely manner; in addition, unlike flammable vapors, in situations in which airborne combustible dust reaches a minimum combustible concentration, the dust cloud generally is dense enough to detect with the naked eye.

Paragraph (e)(4). Final § 1926.1204(e)(4), which is identical to § 1910.146(d)(5)(iv), requires an employer to provide an authorized entrant or employee authorized representative with the opportunity to observe testing or monitoring. See the discussion of final § 1926.1204(c)(2) for an explanation of the importance of providing an opportunity an opportunity for observation to entrants or their representatives.

Paragraph (e)(5). Final § 1926.1204(e)(5), which is similar to § 1910.146(d)(5)(v), requires an employer to reevaluate a PRCS if there is "some indication" that the previous evaluation was inadequate and an authorized entrant or that entrant's authorized representative asks an employer to reevaluate the space. This requirement ensures that entrants, or their representatives, can provide a check on potential human error in the monitoring process before they are potentially exposed to harm. This requirement is consistent with other requirements to allow employee observation of testing results, the reasons for which are set forth in the explanation of § 1926.1204(c)(2). In some cases employees who did not observe the initial monitoring process may notice something about the equipment or space that calls into doubt the initial evaluation, but in other cases this requirement serves as a corollary to the general observation requirements: an employee or employee representative who observes the initial evaluation of the space pursuant to § 1926.1204(c)(2) and notes a problem with that testing may request a re-evaluation of the space under § 1926.1204(e)(5).

Section 1910.146(d)(5)(v) requires an employer to reevaluate when an authorized entrant or the entrant's authorized representative "has a reason to believe" the initial evaluation may have been inadequate. Otherwise, this provision of the final rule is identical to § 1910.146(d)(5)(v). Examples of indications that the evaluation of the permit space was inadequate include: improper use of monitoring equipment (*e.g.*, monitoring devices have low battery life or noticeable damage; monitoring devices improperly calibrated; measurements taken in improper locations); employees noting physical hazards not identified in the evaluation; and inconsistent monitor readings without adequate explanation.

Addressing an example in proposed § 1926.1207(a)(3), one commenter was unsure who would make the final decision of whether there is a reasonable basis for believing that a hazard determination is inadequate (ID–120, p. 4). Specifically, the commenter presented a situation in which an employee provides an alleged basis for believing that a hazard determination is inadequate, but the employer finds that the basis is not reasonable. Under final § 1926.1204(e)(5), the employer may repeat the test, alter the test to assess additional aspects of the space, or assess whether a change occurred in the use or configuration of the space after testing. If such a change occurred, then the employer must reevaluate the space. Therefore, compared to the more subjective language in the general industry standard (*i.e.*, "has reason to believe"), the reevaluation requirement in this final provision (*i.e.*, "some indication") is more objective and based on the observable conditions, thereby reducing ambiguity.

Paragraph (e)(6). Final § 1926.1204(e)(6), which is identical to § 1910.146(d)(5)(vi) except for non-substantive clarifications and grammatical changes, requires an employer to immediately provide the results of testing conducted in accordance with final § 1926.1204 to each authorized entrant or that employee's authorized representative. This requirement will ensure that employees and their representatives have the information necessary to identify potential inadequacies in the testing and take action under paragraph (e)(5) of this section to avoid unsafe entries. In some cases the testing may reveal specific conditions that fall within an employee's expertise or may be relevant to an individual health condition of the employee. For example, if an employee knows that he or she has a particular sensitivity to even low levels of a substance that would not otherwise result in a hazardous

atmosphere, the employee could review the test results and alert the employer if that substance is detected so that the employer can provide appropriate measures to protect the employee. See the discussion of final § 1926.1204(c)(2) for further explanation of this requirement.

Paragraph (f). The introductory text of final § 1926.1204(f), which is identical to § 1910.146(d)(6), requires an employer to provide at least one attendant outside a PRCS while an authorized entrant is performing confined-space operations. Although an attendant does not have the overall responsibility for employee safety and health assigned to the entry supervisor, the attendant is a crucial link between authorized entrants and the entry supervisor, and is essential for proper rescue operations. See the discussion in § 1926.1209 of this final standard for further explanation of the attendant's duties and the importance of the attendant in confined-space operations.

Paragraphs (f)(1) and (f)(2). In final § 1926.1204(f)(1), OSHA authorizes the permit program to allow for an attendant to perform his or her required duties, including assessing authorized entrants' status and meeting the requirements of § 1926.1209 for more than one permit space, similar to the requirement specified in the proposed rule at § 1926.1210(f)(3). Under final § 1926.1204(f)(2), the permit program may allow an attendant to fulfill his or her assessment duties for one or more spaces from a remote location provided the attendant is capable of fulfilling all attendant duties under § 1926.1209 for all spaces to which the attendant is assigned from that remote location. Final § 1926.1204(f)(1) and (f)(2) are similar to the note in the general industry confined-spaces standard at § 1910.146(d)(6). OSHA acknowledges that, although it is best to have an attendant outside each PRCS, there may be situations when one attendant can effectively fulfill the attendant duties in multiple PRCSs. The ability to assess entrants' status in multiple PRCS sites allows employers maximum flexibility in providing for the safety of employees when site-specific factors permit the attendant to do so. For instance, in some circumstances a single attendant equipped with modern technologies such as an automated monitor/alarm system and audio-video equipment may be able to assess entrants' status in multiple sites and react to emergency conditions as effectively as a single attendant at each space.

While paragraph (f)(1) sets forth performance-based measures, OSHA believes that an attendant's ability to assess entrants' status in multiple permit spaces while adequately performing attendant duties is dependent on several factors, that include: (1) the number of permit spaces the attendant assesses simultaneously; (2) the degree and number of the hazards; (3) how effective the assessment technology used is at assessing entrants' status and the conditions in the permit space (*i.e.*, is there a system in place for the attendant to track, from a remote location, who is coming in and out of a permit space); and (4) the distance between the multiple permit spaces. This provision may preclude a single attendant from serving as the attendant for multiple spaces if the employer also designated the attendant to provide non-entry rescue service. In most cases, an attendant with non-entry rescue responsibility must be physically present to retrieve immediately the entrant absent the availability of equipment that would enable the attendant to perform the rescue task remotely and successfully. As noted in the criteria above, the degree of the hazard may affect the timing of entrant retrieval and, thus, the physical proximity required for an attendant who has non-entry rescue responsibility (*e.g.*, if the permit space contains combustible gases that present a dangerous fire hazard, the attendant must be capable of retrieving the entrant immediately).

One commenter suggested that OSHA provide a maximum distance from which one attendant can assess entrants' status in multiple PRCSs (ID–059.1, p. 1). OSHA did not mandate a maximum distance because there are a number of factors that could influence the proper distance from which an attendant can assess entrants' status in multiple PRCSs while remaining in compliance with the applicable attendant requirements under this final rule. For example, some of the factors could be the particular circumstances at the worksite (the location and accessibility of the permit space), the visual acuity and observation skills of the attendant, and the equipment provided to the attendant. This approach provides the most flexibility to employers.

Paragraph (g). Final § 1926.1204(g), which is identical to § 1910.146(d)(7), requires an employer to specify, in its permit program, the means and procedures it will use to ensure that a single attendant is capable of effectively fulfilling the attendant duties for multiple confined spaces if an emergency occurs in one of the spaces. As specified in the final preamble to § 1910.146 and the note to proposed § 1926.1210(f)(3)(ii), effective assessment procedures include procedures to ensure that the attendant can respond adequately to emergencies. If the attendant needs to devote his or her entire attention to one of the spaces or conduct non-entry retrieval, the attendant must have a backup ready to assume the attendant duties for the other space or order the evacuation of that space.

A commenter asserted that paragraph (g) also should include requirements for: (1) testing and charging electronic equipment used to assess entrants' status in multiple PRCSs; (2) the use of equipment within acceptable limits in accordance with Federal Communications Commission (FCC) guidelines; and, (3) attendant training (ID–108.1, p. 2). In response, OSHA notes, first, that final § 1926.1204(d) requires employers to maintain equipment provided for compliance with this final rule, which includes properly testing and charging the equipment. Second, this final rule works in conjunction with other federal laws, and compliance with FCC guidelines is a matter best addressed by the FCC. Third, final § 1926.1207 requires the employer to train all employees, including attendants assessing multiple permit spaces, on the provisions of the standard so that the employees can effectively perform their designated duties under this standard. Thus, OSHA concludes that the final standard already includes the duties requested by the commenter, and that this final standard provides employers with appropriate flexibility in performing these duties.

Paragraph (h). Final § 1926.1204(h), which is identical to § 1910.146(d)(8) except for minor clarifications, requires each employer to specify the names of each person who will have a particular role in confined-space operations, characterize those roles, and train the named people accordingly. In the final rule, OSHA clarified that each employer must designate each and every employee assigned to a specific role under this final rule. This provision will enable employers, employees, and OSHA to identify which employees need to receive what training under final § 1926.1207.

One commenter was uncertain whether the attendant and the entry supervisor must be different employees (ID–124, p. 8). The definition of "entry supervisor" in final § 1926.1202 includes a note explaining that an entry supervisor also may serve as an attendant or an authorized entrant. This note is identical to the note in the general industry confined-spaces standard at § 1910.146(b). OSHA

included this note to parallel the general industry standard and because OSHA's enforcement experience demonstrates that, when the entry supervisor has adequate training, he/she is capable of serving simultaneous roles effectively. Moreover, proposed § 1926.1210(h) specifically stated that an entry supervisor could serve simultaneously as an attendant or an authorized entrant, which is consistent with this final rule, and OSHA did not receive any comments indicating that this dual role was infeasible or inappropriate.

Paragraph (i). Final § 1926.1204(i), which is nearly identical to § 1910.146(d)(9), requires an employer to have and implement effective procedures for summoning rescue services (including procedures for summoning emergency assistance in the event of a failed non-entry rescue), performing rescue, and preventing unauthorized personnel from attempting rescue. The only difference from the general industry requirement is that OSHA added a parenthetical to note that employers have a duty to summon emergency assistance in the event of a failed non-entry rescue.

Several commenters were unsure which employer must summon rescue (ID–025, p. 4; –150, p. 3). Another commenter asserted that the attendant should summon rescue (ID–210, Tr. p. 57). Final § 1926.1204(i) applies to any employer, including a controlling contractor or host employer, that has its own employees performing confined space operations. Each such employer must designate an attendant, and final § 1926.1209(g) requires the attendant to summon a rescue service when needed. When multiple employers are operating in the same space, the employers must coordinate the procedures for summoning a rescue service as part of their general coordination duties under §§ 1926.1203(h)(4) and 1926.1204(k). This provision will ensure that procedures are in place for the timely and effective rescue of entrants when necessary.

Paragraph (j). Final § 1926.1204(j), which corresponds to the requirements in § 1910.146(d)(10), requires an employer to develop procedures for the development, issuance, use, and cancellation of an entry permit; the final provision also is similar to proposed § 1926.1212(a). The permit is one of the most crucial elements of a permit program because it provides specific instructions for monitoring and addressing hazards in a particular space. See the discussion to final §§ 1926.1205 and 1926.1206 for further explanation on the importance of developing and using entry permits for confined-space entry. In the final rule, OSHA added a clarification that these procedures must cover the safe termination of entry operations, which must include procedures for summoning emergency assistance in the event that non-entry rescue fails (see discussion of backup emergency assistance in final § 1926.1211).

One commenter was unsure which employers must comply with final § 1926.1204(j) (ID–120, p. 4). Final § 1926.1204(j) applies to any employer, including a controlling contractor or host employer, that has its own employees performing confined space operations.

Paragraph (k). Final § 1926.1204(k) requires an employer to develop and implement procedures for coordinating confined-space entry when multiple employers are performing work simultaneously that could affect conditions in a permit space, a requirement derived from proposed § 1926.1204(d). In the general industry confined-space standard, § 1910.146(d)(11) requires coordination procedures when multiple employers are working simultaneously "as authorized entrants." This final provision differs from § 1910.146(d)(11) by addressing the need to coordinate work activities through the controlling contractor, as well with employers working outside the permit space when their work could foreseeably affect conditions within a confined space. The controlling contractor (or the employer specified in § 1926.1203(i)) and each entry employer are responsible for coordinating work activities among different employers to protect confined space entrants under final § 1926.1203(h)(4), and entry employers must ensure that their permit programs specify when and how they will share information with the controlling contractor in a timely manner in accordance with § 1926.1203(h)(4) and (h)(5)(ii). The permit program also must address how the entry employer's employees are to receive and transfer information about a confined space from the controlling contractor in accordance with § 1926.1203(h)(2), and how the entry employer will ensure that it implements coordination instructions from the controlling contractor. In addition, the entry employer still has the duty of including in its permit program steps to ensure coordination, even absent action by the controlling contractor. Such steps might include evaluation of work and practices being performed by other employers that could affect conditions inside the space, and coordinating with those employers to ensure safe conditions inside the confined space. For example, if an entry employer sees another employer setting up blasting equipment next to the permit space, the entry employer must check with that employer to ensure that the blasting activity will not take place when an entrant is in the permit space. For additional explanation of the entry employer's responsibilities for coordination, see the discussion of § 1926.1203(h)(4).

Paragraph (l). Final § 1926.1204(l), which is identical to § 1910.146(d)(12), requires an employer to develop and use procedures for terminating an entry permit and entry operations; the final provision also derived from proposed §§ 1926.1212(a) and 1926.1214(d). See the discussion of final § 1926.1205(e) for further explanation of the need to develop and use procedures for terminating an entry permit and entry operations, including closing the entry portal. Also, OSHA responded to the relevant comments to proposed § 1926.1212(a) in its discussion of final § 1926.1204(j).

Paragraph (m). Final § 1926.1204(m), which is similar to § 1910.146(d)(13), requires an employer to review its permit-space program whenever the procedures prove inadequate, and to revise those procedures when necessary. Section 1910.146(d)(13) requires the employer to review its program when *the employer has reason to believe that* the measures taken are inadequate. OSHA revised this language in this final rule by clarifying that the objective circumstances, not the employer's belief, must be the basis of the review. See the discussion of final § 1926.1205(f) for further explanation of the need to review an entry permit and to make revisions as necessary.

In addition, OSHA modified the note under paragraph (m) from the language used in the corresponding note to the general industry standard at § 1910.146(d)(13). OSHA added the phrase "including, but not limited to" in this final provision to clarify that the examples in the note are not an exhaustive list.

Paragraph (n). Final § 1926.1204(n) is identical to § 1910.146(d)(14) except for grammatical revisions, and requires an employer to review its permit-space program at least every year and make revisions to its procedures as necessary; this provision also expands upon, and clarifies, the proposed rule at § 1926.1214(b). The Agency moved the comma that appears after "as necessary" in § 1910.146(d)(14) to appear after "1926.1205(f)" in this final rule to clarify that this provision requires an employer to review cancelled permits within one year after each entry. The

Agency notes that, in interpreting the same language in the general industry standard, OSHA permitted employers to rely on documentation of quarterly reviews, rather than cancelled entry permits, in conducting its annual review, so long as that documentation contains the same information required to be in the cancelled entry permits, including "any information regarding problems encountered during entry operations that was recorded to comply with paragraph (e)(6)" and "any revision of the program that resulted from such problems." See October 21, 1993, letter to John Anderson. The Agency will also accept the equivalent documentation under this construction final rule. Some commenters asserted that requirements to review the program are pointless because they do not ensure that employers will discover hazards in a timely manner (*i.e.*, they will discover any problems after the fact) (ID–075, p. 10;–099, p. 2;–101, p. 2). OSHA did not design final § 1926.1204(n) to ensure that employers discover hazards during a particular confined-space entry operation; the Agency designed other sections of this final rule for that purpose, such as § 1926.1203(h) and final § 1926.1204(m). As OSHA explained in 72 FR 67381 of the preamble to the proposed rule, the purpose of this annual review is to evaluate the effectiveness of the permit program and the protection provided to employees involved in PRCS entries during this period. OSHA understands that some employers will use the same comprehensive permit program for many different spaces in conjunction with more specific information provided on the permits for individual spaces. This requirement will help ensure that employers complete future PRCS entries in a similar manner if the entries were successful, or make changes to the permit program to improve future entry operations if any problems or concerns occurred (72 FR 67381).

One commenter was unsure whether OSHA based the 12-month review period on a calendar year or cancellation of a permit (ID–075, p. 10). This 12-month period is a calendar year because the purpose of final § 1926.1204(n) is to ensure that no more than 12 months separates the date the employer cancels or terminates a confined-space entry and the date the employer reviews its confined-space entry operations for deficiencies. OSHA's experience with the general industry standard indicates that a review, conducted once per calendar year, is sufficient to achieve this purpose, and OSHA did not receive any comments to the contrary. Therefore, if an employer conducted a review of its permit-space program each calendar year, regardless of how many entries it conducted in that calendar year, it will be in compliance with this requirement. Employers may conduct reviews more frequently as appropriate, but this final provision does not require this frequency and, therefore, provides employers with the most flexibility in determining when to conduct this annual review.

The note to paragraph (n), which is identical to the note following § 1910.146(d)(14), clarifies that employers need not conduct separate reviews of each individual permit program implemented during the calendar year; a single review of all entries during the calendar year will suffice. Another commenter asserted that OSHA should require a similar annual review for entry operations performed under the alternate procedures specified by final § 1926.1203(e) and 1926.1203(g)(1) (ID–060, p. 2). Employers who complete a confined space entry entirely under the alternative procedures set forth in final § 1926.1203(e) do not have to comply with the requirements of final § 1926.1204 (see final § 1926.1203(e)(1)). Employers need fewer precautions to ensure the safety of employees working within or near confined spaces when they can use the alternate procedures under final § 1926.1203(e) or reclassify the permit space under § 1926.1203(g)(1). If there is any change to these spaces that would result in a hazard not addressed by these alternative procedures, then the full permit program and the requirements of final § 1926.1204, including the annual review, will apply.

Section 1926.1205—Permitting Process

Section 1205 sets forth the required process for establishing, suspending and cancelling entry permits. This process is important because it helps the employer determine if conditions in the permit space are safe enough for entry, and it requires the involvement of the entry supervisor, thereby ensuring that a person with the qualifications needed to identify permit-space hazards, and the authority to order corrective measures for their control, will oversee entry operations. The provisions in final § 1926.1205 are similar to the provisions in the general industry confined spaces rule at § 1910.146(e); however, OSHA changed the title of the section from "permit system" in the general industry standard to "permitting process" in the final rule to minimize the possibility for confusion if a permit space was established that might be referred to as a system, such as a sewer system.

Paragraph (a). Final § 1926.1205(a), which is almost identical to § 1910.146(e)(1), requires each entry employer to prepare, prior to entry into a PRCS, an entry permit containing all of the information specified in § 1926.1204(c) (practices and procedures for ensuring safe entry). This provision differs slightly from § 1910.146(e)(1) because it refers to "each entry employer," whereas § 1910.146(e)(1) refers to "the employer." OSHA made this change to clarify which employer on a multi-employer worksite has duties under final § 1926.1205(a).

OSHA emphasizes that the process of preparing a permit is considerably more than preparing a simple checklist; it requires careful attention and planning. The permit must list all measures necessary for making the particular permit space safe for entry; if the permit omits some procedures, serious consequences could result. Entry permits are a critical component of the safety process for preparing to enter a confined space because they provide key information about hazards in the PRCS, and the methods used to protect employees from those hazards. The permits also specify who is authorized to perform work within the PRCS, their duties, and the extent of their authority with respect to safety in and around the PRCS. The Agency believes the use of this administrative tool is essential to the employer with employees entering a permit space to ensure that the employees will complete the work within a PRCS safely. The process of preparing the permit, as well as the permit itself, also can be useful to the controlling contractor and other employers working near the confined space because it provides a readily accessible means of identifying the work performed and the provisions needed to ensure worker safety. Making the information on the permit accessible to employers and employees in and around the PRCS also allows them to maintain an elevated awareness of the conditions within the PRCS, as well as the equipment and procedures necessary for safe PRCS entry operations.

One commenter noted that multiple employers may have employees working in the same space, and was unsure whether each employer must prepare an entry permit under final § 1926.1205(a) (ID–120, p. 4). When more than one employer is performing confined space entry, one permit will suffice, provided the controlling contractor and entry

employers properly coordinate the entry operations of the multiple employers as required under §§ 1926.1203(h)(4) and 1926.1204(k), and the permit identifies all of the hazards and safety measures required for all of the work conducted in that space.

Paragraph (b). Final § 1926.1205(b), which is identical to § 1910.146(e)(2), requires the entry supervisor to sign the permit before entry begins. Although the employer remains ultimately liable for compliance with this standard, the entry supervisor's signature underscores to the employer and the entry supervisor the importance of their determination that the PRCS entry operation meets the prerequisites for safe entry listed in the permit. OSHA believes that signing the form makes it more likely that the entry supervisor and his or her employer will address the items listed on the form than if they do not have no to sign the form. Moreover, the entry supervisors may change during the course of the entry, so it is important to identify who completed each evaluation in the event that questions arise.

Paragraph (c). Final § 1926.1205(c), which is identical in substance to § 1910.146(e)(3), requires an employer to make the completed entry permit available to all authorized entrants, or their authorized representatives, at the time each employee enters the space. One of the keys to protecting employees from PRCS hazards is for both employers and employees to know the location of the PRCSs at the job site, the characteristics of the hazards, and their associated dangers. The provisions in this paragraph are designed to achieve this goal. Once entrants are provided with this information, they will then be able to make their own judgments as to the completeness of pre-entry preparations and point out any deficiencies that they believe exist. Employees will also be more likely to bring new hazards to the attention of the supervisor if they are discovered while working in the permit space if the employees are aware of which hazards have already been identified and which have not. Posting the permit for employees to see at the entry point can also be useful when multiple employers will be working in the same permit space.

Sharing this information with employee authorized representatives may help bring the representative's expertise to bear in identifying additional hazards not accounted for in the permit process. One commenter described a situation where he, as an authorized employee representative, was able to alert employees to additional atmospheric hazards that were generated by the adhesives used to join plastic pipe tubes in a room with inadequate ventilation (ID–010). Final paragraph (c) includes one variation from the language of the general industry standard. Under the general industry standard a single posting can be sufficient to inform multiple employees, but employers must still make sure that the permit is available to each entrant, or the entrant's representative, prior to entry into the permit space. For example, an employer does not fully comply with the standard by posting the permit after one of its employees has already entered the permit space. OSHA is including the same requirement in this final rule, but is also taking the opportunity to provide further clarification in this final rule that the information must be made available to "each authorized entrant"; the general industry standard is less specific, referring to "all authorized entrants." In appropriate cases, if an employer fails to make this information available as required, OSHA may issue separate citations with respect to each individual employee who enters a confined space without having access to this information.

Paragraph (d). Final § 1926.1205(d), which is identical to § 1910.146(e)(4), prohibits employers from making the entry permit's duration longer than the time needed to complete the related work. Otherwise, the conditions inside the space are more likely to change and entrants could be unnecessarily exposed to the residual hazards of permit spaces.

One commenter suggested that OSHA limit the duration of the permit's validity to one day or one shift to ensure that someone inspects the confined spaces that employees are entering to discover changed conditions (ID–060, p. 4). OSHA does not agree that such a fixed limit is warranted. This process would be more burdensome because it would require cancellation of entry permits even when there is no change in conditions or hazards. Final § 1926.1204(e)(2) requires an employer to monitor the conditions inside a confined space to determine if they become unacceptable. Furthermore, final § 1926.1205(e)(2) requires an employer to cancel the entry permit if an unacceptable condition arises. Taken together, these provisions provide a less burdensome, more flexible, and even more direct method of achieving the same safety mechanisms as the commenter's suggested approach. Moreover, the less limited requirements are consistent with the procedures required under the general industry confined spaces standard at § 1910.146. OSHA considered and rejected a similar request for a per-shift permit limit when promulgating the general industry final rule (see 58 FR 4505, 4506 (Jan. 14, 1993)).

Paragraph (e). Final § 1926.1205(e), which corresponds to § 1910.146(e)(5), requires an employer to terminate entry and cancel the entry permit under two conditions: when the employer completes the entry operations covered by the permit (final § 1926.1205(e)(1), which is identical to § 1910.146(e)(5)(i)), or when there is a condition inside or near the permit space that is not acceptable under the permit program established for that space (final § 1926.1205(e)(3), which is identical to § 1910.146(e)(5)(ii)). Requiring the entry supervisor to terminate the entry permit under either of these conditions increases the likelihood that the employees will exit the space before new hazards emerge, and that employees will avoid hazards arising from prohibited conditions within the PRCS. When an employer completes an entry without incident, the employer must cancel the permit by removing it from the entry site. If the employer cancels the permit in response to new hazards or changes in the condition of the permit space, the employer must record the reasons for the cancellation on the permit in accordance with § 1926.1205(f).

In response to comments, OSHA also is adding an additional provision in final § 1926.1205(e)(2) that is not in the general industry standard, but would provide employers additional flexibility in certain situations identified by the commenters. Some commenters asserted that it is unnecessary to require cancellation of the entry permit in every instance in which reevaluation is necessary, and that doing so was unnecessarily burdensome (ID–107, p. 4; –116, p. 3). A commenter representing a client involved in sewer construction suggested that, in the event an unacceptable condition arises that necessitates temporary evacuation and reevaluation, but does not present a new or increased hazard for employees working within the confined space, OSHA should allow employers to track these events on the existing permit rather than cancelling the entire permit and filling out a new permit. For example, if there is a temporary loss of power for five minutes such that the entrants must exit the permit space because the lighting conditions are inadequate, the employer would normally reenter once the power returns and the conditions inside the permit space are the same as they were for initial entry.

OSHA agrees that cancelling the permit may be unnecessary when a condition outside or inside the permit space requires an evacuation, but the permit space returns soon after to the same acceptable conditions specified under the permit. So long as the employer records on the permit the event that required evacuation, the employer conducts a full reassessment of the permit space that indicates restoration of the acceptable permit conditions before the employer permits reentry, there are no new gases or physical elements introduced into the space that are not addressed in the permit for that space, and there are no other significant changes to the space, OSHA believes that the employer can satisfy the purposes of the permit program without the additional burden of cancelling and replacing the entire permit. OSHA modified the text of the final rule accordingly by adding final § 1926.1205(e)(2) to allow for the "suspension" of the permit, as an alternative cancellation of the permit, when these criteria are met. During suspension, employers still must fulfill all applicable duties of an entry employer under the standard, such as preventing unauthorized entrance. An employer may temporarily suspend a permit in one of two ways: by removing (leaving just the "Do Not Enter" sign or its equivalent that must be posted under § 1926.1203(b)(1) and remain there throughout the entry), or taking other steps, such as covering the permit, to ensure that no one will mistakenly rely on the permit to enter the space. Regardless of the method of suspension, the employer must also record the reason for the suspension on the permit (see § 1926.1205(f)).

It would still be necessary, however, to cancel the permit and complete a new one if there is any indication that the existing permit may not be adequate to ensure the safety of the entrants. Cancellation of the permit is also necessary if the employer is unable to identify the cause of the change in conditions that led to the evacuation, or if a new substance has entered the permit space or has increased in amount or concentration. For example, if there is gas in a permit space in a concentration held below safe levels by two ventilation fans located on the exterior of the permit space and operated in accordance with the employer's permit program, and one fan stops functioning, all employees would need to exit the space and the employer must suspend the permit until the space is returned to the allowable conditions specified in the permit program. If the employer is able to identify the source of the fan failure (*e.g.*, a burned-out motor), replace the fan, and return the gas in the space to a concentration below the applicable PEL, and nothing else has changed in the space, then the employer may permit its employees to re-enter after conducting a full reassessment of the space and noting the reason for the fan failure on the permit. Similarly, if the presence of a new gas is detected but the permit already anticipates that level of gas and includes a means of controlling that gas, the employer may control that gas in accordance with the existing permit instead of cancelling that permit and creating an entirely new permit. However, if the employer is unable to identify the reason for the fan failure, or that failure appears likely to occur again (*e.g.*, flickering power source), or there has been some additional change in the permit space (*e.g.*, monitoring detects the presence of a new gas not accounted for in the permit program, or condensation has formed within the space impeding entry or exit), then the employer must cancel the permit and develop a new permit that addresses those new conditions.

The final rule, similar to the general industry standard, requires employers to terminate the entry if there is an unacceptable condition "in or near" the permit space. Several commenters noted that the proposed rule included references to "near" in several different provisions and requested clarification. (See, *e.g.*, ID–061.1; –095; –101.1; –106.1; –120.1; –121.1; –124.1; –125.1; –131; –135; –136; –152; –220.) Many of these commenters, however, also urged OSHA to promulgate a construction standard that tracked the language of the general industry standard. OSHA, therefore, did not use "near" in this final rule except in § 1926.1205(e), which tracks the identical use of "near" in the general industry standard. The requests of numerous commenters urging OSHA to follow the general industry standard, and the absence of record evidence suggesting that employers have had difficulty complying with this general industry requirement, indicate that the use of this term in this context is sufficiently clear to employers engaged in permit-space work. The purpose of this provision remains the same in the construction context as in the general industry context: protection of employees working in confined spaces from exposure to additional hazards introduced into the permit space from outside. The use of "near" indicates a physical proximity to the permit space, but OSHA is not specifying a fixed distance because of the variety of potential hazards and the disparate distances from which the hazards could impact the confined space. For example, a small welding job may have no impact on a properly controlled permit space 15 feet away, but a demolition blast could easily result in a significant hazard for employees working in an underground permit space much farther away.

One commenter suggested that existing OSHA standards were already sufficient to protect employees from hazards near the confined space, while another commenter asked whether operating gasoline-powered equipment near the permit space would constitute a hazard, and whether an employer must cancel the entry permit for sewer work every time an automobile passed near the manhole to enter the sewer (see ID–131 and –098.1). The examples provided by the latter commenter demonstrate the need to address these external hazards in the confined spaces standard: activities not necessarily prohibited by any other standard and that usually do not pose a hazard to employees when used in open spaces, such as operating gasoline-powered equipment, can result in hazards when used in close proximity to a permit space. However, because operating gasoline-powered equipment or automobiles near a permit space is not inherently hazardous to the entrants working inside that space, the employer would not necessarily need to cancel the permit at each such occurrence. Instead, the employer must assess the hazards posed in each scenario. If the fumes from the gasoline-powered equipment are spewing into the confined space, then the employer likely would need to remove the entrants and reassess the acceptable conditions for work inside the space. Likewise, if the employer did not anticipate that automobiles would be driving near the entry to a permit space, and did not guard the entrance and establish barriers to adequately protect employees working in the permit space, then the employer would need to require the entrants to leave the space in a safe manner and then reassess the permit program if automobile traffic develops. If, however, the gasoline-powered equipment was operating at such a distance or in such a manner that it would not foreseeably result in a potential hazard to the permit-entrants, or if the employer planned for automobile traffic near the space and provided barriers and other appropriate protection, then the entry could

continue and the permit program would remain in effect. Activities outside the permit space will only require entrants to leave if they could foreseeably result in a hazard not accounted for when the employer developed the permit program.

Paragraph (f). Final § 1926.1205(f), which is almost identical to § 1910.146(e)(6), requires the entry employer to ensure that the cancelled entry permits are saved on file for at least a year after cancellation. In addition, § 1926.1205(f) requires employers to note any problems encountered during an entry operation, particularly those that trigger cancellation or suspension of a permit under § 1926.1205(e), on the pertinent permit.

This provision differs slightly from § 1910.146(e)(6) because it clarifies that "every entry employer" must comply with these duties, whereas § 1910.146(e)(6) refers generally to the duties of "the employer." OSHA made this change in recognition that there may be many different employers on a construction worksite, and that each entry employer has a responsibility to ensure that the records are saved. In some cases, this may involve coordination between different employers.

The purpose of this document retention requirement, and of the requirement to note problems directly on the permit, is to facilitate the evaluation of the effectiveness of protection provided to employees involved in PRCS entries during the annual review required under § 1926.1204(n). The requirements of § 1926.1205(f) help to ensure that employees complete future PRCS entries in a similar way if the previous entries were successful, or that employers improve future PRCS entries by resolving any problems or concerns discovered.

One commenter asserted that the retention period should end upon completion of the project (ID–099, p. 4). OSHA disagrees with this commenter because the lack of document retention would significantly affect the employer's ability to complete its required annual review. OSHA set this minimum retention period at one year to ensure that the documents still would be available when employers conduct the required 12-month review specified by final § 1926.1204(n).

As the Agency noted in the proposed rule, these document-retention requirements are in addition to the document-retention requirements required by other OSHA standards, such as the 30-year retention period for employee-exposure records required by 29 CFR 1910.1020(d) (Preservation of records) [23] (see note to proposed § 1926.1219(b)). In some cases, entry permits may constitute employee-exposure records. (See definition of "employee exposure record" at 29 CFR 1910.1020(c)(5).)

One commenter suggested that OSHA incorporate the language in the general industry confined spaces directive, CPL 02–00–100: Application of the Permit-Required Confined Spaces (PRCS) Standard, 29 CFR 1910.146 (May 5, 1995), to provide additional explanation of what constitutes an "employee exposure record." OSHA agrees that the term has the same meaning in this final rule as in the general industry standard, and that the guidance from CPL 02–00–100 is equally applicable: "[R]esults which show the composition of an atmosphere to which an employee is actually exposed (even if the employee is using a respirator) are exposure records under 29 CFR 1910.1020(c)(5)."

This requirement to maintain exposure records gives healthcare providers, in the event of an emergency, access to information about the substances and exposure levels the employee may have experienced while working within a confined space. This information will enable healthcare providers to administer medical care effectively to injured employees.

Section 1926.1206—Entry Permit

An employer conducting a permit-space entry must post an entry permit outside the permit space to document the employer's efforts to identify and control conditions in that permit space (see § 1926.1205(c)). The purpose of the permit is to provide a concise summary of the permit-space entry requirements for a particular entry that will be useful to the personnel who are conducting the entry operations, to rescue personnel, to the controlling contractor, to other employers working near the confined space, and to any personnel who need to review the conduct of entry operations after the employer terminates the operations. Making the information on this document accessible to employers and employees affected by the hazards in and around the permit space also allows them to maintain an elevated awareness of the conditions within the permit space, as well as knowledge of the equipment and procedures necessary for safe permit-space entry operations.

The introductory language in final § 1926.1206 requires the employer to include, on the entry permit, all of the information specified in § 1926.1206(a) through (p). Most of the information required on the permit is substantively identical to the general industry confined spaces requirements at § 1910.146(f). The exception is paragraph (e), which requires the employer to record the means of detecting an increase in atmospheric hazard levels if a required ventilation system stops working. OSHA included that requirement in the proposed rule and, for the reasons explained below, OSHA concludes that it is important to retain it in the final rule.

Proposed § 1926.1210(k) provided that the employer must document, on the entry permit, all "determinations made" and "actions taken" during PRCS procedures, as required by proposed rule § 1926.1214(a). Commenters appeared to interpret this proposed provision as a broad and overly burdensome requirement, which was not OSHA's purpose (see, *e.g.*, ID–095, p. 4). In light of the concerns about the proposed language, the Agency notes that the final rule is not requiring employers to include on the entry permit each determination or action taken with respect to the permit entry. However, employers still must make certain demonstrations about hazards, ventilation, monitoring, or equipment, and document other determinations, as required by the final standard, and make that information available to employees (see, *e.g.*, § 1926.1203(e)(1), (g)(2), (g)(3)). Final § 1926.1206 is otherwise generally consistent with proposed § 1926.1214(a).

Paragraph (a). Final § 1926.1206(a), which is identical to § 1910.146(f)(1), requires the employer to identify the permit space that workers are planning to enter. This information will ensure that employees use the correct permit for the permit space.

Paragraph (b). Final § 1926.1206(b), which is identical to § 1910.146(f)(2), requires the employer to record the purpose of the entry. As the Agency noted in the proposed rule, this information must be sufficiently specific, such as identifying specific tasks or jobs employees are to perform within the space, to confirm that the employer considered performance of each specific construction activity in the hazard assessment of the PRCS. (See proposed § 1926.1214(a)(1)(ii).) An entry employer's failure to evaluate construction activities performed within the PRCS for their effect on the conditions within the space could result in serious injury or death to employees.

[23] The note in 29 CFR 1926.33 makes the provisions of 29 CFR 1910.1020 (Access to employee exposure and medical records) applicable to construction operations.

It would be sufficient, for example, to state the purpose of entry as "replacement of communications cable sewer line," or "welding upgraded mponent inside steel tank," but it would not be sufficient to state only "communications work in sewer line" or "upgrade to tank."

Paragraph (c). Final § 1926.1206(c), which is identical to § 1910.146(f)(3), requires the employer to record the date and authorized duration of the planned entry. The "date" refers to the day on which authorized entrants are permitted to enter the PRCS. The duration of the permit may not exceed the time required to complete the specified tasks or jobs, including the time necessary to set up and dismantle any tools or equipment required to perform the tasks or jobs (see § 1926.1205(d)). The employer need not list duration in terms of time, but instead may describe it in terms of the completion of tasks identified in the permit. For instance, the employer could describe the duration as "welding and repair of water main" or "upgrading equipment in an electrical vault." One purpose of this provision is to ensure that employees engaged in PRCS operations are informed of the period during which conditions in the PRCS must meet acceptable entry conditions as specified n the entry permit. A second purpose s to place some reasonable limit on the duration of the permit, because a permit of unlimited duration is not likely to account for changed PRCS conditions.

Paragraph (d). Final § 1926.1206(d), which is identical to § 1910.146(f)(4), requires the employer to record the identity of the authorized entrants so that the attendant is capable of safely overseeing the entry operations. Employers can meet this requirement by referring in the entry permit to a system such as a roster or tracking system used to keep track of who is currently in the PRCS. The availability of this information would enable the attendant, entry supervisor, or rescue service to quickly and accurately account for entrants who might still be in the PRCS when an emergency occurs. A second purpose is to provide assurance that all authorized entrants have exited the PRCS at the end of entry operations. A third purpose would be to assist the attendant and entry supervisor in preventing unauthorized personnel from entering the space.

It is extremely important for the employer to confirm that all authorized entrants have exited the PRCS during an vacuation. Therefore, a tracking system that lists the names of the employees who the employer designates as authorized entrants, but does not accurately account for the number of employees inside the PRCS at all times, would not meet the requirements of this paragraph. Merely maintaining a list of authorized entrants, who may or may not be at the job site or inside the PRCS, would not help the employer determine how many authorized entrants are left inside the PRCS should an evacuation be necessary. Likewise, a tracking system that only accounts for the number of authorized entrants inside the PRCS, without providing their names or other identifiers, also is not acceptable; knowing the name or other identifier of each entrant makes it easier for the rescuers to determine where the entrant is assigned to work in the PRCS, and thereby determine the entrant's probable location.

Paragraph (e). When a permit program requires ventilation, OSHA requires employers to ensure that they have a monitoring system in place that will alert employees of increased atmospheric hazards in the event the ventilation system fails (see § 1926.1204(c)(5)). Final § 1926.1206(e) requires the employer to record the means of detecting an increase in atmospheric-hazard levels if the ventilation system stops working. It is important for employers to provide this information on the entry permit so that any new employees can easily access this information and respond appropriately and as quickly as possible to ensure the continued safety of entrants. For example, if the original entry supervisor is replaced by a new entry supervisor halfway through entry operations, the new entry supervisor can refer to the entry permit for this information.

Paragraph (f). Final § 1926.1206(f), which is substantively the same as § 1910.146(f)(5), requires the employer to record the names of each attendant. Final § 1926.1206(f) differs from § 1910.146(f)(5) only in that it clarifies that the name of "each person," rather than "the person," must be recorded on the entry permit. There is often more than one attendant during the course of entry operations, so this requirement would facilitate identifying attendants quickly and easily, thereby expediting communications with them, which is necessary for the performance of safe PRCS entry operations, and for the performance of specified duties during emergency situations. When a new attendant replaces the previous one, the employer must make it clear on the permit which attendant is on duty, such as by crossing out the previous attendant's name, so that there is no confusion about the identity of the current attendant Without this requirement, the employer could waste valuable time finding the attendant responsible for protecting authorized entrants during an emergency.

Paragraph (g). Final § 1926.1206(g), which is nearly identical to § 1910.146(f)(6), requires the employer to record the name of each employee currently serving as entry supervisor. The same reasons for requiring the names of the attendants apply for requiring the name of the entry supervisor here: it provides an assured means of distinguishing these important individuals quickly and easily so that employees may alert them of a developing hazard, and it provides the opportunity for these individuals to review the permit and entry conditions to ensure that entry conditions remain safe. The general industry standard requires a space for each entry supervisor's name, which implies that the entry supervisor names will be filled in, but in this final rule OSHA is modifying paragraph (g) to make that requirement explicit: The employer must ensure that the name of each entry supervisor is entered into that space. As with the changes to the attendants, the employer must ensure that the current supervisor is identified as such when one supervisor replaces another.

Paragraph (h). Final § 1926.1206(h), which is identical to § 1910.146(f)(7) and corresponds to proposed § 1926.1214(a)(2)(i)(A), requires the employer to record the hazards associated with the planned confined space entry operations. This list must include all hazards, regardless of whether the employer protects the authorized entrants from the hazards by isolation, control, or personal protective equipment. Providing this list will make it clear which hazards the employer already identified so that the entrants can confirm that they received training to work around such hazards, and will know to bring any other developing hazard to the attention of the entrance supervisor immediately.

Paragraph (i). Final § 1926.1206(i), which is identical to § 1910.146(f)(8) and corresponds to proposed § 1926.1214(a)(2)(i)(B), requires the employer to record the procedures used to isolate or control the hazards prior to entry. This information must be consistent with the requirements specified in final § 1926.1204(c), and must include the methods used to isolate or control the hazards, the type of personal protective equipment provided, the methods used to monitor each hazard (including the use of early-warning systems, if required by final § 1926.1204(e), and how frequently each hazard is to be monitored). Note that

under final § 1926.1204(e), employers must use continuous monitoring of atmospheric hazards unless the employer demonstrates that periodic monitoring is sufficient. The permit need only refer to the procedures used to meet the requirements of this paragraph in sufficient detail to enable employees to determine what measures they must take, and how to perform those measures.

One commenter urged OSHA to require employers to identify the name(s) of the person(s) who performed all of the hazard-isolation or control procedures listed on the permit pursuant to § 1926.1206(i), such as the person(s) who operated a ventilation machine to control an atmosphere (ID–0625, p. 4). OSHA notes that employers must already include the names or initials of the person performing monitoring under final § 1926.1206(k). To the extent that the commenter intended to ensure the accuracy of the tests and measurements associated with the isolation or control procedures, OSHA notes that the entry supervisor must already verify the accuracy of this information (§ 1926.1210(b)). Therefore, OSHA concludes that, in the absence of additional evidence to indicate that these records would provide a discernible safety benefit, the additional records suggested by the commenter are not necessary.

Paragraph (j). Final § 1926.1206(j), which is identical to § 1910.146(f)(9), requires the employer to specify the acceptable entry conditions. The list of acceptable entry conditions includes energy control considerations and conditions such as the permissible levels allowed for oxygen, flammable gases and vapors, other hazardous substances during PRCS entry. Additional information regarding PRCS conditions includes, for example, the methods used to maintain a water hazard at safe levels. Another example included in the NPRM is when an employer decides to use PPE to protect employees from an atmospheric hazard, the acceptable conditions must include, at a minimum, the type of PPE the employees will use (such as type of respirator), and the levels at which the PPE would protect the employees from the atmospheric hazard. OSHA requires the employer to list the acceptable conditions on the permit so that the authorized entrants, attendants, and entry supervisors have this information on hand at the worksite, thereby ensuring safe entry operations.

This provision also requires employers, when applicable, to provide the ventilation-malfunction determinations made in paragraph (c)(5) of final § 1926.1204. As explained in the proposed rule, and above in the discussion of final § 1926.1204(c)(5), some permit spaces may require ventilation to control the atmospheric hazards at levels that are below the levels at which they are harmful to entrants so that entrants will have time to exit the PRCS safely (72 FR 67365). In these spaces, the employer will be responsible for identifying that level and monitoring the permit-space atmosphere to detect any increase of the potentially hazardous substance. The Agency's requirement that the employer include these determinations on the permit informs employees (for example, entry supervisors, attendants, and authorized entrants) about the time required for the entrants to evacuate the PRCS should the ventilation system fail, and allows authorized entrants, attendants, and entry supervisors to respond quickly to any deviations in these conditions, including ventilation-system failure.

OSHA notes, as it did in the explanation of this provision in the general industry standard, that there is likely to be overlap between this requirement to list the acceptable entry conditions and the separate requirement in § 1926.1206(i) to identify the hazard-control or elimination measures that the employer must also list on the permit (58 FR 4509 (Jan. 14, 1993)). The Agency anticipates that employers may elect to combine these two elements when filling out the permit, and such an approach is permissible so long as the employer includes all of the relevant information in some form that the authorized entrant, attendant, or entry supervisor can identify quickly.

Paragraph (k). Final § 1926.1206(k), which is nearly identical to § 1910.146(f)(10), requires the employer to record the dates, times, and results of the tests and monitoring performed, and the names or initials of the individuals who performed each test. Entering the testing and monitoring results in the permit enables the entry supervisor, attendants, and authorized entrants to determine readily whether acceptable entry conditions exist with regard to atmospheric hazards in the PRCS. The employer also could use this information to identify atmospheric conditions within the PRCS that need to be monitored frequently because atmospheric conditions tend to rise rapidly to hazardous levels. For example, if the oxygen concentration is 19.6 percent, the attendant and entrants should be alert for signs of oxygen deficiency, such as increased breathing rate, dizziness, rapid heartbeat, and headache. Furthermore, documentation of test results on the permit also facilitates the review of canceled permits required under paragraph (d)(14). If testing indicates that levels of hazardous substances are increasing, the increased hazard will be easy to recognize through a review of the recorded test results on the canceled permit.

Listing the names of those who performed the testing identifies a point of contact to which entry supervisors and attendants can direct questions they may have regarding the results and procedures. The date and time (or, for continuous monitoring, a time period) would provide a basis for detecting dangerous trends in atmospheric conditions that may indicate that more frequent observation of the atmospheric data is necessary.

The single difference between the final rule and § 1910.146(f)(10) is that the general industry provision requires documentation of "initial and periodic testing," whereas final paragraph (k) of this final standard requires documentation of the results of all "tests" and "monitoring." OSHA made these changes to address a significant difference between this final rule and § 1910.146: This final rule generally requires continuous monitoring, whereas § 1910.146 only requires periodic testing. For further explanation of this change, see the discussion to final § 1926.1204(e).

Consistent with data collection from continuous monitoring under § 1910.146, the continuous monitoring values recorded on the entry permit are "real time" concentrations. See December 10, 1996, letter to Michael Coleman, available at *www.osha.gov*. Although the final standard does not specify the frequency with which the employer must record continuous monitoring measurements, from a compliance perspective, the quantity of data entered on the permit must indicate the number of times the entry supervisor or other entrant examined the monitoring data. These measurements must be recorded with sufficient frequency to demonstrate that the permit space was monitored such that the employee could identify a change in atmosphere or other potential hazard in time to allow entrants to exit the permit space safely (See also discussion of § 1926.1203(e)(2) and 1926.1204(e)(2).) For continuous monitors with alarms, employers must record each time the alarm is triggered. Employers also must include the initial entry-monitoring results on the entry permit for the reasons explained above; these results also would serve as a baseline for subsequent measurements.

See December 10, 1996, letter to Michael Coleman, available at *www.osha.gov*.

Paragraph (l). Final § 1926.1206(l), which is identical to § 1910.146(f)(11), requires the employer to identify the rescue and emergency services required by this final rule, and the means by which these services will be summoned when needed. Identification of these services and the means for summoning them enables attendants to summon the appropriate service immediately in case of emergency. In some cases, an employer must include pertinent information, such as communication equipment and emergency telephone numbers, on the permit to sufficiently identify the means by which the rescue or emergency services will be summoned. The inclusion of this specific information would allow attendants to avoid errors and delays in contacting the rescue service.

Paragraph (m). Final § 1926.1206(m), which is identical to § 1910.146(f)(12), requires the employer to record all of the methods of communication used between authorized entrants and attendants during entry operations. OSHA notes that establishing a routine for maintaining contact between attendants and authorized entrants would help attendants detect problems within the PRCS. OSHA anticipates that the method of communication chosen may vary according to the circumstances of the particular workplace; however, the methods chosen must enable the attendants and the entrants to maintain effective and continuous contact. OSHA notes that, while such communication will normally be achieved through speech, other methods, such as tapping on a wall, may be acceptable as long as it achieves effective and continuous contact. See July 30, 1993, letter to Julie Emmerich, available at *www.osha.gov*.

Paragraph (n). Final § 1926.1206(n), which is identical to § 1910.146(f)(13), requires the employer to record the equipment it provides in accordance with the requirements of this final rule. This equipment would typically include, for example, personal protective equipment, testing equipment, communications equipment (including equipment needed to assess entrants' status in the space), alarm systems, rescue equipment, and other equipment that the employer would provide to ensure compliance with paragraph (d)(4) of final § 1926.1204 (personal protective equipment) or any other part of the standard. This requirement provides employees with a ready reference to the equipment required for safe entry operations.

Paragraph (o). Final § 1926.1206(o), which is substantively identical to § 1910.146(f)(14), requires the employer to record any additional information needed to ensure safe confined space entry operations. OSHA amended the language in § 1910.146(f)(14) slightly for clarity and conciseness. As OSHA explained in the preamble to the general industry standard, this provision is necessary for employee protection due to "the wide-ranging types of hazards found in permit-required confined spaces, there are many hazards that cannot be adequately addressed with any precision in a generic permit space standard" (58 FR 4510 (Jan. 14, 1993)). Examples of the information required by paragraph (o) may include: Problems encountered in the PRCS; problems that an attendant, entry supervisor, or authorized entrant believes may be relevant to the safety of the entrants working in the space; or any other information that may be relevant to employee safety under these conditions.

Paragraph (p). Final § 1926.1206(p), which is identical to § 1910.146(f)(15), requires the employer to record information about any other permits, such as for hot work, issued for work inside the confined space. If the employer identifies additional permits, these additional permits may be, but are not required to be, attached to the entry permit to provide information about the activity covered by the permit to employees involved in the entry operations so they can take appropriate precautions.

Section 1926.1207—Training

Final § 1926.1207 requires employers to train each employee who performs work regulated by this standard, and specifies the requirements of that training. The provisions in final § 1926.1207 are substantively similar to the provisions in the general industry confined spaces rule at § 1910.146(g). The substance of the training provisions in the proposed rule was similar to, but organized differently than, the training provisions in the general industry rule. The final rule includes a few provisions from the proposed rule to provide clarity and to ease documentation, as explained below, but follows the language and organization of the general industry standard. Proposed §§ 1926.1208, 1926.1213, 1926.1216, and 1926.1217 separated the training requirements based on the type of confined space involved. One commenter asserted that, in general, the training requirements were too scattered throughout the proposed rule (ID–099, p. 4). By organizing the training provisions according to the training provisions of the general industry confined spaces standard at § 1910.146(g), OSHA placed the training requirements together in one section.

Paragraph (a). Final § 1926.1207(a) sets forth the requirement, also found in § 1910.146(g)(1), that employers must train each employee who performs work regulated by this standard. OSHA modified this provision from § 1910.146(g)(1) to include some language from the proposed rule and to clarify two aspects of this requirement: (1) The employer must train each employee; and (2) the employer must provide training at no cost to the employee. Final § 1926.1207(a)(1) refers to "each employee" rather than "all employees" to emphasize that an employer's responsibility in this area flows separately to each employee. The provision of training at no cost is implicit in the general industry standard, and is consistent with OSHA's longstanding policy regarding employer responsibility for training. See, *e.g.*, 29 CFR 1926.1430(g)(3) (training under the Cranes & Derricks in Construction standard), § 1910.1001(j)(7)(iv) (asbestos awareness training for employees who perform housekeeping operation in an area that contains asbestos), and June 25, 1991, Memorandum to Regional Administrators, # 20315 (training under the HAZWOPER standard, 1910.120), available at *www.osha.gov*.

Paragraph (a) of the final rule also requires employers to provide training so that employees who perform work regulated by part 1926, subpart AA, acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under that section, including the safe operation of equipment and the proper use of PPE. Sections 1926.1208, 1926.1209, 1926.1210, and 1926.1211 of this final rule specify in detail the duties of authorized entrants, attendants, entry supervisors, and rescue service personnel. Paragraph (a) requires the training to impart the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under those sections. OSHA believes that the training employers provide employees under this provision will enable the employees to understand their duties under this standard, as well as the hazards posed by permit spaces, and to properly use equipment and PPE in a PRCS. Therefore, this training will enable employees to safely perform their requisite PRCS duties.

In this paragraph, the Agency is requiring the employer to provide whatever training is necessary to achieve the goal of safe performance of

an employee's duties. The performance language used in paragraph (a) will allow the employer to develop and implement the most effective confined space training program to meet the needs of the specific workplace. By requiring training of employees in § 1926.1207, and by specifying what those duties are in the relevant sections, the final rule sets forth requirements regarding whom employers train, as well as the content of the training.

This paragraph also incorporates a requirement found in proposed § 1926.1209(d)(1), which specifies that the training must result in an understanding of the hazards in the permit space(s), and the method(s) used to isolate, control, or in other ways protect employees from the hazards. For example, if an authorized entrant enters the space to isolate an identified hazard or to set up ventilation to control an atmospheric hazard, the employer must train the employee not only in accordance with the PRCS entry requirements, but also to perform the tasks necessary to isolate and control the specific hazards in accordance with other appropriate OSHA requirements applicable to construction. The employer also must train each employee who enters the space thereafter to understand how the employer isolated or controlled any hazards in the space. OSHA believes that the training employees receive under this provision will enable them to associate the signs, symptoms, and characteristic effects (discussed elsewhere in this preamble) to the failure of methods to control or isolate the hazards, and to alert them so that do not inadvertently disturb the isolation or control mechanisms. Therefore, this training will enable employees to safely perform their duties while working in the PRCS, and to respond appropriately if the hazard-protection methods fail.

Additionally, final § 1926.1207(a) includes the requirement, found in proposed § 1926.1209(d)(2), that, for employees not specifically authorized to perform entry rescue, their training must result in an understanding of the dangers of attempting entry rescue. This aspect of the training need not be extensive, as its purpose is to prevent exposure to permit-space hazards by simply keeping all employees who are not authorized to perform entry rescue out of such spaces. OSHA prohibits such entry precisely because it is likely to increase the risks of further injury to both the would-be rescuer and the employee requiring rescue. In final § 1926.1204(a) and (i), the Agency also requires entry employers to take action to prevent all unauthorized entry, but the training required by final paragraph (a) remains crucial to overcome the inclination of many employees to attempt to rescue a trapped colleague. If employees do not fully appreciate the dangers involved, their actions might also pose a danger to those employees designated to provide rescue.

Finally, some commenters asserted that the training requirements in this final rule should require employers to train entrants on the use of gas, propane, and diesel-powered equipment and chemical-cartridge respirators (ID–025, p. 3; ID–095, p. 3). Final § 1926.1207(a) requires employers to ensure that employees acquire the knowledge and skill to safely perform their duties, which includes training employees on how to use all equipment used in the PRCS.

Paragraph (b). Final § 1926.1207(b), which is substantively similar to § 1910.146(g)(2), requires the employer to provide training to each employee covered by this standard, as specified by paragraphs (b)(1)–(b)(5). One commenter requested that OSHA clarify that the employer must provide this training in a language understood by the employee (ID–140, p. 5). OSHA designed the training requirements in final § 1926.1207 to ensure that employees performing work regulated by this final rule understand the hazards so that they can take necessary precautions to perform their work safely. Therefore, the employer must provide this training in a language the employee understands, and ensure that the employee comprehends the training, to achieve the purpose of the training requirements. Final § 1926.1207(b)(1) incorporates the requirement that training be in both a language and vocabulary that the employee understands, which is consistent with OSHA's policy for all OSHA training requirements. See April 28, 2010, OSHA Training Standards Policy Statement, available at *www.osha.gov*. OSHA views this policy as applicable to all training requirements in all OSHA standards, but is adding the language in this standard for clarity.

Final § 1926.1207(b)(2)–(b)(4) require that the employer provide training before assigning the employee duties covered by this final standard, when there is any change in duties, and whenever there is a change in permit conditions that present a hazard for which the employee did not previously receive training. These requirements are substantively identical to § 1910.146(g)(2)(i)–(g)(2)(iii). OSHA believes the requirements in final § 1926.1207(b)(2)–(b)(3) are necessary to ensure that employers provide the training required by final § 1926.1207(a) at the appropriate times, that is, prior to exposure to confined space hazards.

Final § 1926.1207(b)(2), which is identical to § 1910.146(g)(2)(i), requires employers to initially train their employees before assigning them to perform duties under this standard. Accordingly, the employer must ensure that specified employees (that is, entry supervisors, attendants, authorized entrants, and rescue-service employees) receive the training required by final § 1926.1207(a) prior to performing assigned PRCS duties. This requirement ensures that employers train these specified employees regarding PRCS hazards before the employer exposes authorized entrants to these hazards.

Final § 1926.1207(b)(3) and (b)(4) are substantively identical to the general industry standard at § 1910.146(g)(2)(ii) and (g)(2)(iii). They address the issue of refresher training. Final paragraph (b)(3) requires training before there is a change in assigned duties. Such changes could be the result of new equipment or techniques introduced into the entry operations, promotions, or simple reassignments. If an employee previously received training in the new duties and the employer ensures that the employee is still familiar with the previous training, then the employer need not conduct additional training under this paragraph, provided the employer has no evidence that there are inadequacies in the employee's knowledge or use of the relevant permit-space procedures. If there is evidence that such inadequacies exist, the employer must retrain the employee under final paragraph (b)(5).

Paragraph (b)(4) similarly requires retraining if there is a change in permit-space entry operations that presents a hazard for which an employee did not previously receive training. This paragraph changes the phrase "permit space operations," from the general industry standard at § 1910.146(g)(2)(iii), to "permit space *entry* operations" for the reasons explained in the introduction to the discussion of final § 1926.1204. One commenter was unsure whether minor revisions of procedures, such as an increase in the use of mechanical ventilation, would trigger the training requirements of final § 1926.1207(b)(3) (ID–099, p. 3). The relative significance of the change in procedures does not determine the need for additional training; employers must ensure that employees can perform their duties safely, so any change in PRCS entry procedures for which an employee did not receive previous training would necessitate training under this final rule

to the extent it requires new knowledge or skill by the employee.

Final § 1926.1207(b)(5) provides that an employer must retrain an employee whenever the employer has any evidence that the employee has deviated from PRCS entry procedures or inadequacies in the employee's knowledge or use of these procedures. This provision is substantively identical to the general industry standard at § 1910.146(g)(2)(iv), but this final provision clarifies that retraining must occur when there is evidence of deviation, a change from the phrase "reason to believe" in the general industry standard. OSHA believes the term "evidence" will be clearer than the general industry language for both employers and OSHA inspectors. By making this revision, OSHA does not intend to make a substantive difference in the types of employee actions or other factors that would trigger the retraining requirement. Evidence of a need for retraining may come from a variety of sources, such as an employee's actions during, or prior to, an entry, statements made that indicate a lack of understanding of permit-space entry procedures, reports of other employees or third parties, or from other incidents.

One commenter asserted that requiring retraining after every deviation is overly burdensome. (ID–120, p. 3.) This commenter suggested that OSHA require the employer to establish a better line of communication and coordination when the deviation is not too severe. However, the commenter did not suggest a means of identifying the severity of a deviation. In light of the hazards associated with confined spaces, and the procedures implemented to address those hazards, the failure of even one employee to follow the correct procedure can adversely affect the safety of others. OSHA, therefore, concludes that it is necessary to retrain any employee who deviates from the approved entry procedures. This retraining must provide the employee with the knowledge and skills necessary for safe performance of his or her confined space duties in accordance with final § 1926.1207(a), although the employer may restrict retraining to the limited aspect of the employee's overall responsibility on which the employee made the deviation. For example, if employee failed to use a piece of equipment properly, the retraining could focus on the proper use of that equipment, and need not focus on areas unrelated to the deviation, such as the hazards associated with the atmosphere in the space.

Paragraph (c). Final § 1926.1207(c), which is identical to the general industry standard at § 1910.146(g)(3), requires an employer to establish that the employee is capable of performing his or her confined space duties proficiently, and to provide any supplemental training needed to make the employee proficient. This provision ensures that employees will not enter a PRCS without being able to apply the knowledge and procedures addressed in their training. In other words, the employer must determine that, for each employee, the training is effective and resulted in the employee being capable of performing the required duties proficiently.

Some commenters were unsure how an employer can demonstrate that an employee is proficient under final § 1926.1207(c) (ID–106, p. 2; –120, p. 3; –152, p. 3). Final § 1926.1207(c) is a performance-oriented measure that provides employers with flexibility by not requiring a particular way to demonstrate proficiency. Administration of a test or practical examination are some examples of how an employer may demonstrate an employee's proficiency.

Paragraph (d). Final § 1926.1207(d), which is substantively similar to the general industry standard at § 1910.146(g)(4), requires an employer to "maintain training records," as opposed to the requirement in § 1910.146(g)(4) that employers "certify" training. This final paragraph also requires employers to document the names of employees trained, the trainer's name, and the dates of the training performed, and to make these records available for inspection by employees and their authorized representatives. Final § 1926.1207(d) differs from the general industry standard in that it provides more flexibility in the documentation of training, and it requires the retention of this documentation.

The training-documentation provision in final paragraph (d) requires only the name of the trainer, not the trainer's signature or initials as required in the general industry standard. Proposed § 1926.1209(d)(5) contained these more flexible requirements, and OSHA retained them in the final rule. This documentation can take any form that reasonably demonstrates the employee's completion of the training. Examples include a record of test scores, a photocopied card certifying completion of a class, or any other reasonable means. The employer may store these records electronically so long as they are readily accessible upon request. OSHA recognizes that the turnover rate for employees on construction sites is higher than in many other industries, and that employees also are likely to work at several different worksites based on the type of work required. For example, an employer could designate an employee to be an authorized entrant in several different confined spaces at the same worksite, which may require the employee to perform different assigned tasks under various planned conditions. In this situation, the documentation must be readily accessible to determine whether the employee received the training necessary to perform the various tasks under the planned conditions. Compliance with this provision will help ensure safe conditions within the PRCS by providing employers, and OSHA, with an administrative tool that they can use to confirm which employees will be able to perform the duties required by this standard. Section 1926.1207(d) requires, as the general industry standard does, that these training records must be available for inspection by employees and their authorized representatives. Permit-space employees rely on their fellow employees for safe entry operations, and this provision provides that the training records that document employees' training status be available to those employees and their representatives. This requirement can be especially important in the construction industry due to the high level of employee turnover and multiple employers present at construction sites, including different employers who conduct simultaneous entry where one employer's lack of training for its employees could jeopardize the fully trained employees of a different employer. Consequently, making these records available for inspection by employees and their representatives provides an additional level review to ensure that the employees received the proper training and are ready to engage in safe entry operations.

One commenter was unsure whether the final standard would require an employer to maintain the name of the person that provides general confined space training as well as "for the specifics of this PCRS." (ID–098, p. 2). OSHA is uncertain of what training the commenter is referring to. To the extent that the commenter was referring to training required by this final rule, final § 1926.1207(d) requires the employer to record the name of the person who conducted the training. To the extent the commenter was referring to training required by a different rule, the

comment is not applicable to this rulemaking.

As in this final rule, proposed 1926.1219(c) required that employers tain these training records for the time the employee remains employed by them. The general industry confined spaces standard at § 1910.146(g)(4) does not specify how long an employer must retain the documentation. These training records are a valuable resource for tracking whether an employee received the necessary training. If these records are to serve as a tool to confirm employee training, the records must be available during the period the employee is working for the employer. Once the employee ceases to work for the employer, there is no longer a significant benefit in tracking this information. Therefore, OSHA is keeping in the final rule the proposed requirement that an employer must retain training documentation until the employee ceases to work for the employer.

One commenter had several concerns about the retention of training records. First, the commenter asserted that this retention requirement is an unnecessary burden on employers (ID–099, p. 4). OSHA's experience under the documentation requirements of other standards indicates that employers pically use existing training records to eet these documentation requirements and, as explained above, final § 1926.1207(d) allows significant flexibility in the form of the records and how an employer must store them. Next, the commenter was unsure whether final § 1926.1207(d) requires an employer to maintain training records when the employer lays off an employee and then rehires him or her (*id*). In the event an employee ceases to work for the employer, final § 1926.1207(d) does not necessarily require the employer to continue to maintain or store the training records; however, there is an incentive for the employer to retain these records if there is a possibility that the employer might re-hire the employee, as in the example offered by the commenter. The standard does require the employer to maintain a set of training records for all employees performing confined space work, regardless of when the employer hired the employee, so if the employee is rehired the employer would be required to produce that employee's training records or retrain the employee. This commenter also asserted that employers should be free to establish their own olicy for retaining training records (*id*). Final § 1926.1207(d) leaves the employer with discretion in developing its training-documents retention policy, and requires retention only until the employee ceases to work for the employer.

Another commenter asserted that final § 1926.1207(d) should require employers to keep these training records on site (ID–031, p. 1). OSHA finds that such a requirement would be an unnecessary burden on employers. The purpose of the final requirement is to ensure that employers can document their employees' training in case an issue arises with respect to the training (*e.g.*, whether the employee received training, whether the training was adequate). Though the training records need to be readily available, it is not necessary for the employer to have immediate access to these records at the site. Requiring the employer to maintain the records and make them readily accessible for inspection, even offsite and/or in electronic form, is sufficient to accomplish the purpose of the provision.

Section 1926.1208—Duties of Authorized Entrants

An authorized entrant is an employee authorized by an entry supervisor to enter a permit space. As the Agency noted in the preamble to the general industry standard, "[T]his is the person who faces the greatest risk of death or injury from exposure to the hazards contained within the space" (58 FR 4515 (Jan. 14, 1993)). Because of the dangers associated with confined space work, employers must prepare the entrants properly to perform duties so as to assure their own safety and the safety of their fellow entrants. The employer accomplishes this purpose by means of training, communication of effective work rules, and internal administration.

Final § 1926.1208 is nearly identical to the general industry requirements in § 1910.146(h), except for minor editorial revisions and a revision in the introductory text to improve clarity. The introductory language in § 1910.146(h), which sets out requirements for authorized entrants, refers generally to the duties of "the employer." OSHA changed the introductory language to refer to "the entry employer" to clarify how this rule applies on multi-employer worksites. This is a non-substantive change, however, because the provisions in § 1926.1208 apply to each employer establishing the permit program for a permit space or allowing its employees to enter under another employer's program.

The authorized entrant duties also are substantively the same as the duties specified by proposed § 1926.1211(g), except as noted in the discussion below. The Agency did not receive any comments specifically addressing that provision of the proposed rule.

Paragraph (a). Final § 1926.1208(a), which is substantively identical to the general industry standard at § 1910.146(h)(1), requires an employer to ensure that an authorized entrant is familiar with and understands the potential hazards associated with each particular confined space entry, including the mode, signs or symptoms, and the consequences of exposure to these hazards. The final rule uses "familiar with and understands," rather than the "knows" used in the general industry standard, to emphasize the employee comprehension required by the rule. This knowledge and understanding affords authorized entrants with the information they need to protect themselves from these hazards, including recognition of the effects of these hazards should exposure occur.

Paragraph (b). Final § 1926.1208(b), which is substantively identical to the general industry standard at § 1910.146(h)(2), requires an employer to ensure that an authorized entrant uses required equipment properly. OSHA believes that proper use of such equipment is essential for working safely inside a PRCS and preventing any rescue operation from harming the incapacitated authorized entrant. Many employers can meet this requirement through implementation of safe work practices, training, and effective enforcement of those practices.

Paragraph (c). Final § 1926.1208(c), which is substantively identical to the general industry standard at § 1910.146(h)(3), requires an employer to ensure that an authorized entrant communicates effectively with the attendant to facilitate the attendant's adequate assessment of the entrant's status and timely evacuation (see also the discussion attendant-entrant communications in the explanation of § 1926.1206(m)). The authorized entrant's communication with the attendant provides the attendant with information regarding any problems the entrant is having, which the attendant can use to determine whether there is a need to evacuate the PRCS.

Paragraph (d). Final § 1926.1208(d), which is similar to the general industry standard at § 1910.146(h)(4), requires an employer to ensure that an authorized entrant alerts the attendant whenever one of the following circumstances arises: (1) There is a warning sign or symptom of exposure to a dangerous situation; or (2) the entrant recognizes a prohibited condition. In some instances, a properly trained authorized entrant may be able to recognize and report his

or her own symptoms, such as headache, dizziness, or slurred speech, and take the required action. In other cases, the authorized entrant, once the effects begin, may be unable to recognize or report them. In these latter cases, this provision requires that other, unimpaired, authorized entrants in the PRCS, who employers must properly train to recognize signs, symptoms, and other hazard-exposure effects in other authorized entrants, report these effects to the attendant. Reporting these effects will ensure the safety of the authorized entrants by removing them from the hazardous conditions in a timely manner.

Paragraph (d)(1) differs slightly from the corresponding general industry provision at § 1910.146(h)(4)(i). The general industry provision requires an employer to ensure that an authorized entrant alerts the attendant when "the entrant recognizes" a dangerous situation. Final § 1926.1208(d)(1) requires an employer to ensure that an authorized entrant alerts the attendant whenever "there is . . . a dangerous situation." OSHA made this change to make the requirement objective, and not contingent on the subjective belief of an authorized entrant about the level of danger. For example, if an entrant knocks over a container of sealant that was not scheduled to be opened until later, thereby releasing hazardous fumes into an inadequately ventilated permit space, the final rule makes it clear that the entrant has a duty to report the incident to the attendant immediately. The employer must ensure that the entrant is adequately prepared to identify such an incident as a dangerous situation, and the entrant's failure to do so would not excuse the entrant or employer from that duty.

By using language closer to that in the general industry, OSHA has deviated slightly from the equivalent requirement in the proposed rule, § 1926.1211(g)(3), which required the authorized entrant to alert the attendant of "any sign, symptom, unusual behavior, or other effect of a hazard." OSHA retained the reference to a "symptom" from the proposed rule, but believes that the reference to the "dangerous situation" in the general industry standard provides slightly broader coverage than the proposed language. Under the general industry standard and this final rule, attendants would need to be aware, for example, of an entrant experiencing a heart attack or other condition unrelated to the conditions in the confined space, but which might nevertheless affect that entrant and/or other entrants in the space. However, the general industry language incorporated into the final rule provides sufficient specificity regarding the conditions covered by the provision, and employers and authorized entrants are familiar with the language, having used it for years in general industry work (and in construction work if they chose to voluntarily follow the general industry requirements). Other examples of exposure to a dangerous situation that an authorized entrant must report to the attendant under paragraph (d)(1) or (d)(2) include: Low measurements of supplied air in a closed-respirator system; fraying or snagging of a retrieval line; a leak allowing an unidentified substance to enter the confined space through the walls of the space or from a container brought into the space; sparks or other evidence of potential electrical malfunction (particularly in areas where flammable gases are present); and any changes identified by the entrant in his or her physical condition or the physical condition of another entrant (*e.g.*, dizziness, chest pains, vertigo, breathing difficulty, trembling, etc.).

Paragraph (e). The introductory language in final § 1926.1208(e), which is identical to the general industry standard at § 1910.146(h)(5), requires an employer to ensure that an authorized entrant exits from the confined space whenever one of circumstances identified in final § 1926.1208(e)(1)-(e)(4) arises.

Final § 1926.1208(e)(1), which is similar to the general industry standard at § 1910.146(h)(5)(i), requires an employer to ensure that an authorized entrant exits from the confined space whenever the attendant or entry supervisor orders an evacuation. It is essential that the authorized entrants quickly comply with the command to evacuate, particularly because the attendant or entry supervisor may be aware of a hazard that the authorized entrant has not detected. Even when there is disagreement between the entry supervisor and attendant as to whether to evacuate, this provision requires the employer to enforce orders to evacuate given by either the entry supervisor or the attendant. OSHA believes this provision is necessary because emergencies within a confined space are time sensitive, and the entry supervisor and attendant may have different information regarding the types or severity of the hazards in the PRCS.

Final § 1926.1208(e)(2), which is similar to the general industry standard at § 1910.146(h)(5)(ii), requires an employer to ensure that an authorized entrant exits from the confined space whenever there is a warning sign or symptom of a dangerous situation. The phrase "warning sign or symptom of a dangerous situation" has the same meaning as in final paragraph (d) of this section. As with final paragraph (d), and for the same reason, final paragraph (e)(2) differs slightly from the corresponding general industry provision at § 1910.146(h)(5)(ii) because final § 1926.1208(e)(2) requires an employer to ensure that an authorized entrant exits the space whenever "there is . . . a dangerous situation," rather than whenever "the entrant recognizes" a dangerous situation. This provision requires authorized entrants to exit the PRCS as quickly as possible in such cases because the safety procedures delineated in the permit are designed to work in the context of clearly defined acceptable entry conditions, and deviations from the planned measures therefore require timely evacuation to ensure the health and safety of the entrants pending evaluation of the dangerous situation.

Final § 1926.1208(e)(3), which is identical to the general industry standard at § 1910.146(h)(5)(iii), requires an employer to ensure that an authorized entrant exits from the confined space whenever the entrant detects a prohibited condition, as defined in final § 1926.1201. This requirement ensures that employees exit the confined space if there is any prohibited condition, such as a hazardous atmosphere or uncontrolled physical hazard, in the space. Exiting the space upon detecting a prohibited condition will prevent serious injury or death to the entrants. Other examples of prohibited conditions include, but are not limited to, the emergence of a new hazard, a hazard level that exceeds acceptable entry conditions, or personal protective equipment that is not working as planned. In such circumstances, authorized entrants must exit the space to protect their health and safety.

Final § 1926.1208(e)(4), which is identical to the general industry standard at § 1910.146(h)(5)(iv), requires an employer to ensure that an authorized entrant exits the confined space whenever an evacuation alarm sounds. Examples of these alarms include, but are not limited to, atmospheric or engulfment-hazard monitor alarms or alarms activated by an authorized entrant or other employee. This provision ensures that entrants in a PRCS exit the space in a timely manner upon activation of an evacuation alarm warning them of an impending danger, thereby preventing serious injury or death to the entrants.

Section 1926.1209—Duties of Attendants

In final § 1926.1209, OSHA sets out the duties of the attendant required by final § 1926.1204(f) as part of every permit program. The general industry standard recognizes the need for an attendant outside permit spaces, and the preambles for final § 1926.1204(f) and the general industry standard at 58 FR 4517 (Jan. 14, 1993), explain the need for these attendants. One of the major problems in permit space entry operations is that, if an entrant within the space is injured or incapacitated in the space, he or she cannot normally be seen from outside the space, so the attendant is critical to recognizing quickly any injury or incapacitation so that the employer can initiate the applicable rescue operation as soon as possible. The attendant also plays a critical role in protecting employees inside the confined space from unauthorized entries and potentially hazardous conditions outside the confined space that could affect the workers inside the confined space.

The provisions in final § 1926.1209 are substantively identical to the provisions in the general industry confined spaces rule, except as noted below. The introductory language to § 1910.146(i) refers to "the" employer. As in the introductory language for many of the provisions in the final rule, OSHA refers to "the entry employer" in the introductory language of § 1926.1209 to clarify how this rule applies on multi-employer worksites.

The attendant duties are also similar to the duties specified in proposed §§ 1926.1210(f) and 1926.1211(f). The final rule does not include a paragraph found in proposed § 1926.1211(f)(9), which expressly prohibited attendants from entering a confined space to perform rescue. OSHA did not include this paragraph because the prohibition is clear from the general industry standard language incorporated into the final rule, *i.e.*, employers must ensure that attendants never enter a confined space, whether it is to perform rescue or for any other purpose, unless another person assumes the duties of the attendant, and the attendant is properly trained for rescue activity. See § 1926.1209(d) and its Note. In this way, the final rule provides more flexibility to employers than the proposal.

Paragraph (a). Final § 1926.1209(a), which is almost identical to the general industry standard at § 1910.146(i)(1) (except for non-substantive clarifications), requires an employer to ensure that each attendant is familiar with hazards that he or she may encounter during entry, as well as the signs and consequences of such exposures. Section 1910.146(i)(1) requires an employer to ensure that each attendant "knows" the hazards that he or she may encounter during entry. OSHA replaced "knows" with "is familiar with and understands" in the final rule to emphasize that the element of comprehension is critical to the attendant's ability to fulfill his or her duties. Attendants must be able to recognize when entry conditions in the PRCS are unacceptable—that the system of employee protection is malfunctioning. Because attendants would be able to easily communicate with entrants and entry supervisors, their recognition of deviations from acceptable entry conditions, and of the signs, symptoms, and characteristic effects that indicate exposure to a hazard, will enable a timely evacuation from the PRCS. For additional information concerning the signs and symptoms of exposure, see the discussion of § 1926.1208(d) in this preamble.

Paragraph (b). Final § 1926.1209(b), which is identical to the general industry standard at § 1910.146(i)(2), requires the attendant to be aware of the potential behavioral effects of hazard exposure to authorized entrants. While there is overlap between this requirement and the requirement to be familiar with and understand signs and symptoms of exposure, the same overlap exists in the general industry standard and OSHA is preserving the separate requirements for consistency with the general industry standard and to emphasize the importance of recognizing behavioral changes as possible evidence of hazard exposure. OSHA believes this requirement is necessary because the attendant is likely to be in a position to quickly recognize deteriorating conditions within the space and readily communicate the need for an immediate evacuation. For instance, subtle behavioral changes or effects detected in an entrant's speech, or deviations in established communication procedures, would alert the attendant that it is necessary to initiate the procedure to evacuate or rescue the entrant from the space.

Paragraph (c). Final § 1926.1209(c), which is identical to the general industry standard at § 1910.146(i)(3), requires the attendant to maintain an accurate count at all times of authorized entrants, and to ensure that the method used to identify entrants under final § 1926.1206 of this section is accurate. In emergency situations requiring evacuation, the count and identification of entrants is necessary to determine whether evacuation of all authorized entrants from the space occurred, and that no unauthorized entrants remain in the space. This information can then be relayed, if necessary, to rescue workers.

Paragraph (d). Final § 1926.1209(d), which is identical to the general industry standard at § 1910.146(i)(4), requires the attendant to stay outside of the permit space during entry operations until he or she is relieved by another attendant. One of the main duties of the attendant is to recognize hazardous conditions that are occurring inside the PRCS, and to communicate this information to rescue personnel in emergency situations. The attendant is also often the first (and sometimes only) person to recognize prohibited conditions or signs of hazardous conditions within the space. If the attendant was inside the space, the attendant could become incapacitated if an emergency occurred, or the entrants are exposed to prohibited conditions, and consequently rendered unable to perform the duties that are necessary to protect the other employees.

OSHA included a note to final § 1926.1209(d) that is substantively the same as the note in the general industry standard. OSHA reorganized the sentence structure of the note in the final rule to clarify that the attendant cannot attempt rescue until properly relieved, and then only if the attendant is permitted to do so under the permit program and adequately trained and equipped for entry rescue. However, the final rule permits the attendant to perform non-entry rescue so long as the attendant receives proper training to do so. If the attendant is performing his or her duties in multiple spaces, the attendant also must order the entrants in those other spaces to exit the spaces while the attendant is involved in the rescue, or ensure that another person assumes the attendant duties for the other spaces.

Paragraph (e). Final § 1926.1209(e), which is nearly identical to the general industry standard at § 1910.146(i)(5), requires the attendant to communicate with authorized entrants as necessary to keep track of the entrants' status and to notify entrants if evacuation under final § 1926.1209(f) of this section is necessary. OSHA believes that this communication provides information that the attendant needs to determine if the entry can continue. For example, subtle behavioral changes detected in the entrant's speech, or deviations from set communication procedures, could alert the attendant that it is necessary to evacuate or rescue the entrant. This requirement may assist the attendant in fulfilling the duties to identify signs and

symptoms of exposure or behavioral changes (see paragraphs (a) and (b) of this section). In addition, if the need arises, the attendant must communicate to the entrants an order to evacuate because the entrants may not know that there is an emergency.

In the final rule, OSHA requires the attendant to stay in communication to "assess" the entrant's status, rather than to "monitor" it as required in the general industry standard. While there is no substantive difference between these terms, OSHA uses "assess" because "monitor," as defined in the final standard, refers to the identification and evaluation of hazards in a confined space. Assessment connotes an interactive duty in which the attendant may ask questions of the entrant, or ask the entrant to perform a task so the attendant can evaluate the entrant's status.

As with the general industry standard, the attendant's "communication" with the entrant may take different forms depending on the limitations of the particular permit space. In most instances, the attendant could use voice communication, including communication by phone, walkie talkie, or other device that provides a clear and continuous means of communication with the entrant. In other cases, alternative methods, such as tapping on the walls of the space to allow for assessment through a pre-arranged code, may be sufficient to satisfy § 1926.1209(e). See, *e.g.*, July 30, 1993, letter to Julie Emmerich.

Paragraph (f). Final § 1926.1209(f), which is almost identical to the general industry standard at § 1910.146(i)(6), requires the attendant to assess the activities and conditions inside and outside the space to determine if it is safe for entrants to stay in the space. OSHA again uses "assess" instead of "monitor" for the same reason discussed above in final § 1926.1209(e). OSHA refers to "activities and conditions" in the final rule, as opposed to just "activities" in the general industry standard, for internal consistency within this provision. In the same paragraph, OSHA requires the attendant to evacuate the permit space under any of the four "conditions" listed in final § 1926.1209(f)(1) through (f)(4): (1) The attendant notices a prohibited condition, (2) the attendant identifies the behavioral effects of hazard exposure in an authorized entrant, (3) there is a condition outside the space that could endanger the authorized entrants, or (4) the attendant cannot effectively and safely perform the duties required under final § 1926.1209. Thus, it is necessary for the attendant to assess both the activities and conditions affecting the entrants.

In the general industry standard, OSHA requires the attendant to order evacuation "if the attendant detects" a prohibited condition, certain behavioral effects, or a condition outside the space that could endanger the entrants. See § 1910.146(i)(6)(i) through (i)(6)(iii). OSHA did not include the quoted language in the final rule because existing conditions, not detection by the attendant, trigger the duties in final § 1926.1209(f)(1) through (3). OSHA believes that each of these conditions represents potential precursors to serious safety hazards that threaten the health and well-being of employees working in and near the PRCS, and the employer has a duty to ensure that the attendant detects them.

One of the conditions that triggers evacuation is a situation that arises outside the permit space that could endanger the workers inside the space. See final § 1926.1209(f)(3). This requirement also is specified in the general industry standard. Under final § 1926.1203(h)(4) and § 1926.1204(k), the employer must develop and implement procedures to coordinate entry operations with other employers working outside the confined space when the activities of those employers could, either alone or in conjunction with the activities within a permit space, foreseeably result in a hazard within the confined space. In most cases, employers will perform such activities outside the space in close proximity to the permit space, and the attendant must be aware of the applicable coordination procedures to identify any deviation and evacuate the entrants if the deviation makes it unsafe for the entrants to remain in the permit space. While not required to do so, the attendant may take steps to stop activities that do not conform to those procedures, either directly or by notifying the entry supervisor and the controlling contractor, provided that doing so does not interfere with the attendant's ability to fulfill the duties required by § 1926.1209. However, if the employer does not address the potentially endangering activities immediately, the attendant must evacuate the entrants. Consider, for example, a situation in which employees are working inside a storm-sewer permit space that is not isolated from the general storm sewer system. If someone within the view of the attendant is setting up for an activity that will discharge water into the upstream portion of the storm sewer system, the attendant must alert the entry supervisor, and may call to the person setting up the discharge system to request that the person not discharge water into the storm sewer until the employees in the storm sewer have completed their work. If the potential pumpers refuse to wait, then the attendant must order the immediate evacuation of the permit space. See § 1926.1209(f)(3).

Other examples of conditions or activities outside a permit space that would require the attendant's attention include the placement of potentially hazardous items near a ventilation intake source (*e.g.*, an open container of epoxy or gasoline-powered equipment emitting exhaust), or physical conditions that could affect the permit space (*e.g.*, heavy rains outside a below-ground permit space).

One commenter asserted that requiring an attendant to evaluate confined space hazards inside and outside a ground storage tank exposes the attendant to both fall hazards and struck-by hazards (ID–210, Tr. p. 223). For example, a situation in which the tank does not have a ground level entrance, and the attendant must climb a vertical fixed ladder to gain access, exposes the attendant to a fall hazard. However, this comment fails to recognize that the standard would permit the attendant to use electronic monitoring and communications or other means to fulfill the duties in § 1926.1209. Thus, depending on the circumstances of the space, the attendant might only need to physically approach the entrance of the permit space to perform non-entry rescue if non-entry rescue is appropriate (the retrieval equipment would not increase the overall risk of entry and would contribute to the rescue of the entrant), and then only when assigned and trained to do so. In addition, if the attendant encounters a hazard not covered by the confined spaces standard (*e.g.*, a fall hazard), the employer must comply with the relevant OSHA requirements that address the hazard (*e.g.*, 29 CFR part 1926, subpart M, for fall hazards).

More importantly, it appears that the commenter also is challenging the general need for an attendant by asserting that an attendant is unnecessary when the employer is performing work inside an above-ground storage tank (ID–210, Tr. p. 223). In these situations, so long as the space meets the definition of a permit-required confined space, an attendant is necessary for safe entry operations. Although the person designated by the employer as attendant is not assigned the overall responsibility for employee safety and health assigned to the entry

supervisor, the attendant is a crucial link in the communication chain between the entry supervisor, rescue operations, and the authorized entrants. For additional explanation of the importance of the attendant's role, see the introductory discussion of § 1926.1209.

It is extremely important that attendants understand their duties, stay in contact with the entrants, and remain alert to conditions inside and outside the PRCS. The attendant may be in the best position to warn the entrants of hazardous conditions developing outside the space and impending danger within the space, and to recognize physical and behavioral changes in the entrants that indicate that conditions within the space may be deteriorating. Should the entrant become incapacitated, the attendant often is an entrant's only contact with individuals outside the confined space. Therefore, the attendant is necessary to detect emergencies that develop in the space, and to summon emergency assistance before it is too late to prevent injury or death to the entrant.

Another commenter suggested that OSHA make it explicit that the attendant must remain outside the confined space when monitoring atmospheric conditions of the confined space (ID–132, p. 3). This additional language is unnecessary because final § 1926.1209(d) already requires attendants to remain outside the confined space while fulfilling all of their duties under this section, including the duties specified in § 1926.1209(f).

Paragraph (g). Final § 1926.1209(g), which is identical to § 1910.146(i)(7), requires the attendant to call upon rescue and other emergency services as soon as he or she decides that authorized entrants may need assistance to escape from permit space hazards. This provision is necessary to ensure that rescue of authorized entrants occurs as soon as possible to maximize their chance of survival and limiting their injuries, as well as minimizing risk of injury to the rescue-service employees. The Agency notes that in some situations, the attendant may be the person designated to perform non-entry rescue and, therefore, may simply commence that rescue. If other personnel are necessary for non-entry rescue, or if entry rescue is necessary, then the attendant must summon those personnel immediately.

One commenter noted that the parallel language in proposed paragraph § 1926.1211(f)(6) did not specifically require the attendant to "summon" the rescue service (only to "inform" them), and requested that OSHA insert language requiring that action (ID–210, Tr. p. 357). OSHA responded to this comment by adopting the language of the general industry standard in final § 1926.1209(g).

Paragraph (h). Final § 1926.1209(h), which is identical to the general industry standard at § 1910.146(i)(8), requires the attendant to take the actions specified in § 1926.1209(h)(1) through (h)(3) to prevent unauthorized persons from entering a permit space while entry is taking place. OSHA recognizes that there are individuals who may mistakenly believe that they are to work on a task in the space, or who may simply wander by or attempt to enter into the space unaware of the dangers of the PRCS. Final § 1926.1203(b) requires the employer to notify the controlling contractor and other specified employees, as well as the employees' authorized representatives, about the location of, and dangers posed by, the space. However, if someone other than an authorized entrant happens to approach the PRCS, § 1926.1209(h)(1) specifies that the attendant must make that individual aware that he/she must stay away from the PRCS. Some construction sites may be accessible to the public, so the attendant also would be responsible for warning members of the public who may attempt to enter a permit space at the site. Should an unauthorized person enter the PRCS, paragraph (h)(2) of § 1926.1209 requires the attendant to advise him/her to exit the space immediately. This provision protects employees who enter permit spaces without proper authorization, training, or equipment, from the hazards of the permit space, and prevents injury to the entrants already in the permit space from the actions of unauthorized entrants and the items they may carry into the space.

Because an attendant may not have supervisory authority, or because the errant individual may work for another employer at a multi-employer construction site, an attendant may not have the authority to stop unauthorized individuals from entering the PRCS, or to require them to exit once they are inside the space. Therefore, paragraph (h)(3) of § 1926.1209 requires the attendant to notify the entry supervisor, along with the authorized entrants, of this situation, and to evacuate if necessary, as unauthorized entry will typically create a prohibited condition under the permit. Accordingly, OSHA does not encourage or require attendants to expose themselves to potential harm by physically preventing entry to any person.

Paragraph (i). Final § 1926.1209(i), which is identical to the general industry standard at § 1910.146(i)(9), requires employers that designate attendants to perform non-entry rescues to ensure that the attendants perform these rescues in accordance with the employer's rescue procedure. When properly executed, the attendant's performance of non-entry rescue can be the fastest and most effective means of successfully rescuing an entrant, while preventing injuries and deaths that may result from improperly executed entry rescue operations. However, if the employer designates the attendant to perform non-entry rescue but does train the attendant to perform non-entry rescue, or if the attendant does not operate winching equipment or perform other components of the rescue in accordance with the proper procedures, then the result could render the rescue ineffective and endanger the attendant (*e.g.*, improper line retrieval could cause the attendant to lose balance and fall into the permit space), delay rescue (and, thereby, endanger the entrant in need of rescue), or endanger other entrants.

Paragraph (j). Final § 1926.1209(j), which is identical to the general industry standard at § 1910.146(i)(10), requires that the attendant not engage in other activities that could distract him or her from attending to the permit space. The attendant could endanger the authorized entrants if distracted from these duties. If an attendant performs a task that diverts his or her attention from the attendant duties, an emergency condition inside or outside the space could go undetected until it is too late to prevent injury or death to the attendant. However, OSHA also recognizes that the attendant can perform some additional tasks safely, particularly those tasks that enhance the attendant's knowledge of conditions in the permit space. For example, passing tools to authorized entrants and remote monitoring of the atmosphere of the PRCS are among the types of duties permitted, provided the attendant does not enter the PRCS. Activities requiring close or prolonged concentration, or those activities requiring that the attendant be away from a location in which he can observe the PRCS, would likely interfere with attendant duties. Employers must not assign such activities to an attendant and must ensure that an attendant not engage in such activities. The Agency notes that, although the employer may assign attendants to more than one permit space at the same time under § 1926.1204(f), the employer must still

properly train and equip the attendant so that the attendant's role with respect to one space does not interfere with his or her duties with respect to other permit spaces. See also § 1926.1204(f)(1). In other words, the attendant's duty under § 1926.1209(j) applies separately with respect to each individual permit space.

Section 1926.1210—Duties of entry supervisors

The duties of the entry supervisor are critical to the safety of entrants working in a permit space. The employer must assign an entry supervisor who has the responsibility to supervise testing the atmosphere and identifying hazards both before and during entry, terminating entry when necessary, removing unauthorized entrants, and generally ensuring that the work performed in the permit space conforms to the permit program and the acceptable conditions specified on the permit. As noted in the preamble to the general industry standard, the entry supervisor has "overall accountability for confined space entry" (58 FR 4523). OSHA enumerated specific responsibilities in § 1926.1210 of the final rule, which is almost identical to § 1910.146(j) of the general industry standard. The final rule also is consistent with the entry supervisor requirements in the proposed rule, which were at proposed § 1926.1210(e)(2) and § 1926.1211(d)(1) and (d)(2).[24]

The introductory language to § 1910.146(j) refers to "the employer." In this final rule, OSHA instead refers to "the entry employer" to clarify how this rule applies on multi-employer worksites. This revision is non-substantive; in both cases, the requirements apply to each employer establishing the permit program for a permit space.

One commenter suggested that OSHA use "competent person" in place of "entry supervisor" to "be more consistent with other construction standards" (ID–124, p. 8). Although some employers in the construction industry may not be as familiar with the term "entry supervisor," OSHA is retaining the language of the general industry standard because the term is clear and intuitive, and the majority of commenters seemed familiar with that terminology.

Paragraph (a). Final § 1926.1210(a), which is identical to the general industry standard at § 1910.146(j)(1), except for a non-substantive clarification, requires the employer to ensure that each entry supervisor is familiar with, and understands, the hazards that entrants may encounter during entry, including information on the mode, signs or symptoms, and the consequences of exposure to these hazards. Consistent with its approach in other provisions noted earlier, OSHA changed the use of the term "know," found in corresponding § 1910.146(j)(1), to "is familiar with and understands" in this final rule to clarify that the entry supervisor must comprehend the hazards that entrants may encounter.

In the discussion of the duties of the entry supervisor in the preamble to the general industry standard, OSHA explained that, in light of the overarching responsibility of the entry supervisor for the safety of all entrants, it is "only reasonable that he or she be expected to know at least as much, if not more, than authorized entrants and attendants" (58 FR 4523). That knowledge is particularly important in the context of construction, where high turnover of employees and changes to the work site may be more frequent than for general industry. As an individual with the authority to terminate entry and cancel the entry permit, it is essential that the entry supervisor recognize hazardous conditions and telltale indications (signs, symptoms, and characteristic effects) that a hazard from within or outside the permit space is affecting employees engaged in the PRCS operations. By meeting the knowledge requirements of final § 1926.1210(a), the entry supervisor will be able to effectively identify emergency situations by observing employees involved in entry operations.

Paragraph (b). Final § 1926.1210(b), which is identical to the general industry standard at § 1910.146(j)(2), requires the entry supervisor to verify that the employer performed all tests specified by the entry permit, and that all procedures and equipment so specified are in place before he or she may sign the permit and allow entry. The paragraph also specifies that the entry supervisor must verify this information by checking the corresponding entries on the permit. These preliminary checks are necessary to ensure that the conditions in the space are within the acceptable entry conditions—hazard levels are as planned, and protective measures are in place, working properly, and are effective—before entry operations commence.

Paragraph (c). Final § 1926.1210(c) requires the employer, through the entry supervisor, to stop the entry and cancel (or suspend) the permit, as set forth by final § 1926.1205(e), when certain conditions change inside the permit space. By requiring the entry supervisor to terminate the entry permit under the specified conditions, the final rule ensures that the employees will exit the space if there is a deviation from acceptable entry conditions and, therefore, avoid encountering harm arising from prohibited conditions within the PRCS. Final § 1926.1210(c) is nearly identical to the general industry standard at § 1910.146(j)(3), except that the new final provision allows for the suspension of a permit, rather than a cancellation, as permitted in final § 1926.1205(e). For additional explanation of the suspension of the permit, see the explanation above of § 1926.1205(e).

To perform this duty effectively, an entry supervisor must be knowledgeable of the hazardous conditions and the tests and procedures used to monitor these conditions so the entry supervisor can respond in a timely manner to a developing hazard. While the entry supervisor need not personally perform the testing or monitoring (but may choose to do so if properly trained), the entry supervisor must possess the expertise necessary to oversee the testing and identify the hazards in the permit space, and is ultimately responsible for identifying deviations from acceptable entry conditions and other unsafe conditions. In the proposed rule, this requirement differed slightly from the requirements in the general industry standard and this final rule, but the result is the same: The entry supervisor must have all the information regarding the conditions and monitoring results required to know when it is necessary to terminate entry. This requirement remains in effect even if the entry supervisor assumes other duties, such as the duties of an entrant or attendant.

Paragraph (d). Final § 1926.1210(d), which is nearly identical to the general industry standard at § 1910.146(j)(4), requires the entry supervisor to verify that rescue services are available, and that the means for obtaining such services are operable. Because the employer must assign authority for safe permit entry operations to the entry supervisor, it is reasonable and consistent with the rescue provisions to specify that the entry supervisor verify that the rescue service is available, and that the means of summoning it in a

[24] OSHA specified in the proposed rule that the entry supervisor is responsible for evacuating employees from the permit space under specified conditions, and for terminating entry and canceling the permit. OSHA included similar requirements in final § 1926.1205(e) (permitting process), which is a more appropriate location than § 1926.1210 of the final rule because the requirements in § 1926.1205(e) address the process of terminating and canceling the permit.

timely manner is functioning properly. The only difference between this final provision and the general industry standard is that OSHA clarified in this final provision that, as part of the contact with the rescue service, the entry supervisor must verify that the rescue service will notify the supervisor if that service becomes unavailable during the entry process. This clarification corresponds to the employer's duty to confirm the continued availability of the rescue service in final § 1926.1211(a)(3), and is consistent with the proposed rule, which focused overall coordination of the permit entry operations on the entry supervisor (see 72 FR 67368 (Nov. 28, 2007)). Under both the proposed and final rules, the overall coordination duties include managing communications with the rescue service.

Paragraph (e). Final § 1926.1210(e), which is identical to the general industry standard at § 1910.146(j)(5) and consistent with the proposed rule at § 1926.1211(d)(2), requires the entry supervisor to remove unauthorized individuals who enter, or attempt to enter, the permit space during entry operations. Unauthorized entrants lack the safety training necessary to work in the PRCS, and the entry permit does not account for them. Their presence in a permit space not only poses a danger to them, but may also endanger the authorized entrants in the space.

In the final rule, OSHA requires attendants to warn persons near a permit space not to enter the permit space unless they have authorization to do so, but the attendant is not required to physically prevent unauthorized entry or to remove an unauthorized entrant (final § 1926.1209(h)). Under the final rule, as with the general industry standard, the entry supervisor has ultimate responsibility for preventing unauthorized entry and, if that fails, for removing the unauthorized person as quickly as possible from the permit space.

Paragraph (f). Final § 1926.1210(f) is identical to the general industry standard at § 1910.146(j)(6) and consistent with the proposed rule at § 1926.1211(e)(2). While paragraphs (a) and (b) of this section of the final rule set out the entry supervisor's responsibility to ensure that the permit space will be safe prior to entry, and paragraph (c) of this section makes it clear when the employer must cancel or suspend the permit, paragraph (f) requires the entry supervisor to ensure the maintenance of safe working conditions during the entry. In final § 1926.1210(f), OSHA sets out the entry supervisor's duty to assess the space when first assigned entry supervisor duties for the permit space, and at regular intervals thereafter.

OSHA recognizes that employers will need to replace entry supervisors occasionally for various reasons (for example, shift changes, lunch breaks, and regular rotations to other tasks at the job site). This final provision requires that, whenever there is a transfer of supervisory responsibility for a permit-space entry operation, the entry supervisor must assess the space and its hazards to maintain entry operations that are consistent with the entry permit and other requirements of the standard pertaining to the maintenance of acceptable entry conditions. This requirement ensures that the new entry supervisor reviews the permit and entry conditions and, consequently, has the information necessary for performing the duties enumerated in final § 1926.1210.

Final § 1926.1210(f) also requires that the entry supervisor assess the space and its hazards at intervals dictated by the hazards and operations performed therein. This requirement addresses the fact that conditions often change over time within a permit space, while providing the employer some flexibility to monitor different hazards at different intervals of time (see 58 FR 4524). Some hazards may develop rapidly and require more frequent assessments, such as when employees are in a space with a combustible gas already at 9 percent of its LEL, and the employer expects the operations to generate additional gas that will be controlled through ventilation. Other hazards, such as a slow leak of water from a pipe into a permit space, are likely to develop at a more predictable pace that would allow for less frequent monitoring. The type of operation and location or characteristics of the space may also require more frequent assessments by the entry supervisor, such as demolishing an underground wall near water pipes or performing construction work in a sewer system where even a small leak of an unidentified substance or other small change in the sewer space could potentially place the lives of the employees in danger.

One commenter asserted that it is not feasible for an employer to have only one entry supervisor because employees could perform no work in the permit space if the entry supervisor is absent (ID–107, p. 4). This commenter misunderstands the entry supervisor requirements. Final § 1926.1210(f) permits an employer to transfer the duties of the entry supervisor between employees, so long as each such entry supervisor has the proper qualifications to perform these duties and receives the appropriate information about the space from the previous supervisor.

Another commenter also was unsure whether the final rule requires the entry supervisor to be on the construction site at all times (ID–124, p. 7). The entry supervisor is responsible for crucial duties, including monitoring the space, physically removing unauthorized entrants, and terminating entry if necessary. Therefore, it is highly unlikely that the entry supervisor will be able to fulfill the required duties from a distance. However, the standard does not foreclose the potential for technology advances that may allow an entry supervisor to perform the required functions while located away from the permit space. If the entry supervisor is unable to perform his or her duties, either because he or she is not present on the site or for another reason, then the employer must terminate the entry or replace that entry supervisor with a supervisor properly qualified under this final section, and who makes the determinations required by final § 1926.1210(f), or the employer will not be in compliance with this final rule.

Section 1211 — Rescue and Emergency Services

An employer conducting a permit-space entry must include procedures for providing rescue and emergency service as part of its permit-space program (final § 1926.1204(i)). Final § 1926.1211 specifies requirements for that rescue and emergency service. The requirements in final § 1926.1211 are substantively similar to the corresponding provisions in the general industry confined spaces standard at § 1910.146(k). In general, the substance of the rescue provisions in the proposed rule was similar to that of the rescue provisions in the general industry rule, but the language of the general industry rule is more performance-oriented and includes fewer detailed requirements than the proposed rule.

Final § 1926.1211 uses the term "rescue and emergency services." There are two types of rescue services addressed by this provision: Non-entry rescue and entry rescue, and the employer must determine which is appropriate. Emergency services are distinct: They are the services that must be used to retrieve the entrant when the employer's non-entry or entry rescue fails.

OSHA notes that during the rulemaking for the general industry confined spaces standard, a commenter raised a question as to whether an entry rescue service involved only off-site

rescue teams (58 FR 4525). The Agency made clear in that rulemaking that an employer could use an on-site team as long as the employer met all the criteria outlined in the standard. That rationale is equally applicable to this final rule. Consequently, the term "rescue service" in this standard does not exclude the use of an on-site entry rescue service. Indeed, as OSHA noted in the preamble to final § 1910.146, the need to respond as quickly as possible to an emergency within a permit space indicates a preference for on-site rescue teams wherever it is practical.

Some employers may prefer to establish an on-site rescue service. Other employers may prefer to rely on off-site rescue services, perhaps because they believe that they do not have the resources to train employees to perform rescue or because the ready availability of an adequate off-site rescue service makes an on-site capability unnecessary. The final rule allows employers to make arrangements for either on-site or off-site services.

Also, the final rule's phrase "rescue service" refers to all rescue personnel provided to remove entrants from permit spaces. It includes situations in which one person will be responsible for the rescue of authorized entrants (*e.g.*, when the employer uses non-entry rescue systems). In such situations, the evaluation and selection requirements of final § 1926.1211(a) will apply. The training and practice requirements of final § 1926.1211(b) also apply in these situations. Thus, OSHA is treating all rescue services alike, whether the service is on-site or off-site, whether the service is entry rescue or non-entry rescue, or whether the service consists of a multiple-person team or a single person.

One commenter asserted that the rescue requirements should differ based on the type of hazard that is present in or near the confined space (ID–077, p. 1). This standard does set different requirements based on the type of hazard in a PRCS, although the requirements in § 1926.1211(a)(1) and (a)(3)(i) establish performance-oriented criteria that vary based on the hazards in the permit spaces. Final § 1926.1203(e) allows an employer to use alternative entry procedures different than those required by the rest of this standard under certain circumstances. Final § 1926.1203(g) allows an employer to reclassify a PRCS as a non-permit confined space when the employer meets the requirements of that paragraph. The rescue requirements in this final standard do not apply when an employer is using the procedures in final §§ 1926.1203(e) or 1926.1203(g). When an employer is working within a PRCS that does not meet the criteria in one of those paragraphs, however, the rescue requirements are the same for all hazards severe enough to trigger the PRCS program required by final § 1926.1204.

Paragraph (a). The introductory text in final § 1926.1211(a), which is identical to the general industry standard at § 1910.146(k)(1), introduces the requirements for designating rescue services. This paragraph emphasizes the evaluation that an employer must perform of available rescue and emergency service resources before designating a rescue provider for the purposes of this standard as required at § 1926.1204(i) of this final rule. The requirements of this paragraph apply equally to both on-site (employees of the entry employer or controlling contractor) and third-party rescue services.

One commenter asserted that some third-party rescue services, such as fire departments, are unwilling to be the designated rescue service due to liability concerns (ID–075, p. 8). Another commenter asserted that relying on local fire departments to provide third-party recue services can be problematic because the rescue service is not designed specifically to provide confined space rescue at a particular worksite (ID–210, Tr. p. 192). These comments imply that OSHA requires employers to designate the local fire department as the rescue service, which is not the case. In the final rule, OSHA provides employers with much flexibility in choosing its third-party rescue service if the employer elects to rely on a third-party rescue service.

Contrary to the assertion of one commenter (ID–107 p. 4), both the proposed rule and the general industry standard require employers to provide a rescue service for entries, even if a third-party rescue service is not available. (See proposed § 1926.1211(h) and 72 FR 67377–78; 29 CFR 1910.146(d)(9); 58 FR 4524–27; and 63 FR 66018, 66023 (Dec. 1, 1998).) If one third-party rescue service will not assume the responsibility of providing rescue under this final rule, or is not adequately prepared to meet these rescue requirements, then the employer must either find a different third-party rescue service that is capable of performing this service, or train and equip its own employees to provide adequate rescue service.

Paragraph (a)(1). Final § 1926.1211(a)(1), which is identical to the general industry standard at § 1910.146(k)(1)(i), requires an employer to assess a prospective rescue service's ability to respond to a rescue summons in a timely manner. Final § 1926.1211(a)(1) provides that the hazards identified in the permit space determine timeliness. This provision defines "timeliness" in terms of how quickly an entry rescue service needs to reach an entrant to prevent further serious physical damage that may result from hazards in the PRCS while the entrant is awaiting rescue. For example, as stated in the note to paragraph (a)(1), OSHA's respiratory protection standard at 29 CFR 1910.134, made applicable to construction by 29 CFR 1926.103, requires standby rescue personnel equipped with respiratory protection when employees are working in atmospheres that require respiratory protection because the atmospheres are immediately dangerous to life or health (IDLH). Consistent with that requirement, the timeliness requirement in this final rule also means that employers must ensure that an appropriate rescue service is on site for IDLH permit entries. An atmosphere in a permit space where an exposed entrant could suffer irreversible impairment within four to six minutes would meet the definition of an IDLH atmosphere. However, because not all permit spaces pose the same immediate dangers as those spaces with IDLH atmospheres, employers may use a less resource-intensive and more measured response capability for situations in which the need for a nearly instant response is not present. For example, in appendix F to § 1910.146, OSHA explained that if the danger to entrants is restricted to mechanical hazards that would cause injuries (*e.g.*, broken bones, abrasions) a response time of 10 or 15 minutes might be adequate.

At least one commenter was unsure what constitutes a response in a "timely manner" (ID–121, p. 5). Another commenter suggested that OSHA identify the factors in § 1910.146(k)(1)(i) of the general industry confined spaces standard that it would use to analyze whether a rescue response is "timely," and apply them in the construction standard (ID–129, p. 3). The factors that apply in general industry are relevant in evaluating timeliness in this final rule.

When the Agency added the parallel rescue selection requirements to paragraph (k) of § 1910.146, it included a substantive discussion of "timely" rescue in the preamble, and concluded that the determination of timeliness "will be based on the particular circumstances and hazards of each confined space, circumstances and hazards which the employer must take into account in developing a rescue

plan" (63 FR 66023). As the note to new § 1926.1211(a)(1) makes clear, the same approach applies in this final rule. Employers must consider the known hazards of in the space, the time it takes to reach the permit space, as well as the time it will take to enter the space and retrieve employees from inside the space, when determining what is a "timely" response. Several commenters acknowledged that so many factors could affect whether a response is "timely" that it is not practical for OSHA to adopt a bright-line timeframe that would work in all scenarios (ID–090, p. 1; ID–108, p. 3; ID–116, p. 4). As noted in the discussion above, OSHA identified some of the factors that determine whether an employer's response to an emergency is "timely," but these factors are not exclusive. The standard as a whole will prevent employee exposure to hazards, but employers must develop rescue plans that anticipate and minimize potential harm to employees in the event an employee becomes trapped or exposed to an atmospheric hazard. For example, if a permit space contains a potential IDLH atmosphere that the employer will control through ventilation, the employer has a duty to ensure that the ventilation is effective, but also has a separate duty to plan for rescue in the event that the ventilation fails and an employee becomes trapped in the increasingly hazardous atmosphere.

The deaths of two workers during a sewer entry illustrate the potential consequences of inadequate rescue planning: Not only did the two employees enter the space without a permit, rescue plan, or retrieval lines, but the employer also did not assess a potential rescue service. See *S. J. Louis Construction*, OSHRC Docket No. 12–1045 (2013) (Welsh, ALJ). The first worker was overcome quickly by a hazardous atmosphere in the sewer manhole, and the second worker was also overcome after he entered the sewer manhole to attempt rescue. The firemen who responded first were not trained or equipped for permit-space entry and had to summon a different rescue service. The first worker was washed down the sewer line before the second rescue service arrived and was trapped underwater so that it took nearly a day to retrieve his body.

One commenter asserted that, when using a third-party rescue service, it is infeasible for the third-party rescue service to maintain constant contact with construction sites, and not reasonable for outside services to track frequent changes in a confined space's configuration (ID–116, p. 4). Another commenter asserted that it is too costly to require rescue services on site, and that OSHA should allow an employer to merely establish a rescue plan to address accidents (ID–108, p. 5). Neither final § 1926.1211(a)(1), nor any other paragraph in final § 1926.1211, requires an employer's rescue service to be on the construction site at all times, absent an IDLH atmosphere or other hazard that would require immediate rescue, or to be in constant contact with the construction site.

In general, final § 1926.1211(a) only requires an employer to determine that the rescue service is capable of responding to an emergency in a timely manner. However, compliance may require the employer to communicate with an off-site rescue service immediately prior to each permit-space entry unless the employer has been assured that personnel are always available and able to respond in a timely manner. Section 1910.146 addresses the scenario in which the designated rescue service is a local fire department that cannot guarantee that the rescue team will available during the employer's entire permit-space entry operations; in such a case, the employer must ensure close communication with the rescue service during entry operations so that, if the rescue service becomes unavailable while an entry is underway, the employer can abort the entry immediately. May 23, 2008, letter to Jonathan Pennington. To facilitate this communication, OSHA requires in final paragraph (a)(3)(iii) that the entry employer select a rescue provider that agrees to notify the entry employer in the event the rescue service is unavailable. Entry operations must not resume until the entry supervisor verifies that rescue services are available (final § 1926.1210(d)).

One commenter asserted that OSHA should focus on the capability of the rescue service to provide life support, and not whether the rescue response is "timely" (ID–017, p. 2). For example, the provision should focus on requiring someone trained in space-specific rescue techniques, first aid and cardiopulmonary resuscitation, who can gain safe access to the patient, stop the bleeding, administer CPR, and perhaps effect rescue. Final § 1926.1211(a)(2) specifies the requirement to assess whether a rescue service is capable of providing adequate and effective rescue service. Final § 1926.1211(a)(1) requires the employer to assess whether the rescue service is capable of applying such skills in a timely manner.

Paragraph (a)(2). Final § 1926.1211(a)(2), which is identical to the general industry standard at § 1910.146(k)(1)(ii), requires an employer to assess a prospective rescue service's ability to provide adequate and effective rescue services. This requirement is necessary to ensure that the rescue service can perform rescue safely and effectively.

Many third-party emergency responders may be able to provide proper permit-space rescue functions for spaces that do not require immediate, stand-by rescue capability, but not all responders have this ability. Each employer relying on these services must verify that the emergency responder has the training, equipment, ability, and willingness to perform rescue for confined spaces in its facility.

In evaluating a prospective rescue provider's abilities, the employer also must consider the willingness of the service to become familiar with the particular hazards and circumstances faced during its permit-space entries. Paragraphs (a)(4) and (a)(5) of final § 1926.1211 require the employer to provide its designated rescuers with information about its confined spaces and access to those spaces to allow the rescuers to develop appropriate rescue plans and to perform rescue drills. A rescue service's receptiveness to this information is directly relevant to its ability to function appropriately during actual rescue operations.

Two commenters suggested that OSHA provide additional guidance about how employers that use a third-party rescue service are to verify that they meet the requirements in final § 1926.1211(a) (ID–099, p. 3; ID–132, p. 3). OSHA has provided performance-based requirements that are closely aligned with the general industry standard. Therefore, OSHA does not believe that it will be difficult for an employer to determine whether the rescue service meets these requirements. However, OSHA is willing to provide additional guidance as necessary.

Paragraph (a)(3). Final § 1926.1211(a)(3), which is identical to § 1910.146(k)(1)(iii) except for the addition of § 1211(a)(3)(iii), introduces the requirements that a designated rescue service must meet. Final § 1926.1211(a)(3) requires the employer, after performing the evaluations required by paragraphs (a)(1) and (a)(2) of this section, to select a rescue provider that meets the requirements of this paragraph. Therefore, it is not sufficient for an employer simply to perform the evaluations required. The employer also must use the results of those evaluations to select a rescue service that will meet the requirements of this standard.

Final § 1926.1211(a)(3)(i), which is identical to the general industry

standard at § 1910.146(k)(1)(iii)(A), requires an employer to designate a rescue team that is capable of reaching victim in an appropriate amount of time. This requirement is an important element of a preplanned rescue because it eliminates further risk of injury and death resulting from an unnecessary lapse of time between an emergency and when the rescue service affects the rescue. Delays may occur for reasons such as: The travel distance from an off-site location is too far away from the permit space; time needed to gather rescue equipment from storage; lack of training needed to use the rescue equipment properly; or the rescue service is off-duty at the time of the emergency. As discussed above, the time required to respond to a rescue summons varies with the hazards posed by the permit space, and the entry employer must consider the hazards involved in its permit-space work and select an appropriate rescue service.

Final § 1926.1211(a)(3)(ii), which is identical to the general industry standard at § 1910.146(k)(1)(iii)(B), requires an employer to designate a rescue team that is capable of providing proficient rescue service. This requirement is an important element of a preplanned rescue because it eliminates further risk of injury and death resulting from improperly equipped or untrained rescuers. At a minimum, the designated service must comply with final § 1926.1211(b).

Final § 1926.1211(a)(3)(iii) requires an employer to designate a rescue service that agrees to notify the entry employer immediately if it becomes unavailable during an entry operation. There is no corresponding provision explicitly required in § 1910.146, although § 1910.146(k)(1)(iii)(A) implies such a duty. For a rescue service to be effective, it must be available when the entry employer is conducting permit-space entry operations. This provision will promote employee safety by ensuring that entry employers know when their designated rescue services are unavailable.

Final § 1926.1211(a)(3)(iii) enhances an employer's knowledge about the availability of a rescue service during entry operations. This final provision, in combination with other provisions of this final standard, ensures that entry employers know that the rescue service is available. Final § 1926.1210(d), and § 1910.146(j)(4), both require the entry supervisor to verify that the rescue service is available.

Final § 1926.1211(a), and § 1910.146(k)(1), address the employer with a designated third-party rescue service that cannot guarantee that its rescue team will be available during the employer's permit-space entry operations. In such a case, the employer must maintain close communication with the rescue service during entry operations so that, if the rescue service becomes unavailable while an entry is underway, the employer can instruct the attendant to abort the entry immediately. May 23, 2008, letter to Jonathan Pennington. Consistent with these two provisions, the rescue service needs only to communicate its unavailability when the entry employer informs it that entry operations are underway. Although the employer is less likely to know exactly when a third-party service is responding to another call that would make the service unavailable to perform rescue from the PRCS, this requirement also applies to on-site rescue services if, for example, the on-site service members become involved in other work activities that prevent them from responding in a timely fashion to a rescue summons.

Paragraph (a)(4). Final § 1926.1211(a)(4), which is identical to the general industry standard at § 1910.146(k)(1)(iv), requires an employer to inform the designated rescue service of the known hazards associated with the permit space in the event rescue becomes necessary. This provision provides the rescue service with information about hazards and conditions in the permit space that will protect the rescue-service employees who enter the permit space for rescue operations, training, or any other purpose.[25] Compliance with this paragraph, as well as with paragraphs (a)(1) and (a)(2) of this section, would require the employer to provide this information to the rescue service prior to permit-space entry. Similarly, if an entry involves hazards not usually encountered by the rescue service, or hazards or a configuration that would require the rescue service to use equipment that it does not always have available, the employer would have to notify the rescue service of these hazards and conditions prior to beginning the entry operation. In most cases, this information exchange can be accomplished during a single conversation, but additional conversations would be necessary in the event of changes in the conditions or configuration of the space after the initial conversation.

[25] To meet the requirements of this provision, the employer would have to inform the rescue service that the employer selected the service to rescue its employees during entry operations, and that the employer is relying on the rescue services to perform these rescues when necessary.

Paragraph (a)(5). Final § 1926.1211(a)(5), which is identical to the general industry standard at § 1910.146(k)(1)(v), requires an employer to provide the designated rescue service with access to all permit spaces from which the rescue service may need to perform a rescue. The purpose of the provision is to provide the rescue service with an opportunity to develop appropriate rescue plans and to practice rescue operations. OSHA believes that this provision will allow the rescue service to become familiar with the configuration and features of the permit space to which the employer may summon it to perform rescue operations, and thereby develop appropriate rescue plans and practice rescue operations.

Access to the permit space or a simulated permit space for the purpose of planning and practicing rescue operations increases the probability that rescue operations will proceed more efficiently and effectively, thereby reducing the probability of serious injury or death to authorized entrants and rescuers during an actual entry-rescue operation. Note that this provision does not require the third-party rescue service to use the permit spaces for practice; final paragraph (a)(5) simply requires that the entry employer provide access to the space. In performing practice rescues, the third-party service may use any representative permit spaces that replicate the permit spaces from which it may perform a rescue in accordance with final § 1926.1211(b)(4).

Paragraph (b). Final § 1926.1211(b) sets forth four requirements for an employer that has employees designated to provide rescue service. Paragraph (b) is identical to the general industry standard at § 1910.146(k)(2), except that OSHA replaced references to employers' responsibilities for "employees" collectively with references to employers' responsibilities to "each employee"; this revision emphasizes that an employer's responsibility in this area is to each employee individually.

Final § 1926.1211(b) applies to the employer of the rescue service (including non-entry rescue personnel) when that employer also is the entry employer or other employer performing work integral to construction. When the employer is a third-party rescue service that does not perform work integral to construction, then the work performed by the rescue service is covered under the corresponding general industry standard at § 1910.146(k)(2). OSHA believes that it is important to protect employees who enter permit spaces to perform rescue duties regardless of the

employer responsible for the rescue team. By making this final paragraph substantively identical to § 1910.146(k)(2), there are no differences in the requirements for rescue-team employers under the general industry or construction confined space standards. The Agency determined that this requirement is necessary to provide protection for employees in on-site rescue teams, while employees of third-party rescue services will be protected under identical general industry requirements. This is consistent with the intent of the Agency to protect both on-site rescue teams and third-party rescue services in the general industry confined spaces standard (58 FR 4527).

One commenter, representing a company involved in sewer work, asserted that it is neither practical nor feasible for employers performing construction to employ their own rescue personnel (ID–107, p. 4). However, neither proposed § 1926.1213(c) nor final § 1926.1211(b) specify that entry employers must hire additional, rescue-specific, personnel. Rather, employers that train and equip current employees as required by this standard may designate their own employees to provide permit-space rescue, just as under the general industry standard. Also, the commenter referred to a "typical sewer construction/maintenance project," implying that the company it represents engages in maintenance projects that would be subject to the same requirement in the general industry standard. However, the commenter did not indicate that this company, or any other company, found it infeasible to comply with the general industry standard. The commenter did not provide any explanation for why compliance with the requirement in this final standard would be more burdensome than compliance with the general industry work.

Other commenters incorrectly asserted that OSHA would require construction employers to become experts in rescue service (ID–126, pp. 2–3; ID–075, pp. 8–9). Final § 1926.1211(b) does not prohibit employers from using a third-party rescue service; it merely permits employers to use their own employees to provide rescue service. The general industry confined spaces standard at § 1910.146(k) also provides the option of using an employer's own employees to provide rescue services. At least one commenter supported the provision permitting construction employers to use their own employees to provide rescue service, noting that the use of a third-party rescue service is not always effective because of the location of the site or the competency of the third-party rescuers (ID–143, p. 2).

Paragraph (b)(1). Final § 1926.1211(b)(1), which is nearly identical to the general industry standard at § 1910.146(k)(2)(i), requires an employer with employees designated to provide rescue service to equip each affected employee with PPE and to train the employees, at no cost to those employees, how to use the PPE safely. The provisions in this paragraph will help the employer prevent injuries and deaths that could occur without the appropriate PPE, or because the employees did not receive proper training in use of such equipment. Employers still must select and use PPE in accordance with subpart E of part 1926 and all other applicable requirements. These requirements, which include proper selection and use of respirators in accordance with the requirements of the respiratory protection standard at § 1926.103, continue to apply when workers are working in a permit space.

Paragraph (b)(2). Final § 1926.1211(b)(2), which is nearly identical to the general industry standard at § 1910.146(k)(2)(ii), requires an employer with employees designated to provide rescue service to train each employee performing the rescue service, and to ensure that these employees successfully complete the training required for authorized entrants.

This provision would ensure that rescue-service employees can perform their assigned duties proficiently and safely under hazardous permit-space conditions. Lack of such training would endanger the rescue-service employees, those in need of rescue, and others affected by the permit-space rescue operations. Training in the proper use of rescue equipment will help the employer eliminate injuries and deaths caused by the improper use of such equipment. Rescue-equipment training must include training on all equipment that may be used in conducting a rescue in the PRCS, such as the care and inspection of breathing and ventilation gear and emergency-evacuation equipment, and the use of two-way radios and fire-fighting equipment. Training in the requirements for authorized entrants also will protect the rescue-service employee, those in need of rescue, and others affected by the rescue operations because rescue-service employees will be familiar with the hazards of permit spaces and the modes of communicating with attendants. The rescue service may need to use the same modes of communication to communicate with a trapped entrant.

One commenter suggested that OSHA require an employer to train all of its employees, not just entry rescue-service employees, on how to perform rescue duties (ID–150, p. 3). OSHA disagrees with this commenter because, under final § 1926.1211, training for employees not authorized to perform rescue is not necessary for an employer to be ready to provide effective and timely rescue service.

Paragraph (b)(3). Final § 1926.1211(b)(3), which is nearly identical to the general industry standard at § 1910.146(k)(2)(iii), requires an employer with employees designated to provide rescue service to train the employees performing both non-entry and entry rescue services in basic first aid and cardiopulmonary resuscitation (CPR). The Agency believes this requirement is necessary because of the hazards and resultant injuries that may occur in permit spaces. This requirement also will improve the probability that the injured employees survive until higher levels of medical treatment become available.

Paragraph (b)(4). Final § 1926.1211(b)(4), which, apart from an addition discussed below, is identical to the general industry standard at § 1910.146(k)(2)(iv), requires an employer to ensure that the designated rescue service practices rescue operations at least once every 12 months. OSHA believes this training requirement for entry-rescue service employees is necessary to maintain proficiency in entry-rescue procedures and the use of rescue equipment. This training also will ensure that the employer trains the entry rescue-service employees on all revisions to entry-rescue procedures, and that the employees are cognizant of any other new information regarding entry rescue. Practicing rescues in a permit space or a representative permit space also highlights deficiencies in rescue procedures, and allows for revisions of those procedures before they can adversely affect the safety of rescue-service employees or employees in need of rescue during an actual rescue operation.

One commenter read the proposed rule as prohibiting rescue services from conducting practice rescues in the actual permit space (ID–107, p. 4). There was no such prohibition in the proposed rule, and by adopting the language of the general industry standard in this final rule, OSHA makes it clear that rescuers may practice by removing dummies or real persons "from the actual permit spaces or from representative permit spaces." If the employer does not use actual permit

spaces for practice, representative permit spaces must simulate the types of permit spaces from which the rescuers may perform rescues with respect to opening size, configuration, and accessibility.

Proposed § 1926.1213(d) provided that this practice is not necessary when the affected employees properly performed rescue in the same, or similar, permit space during the last 12 months. This proposed language made explicit the existing rule under the general industry standard, which, in its original preamble, stated that satisfactory performance of one or more actual rescues in the same, or similar, space during the 12-month period prior to the training anniversary date could substitute for a practice rescue (58 FR 4528). OSHA previously recognized in other standards (such as in § 1910.120—Hazardous waste operations and emergency response) that actual experience at a particular task can be at least as valuable as a practice session or other type of training. However, just as the rescue service must practice in the same spaces or spaces similar to the ones in which it is to provide rescue, for an actual rescue to take the place of a practice rescue, it must be in the same or similar space. Also note that unsatisfactory performance of a rescue indicates the need for further training and, therefore, cannot substitute for a practice rescue. This exception applies when the rescuers perform a rescue operation in a satisfactory manner and the entrants, through factors beyond the rescuers' control, do not survive. Therefore, this final rule incorporates the exception from the proposed rule by adopting the performance-based language of the general industry standard.

One commenter asserted that the requirement to perform a simulated rescue is infeasible in situations where the rescue service is a small local fire department (ID–090, p. 2). Nevertheless, the commenter volunteered that performing the simulated rescue is the safest approach. When a third-party rescue service does not have the resources to perform this simulated rescue, the employer must either train its own employees to provide rescue or designate a third-party rescue service that is capable of complying with all of the rescue requirements in final § 1926.1211(b).

Another commenter asserted that OSHA wrote proposed § 1213(c)(6) in a manner that allowed an entry employer's employees to enter a confined space even when the initial practice rescue occurred 15 years before the entry takes place (ID–013, p. 5). This commenter misread the requirement. Final § 1926.1211(b)(4), as in the proposed rule, requires an employer to conduct a practice rescue at least once every 12 months after the initial practice rescue. Therefore, 12 months minus one day is the longest period allowed between a practice rescue and the moment the employer begins entry operations.

Another commenter asked how employers who designate a third-party rescue service can verify that the service practices rescue every 12 months (ID–099, p. 3). The duties in paragraph (b) apply to the "employer whose employees have been designated to provide permit space rescue." Therefore, if an entry employer hires a third party to provide rescue services, the final standard does not require the entry employer to verify the practice of the third party. However, paragraph (a), which applies to all employers that designate rescue and emergency services, requires those employers to evaluate the rescue proficiency of the rescue team, even a third-party rescue team, and select a team that is proficient. This commenter also asserted that it is too burdensome to fulfill the requirement to practice rescue operations, but did not provide a specific reason why compliance is infeasible (*id.*). Both the general industry confined spaces standard at § 1910.146(k)(2)(iv) and NFPA 1670, sec. 7.1.3.4 (2009 ed.) also specify a requirement to practice rescue operations found in final § 1926.1211(b)(4). Without a specific reason to depart from this established procedure, OSHA finalized this provision to be similar to proposed rule § 1926.1213(c)(6) and the corresponding provision for general industry confined spaces at § 1910.146(k)(2)(iv).

Paragraph (c). Final § 1926.1211(c), which is substantively similar to the general industry standard at § 1910.146(k)(3), requires that an employer use non-entry rescue, instead of entry rescue, unless non-entry rescue is more dangerous or ineffective than entry rescue. The major difference between this final provision and § 1910.146(k)(3) is that OSHA revised this final requirement to clarify the employer's obligation.

If the employer determines that it will use non-entry rescue, final § 1926.1211(c) also requires the employer to use a retrieval system or method. Accordingly, in general authorized entrants must wear retrieval devices and employers must use a retrieval system, in addition to confirming that emergency assistance is available in the event the non-entry retrieval fails.

Retrieval lines can be highly effective in assisting in the rescue of an unconscious or otherwise incapacitated employee from a confined space. The other major advantage of using retrieval lines for rescue is that it is not necessary to expose a rescuer to the hazards of entering the permit space to help remove an injured entrant. The effectiveness of retrieval lines in rescue was recognized by employers using this equipment for confined space entries during the general industry standard rulemaking (see 58 FR 4530), and mandatory use of retrieval lines is included in both ANSI Z117.1 and the general industry standard. However, the Agency recognizes that many spaces do not readily or safely accommodate the use of retrieval lines. For example, obstructions can snag the retrieval line, and the air lines and electric cords within the space can pose entanglement hazards. In addition, depending on the number of entrants and how much they move around in the space, the retrieval lines themselves could pose an entanglement hazard (see final § 1926.1211(c)(3)).

To allow for the greatest degree of safety in addressing these problems, the final standard requires the use of retrieval systems or methods whenever an authorized entrant enters a permit space, except in situations for which the employer can demonstrate that the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue. This is the approach taken in ANSI Z117.1 and the general industry standard, and OSHA believes that adopting this approach will provide the most effective protection for employees, with appropriate allowance for situations in which employers should not use retrieval systems.

When enforcing this provision, OSHA may inspect the permit space to determine whether a retrieval system would contribute to a rescue without increasing the overall risk of entry. Although some spaces may have configurations or hazards that warrant a slightly different approach, in general, the Agency intends to use the following factors in determining that a permit space does not require an employer to use a retrieval system: (1) The permit space has obstructions or turns that prevent transmitting pulls on the retrieval line to the entrant; (2) the permit space has projections that would cause injury to an employee making forceful contact with the projections during rescue; and (3) when an entry employee enters the permit space using

an air-supplied respirator and the non-entry rescuers cannot control the retrieval line so as to prevent tanglement of the retrieval line with e respirator's air line.

Section 1926.1211(h) of the proposed rule specified that employers must provide both entry and non-entry rescue, while proposed paragraph (h)(2)(i) specified that employers must summon an entry-rescue service whenever they initiate a non-entry rescue. One commenter was unsure whether employers must prepare to provide both entry and non-entry rescue (ID–098, p. 2). Another commenter asserted that it was too burdensome to require employers to prepare for both entry and non-entry rescue when working within or near a PRCS. (ID–120, p. 3). To address these concerns, OSHA based the final rule on the general industry confined space standard, but drafted the final rule to be more performance-oriented than the general industry standard.

The final rule provides for a "back-up" to non-entry rescue, much as the proposed rule did, but in a manner that is less burdensome for employers. Consequently, final § 1926.1211(c) requires that, if an entry employer determines that it will use non-entry rescue, it must confirm, prior to entry, at emergency assistance *will be available* in the event that non-entry rescue fails. OSHA expects this confirmation will typically involve a quick phone call or other communication to establish availability before making the first entry. The employer need not repeat such confirmation when there are several entries planned as part of the same project, provided the employer discusses during the initial contact with the rescue service the availability of emergency assistance for the expected duration of the project. This confirmation is especially important if the employer uses a 911 service or other third-party service that is small and has few teams on call because the service must be available to provide emergency assistance quickly when needed if the assistance is to be effective. In the event emergency assistance is summoned, OSHA anticipates that the emergency assistance provider will assume direction of the rescue and would request any other information it deems essential to effectively provide assistance, and notes that employers may be required by other laws to comply with the emergency assistance quests for information. OSHA is not requiring the employer to provide other specific information at the site out of concern that such a requirement might slow the rescue process if it compels the employer to provide information not needed by the emergency assistance provider. Note that arranging for emergency assistance is not the same as providing for entry rescue; emergency assistance is intended as the backup for the employer's rescue plan, whether the employer relied on entry or non-entry rescue. Entry rescue requires personnel trained to recognize the hazards associated with entry rescue and perform entry rescue duties. These personnel must be trained in performing entry rescues and must have practiced such a rescue within the past year. Employers must designate entry rescuers when non-entry rescue is not an appropriate option. Emergency assistance is intended to supplement employer rescue efforts and provide emergency care to employees injured on site and/or rescued from a confined space. Emergency assistance is required if there is a problem with a non-entry rescue or with an entry rescue.

The non-entry rescue requirements are based on the general industry standard, but provide additional guidance. While there is no corresponding provision stated explicitly in the general industry standard at § 1910.146, § 1910.146(d)(9) requires employers to develop plans to summon emergency services and for rescuing personnel. In final § 1926.1204(i), OSHA clarified that, if the entry employer uses non-entry rescue as the designated method of rescue, the employer must develop a procedure for summoning emergency assistance in case the non-entry rescue is not able to retrieve the entrant. Emergency assistance, such as a 911 emergency-responder service or an on-site or off-site entry-rescue team, may prevent such a situation from resulting in injury or death, so it is critical that emergency assistance be available to respond to the emergency.

In final § 1926.1211(c), OSHA also clarifies that, if the employer determines that it will use entry rescue, it must designate a rescue service that is capable of providing entry rescue. Additionally, it sets requirements for non-entry rescue systems; these requirements do not differ substantively from the corresponding general industry provision.[26]

Paragraph (c)(1). Final § 1926.1211(c)(1), which is similar to the general industry standard at § 1910.146(k)(3)(i), requires an employer to provide each employee with a chest harness or full body harness for most non-entry rescue, but permits use of wristlets or anklets if the employer can demonstrate that the chest or full body harness is infeasible or creates a greater hazard. A chest or full-body harness prevents further injury should an employee become suspended during a rescue; without a chest or full-body harness, injuries can result from the unequal distribution of force on the body during suspension (see the preamble to OSHA's final rule on fall protection for construction at 59 FR 40672, 40702–40704 (Aug. 9, 1994), for a detailed discussion of this issue.)

One commenter asserted that OSHA should require the use of a full-body harness to perform rescue in every instance because it is the most effective means of rescue (ID–210, Tr. p. 68). OSHA disagrees with this commenter. Permit spaces come in many different sizes and configurations, which may make a chest harness more appropriate than a full-body harness in some circumstances.

This provision also provides that the employer must place the retrieval line attached to the harness on the entrant's back near shoulder level, over the entrant's head, or at another point that will establish a small enough profile for successful removal of the entrant from the permit space. One commenter agreed that it was safer to attach the line to the entrant's back, rather than the chest (ID–095).

Final § 1926.1211(c)(1) differs from the general industry standard at § 1910.146(k)(3)(i) in that it includes both anklets and wristlets as acceptable means of retrieval in lieu of a harness in limited circumstances. Employers can use wristlets or anklets in lieu of a harness only if the employer can demonstrate that the use of a harness is infeasible or creates a greater hazard to the employee, and that the use of the wristlets or anklets is the most effective alternative available. Proposed § 1926.1213(a)(4)(iii) permitted employers to use ankle straps, along with wristlets, for non-entry rescue under limited conditions. One commenter supported this proposed minor change from the general industry standard, asserting that anklets may be the safest alternative in horizontal entries (ID–094). However, because of the potential safety advantages of the chest and full-body harnesses, the Agency believes that it is necessary to limit the circumstances when employers

[26] As with the general industry standard, the construction standard relies on existing fall-protection requirements to ensure the proper use of fall-protection equipment. Final § 1926.1211(c) does not address the issue of fall protection for entry into, and exit from, vertical type permit spaces; 29 CFR part 1926, subpart M, and the General Duty Clause, 29 U.S.C. 654(a)(1), govern fall protection in construction.

can use either wristlets or anklets to those in which the employer can demonstrate that use of a harness is infeasible or a greater hazard than wristlets or anklets because of the increased risk of employee injury during a rescue.

Paragraph (c)(2). Final § 1926.1211(c)(2), which is identical to the general industry standard at § 1910.146(k)(3)(ii), requires an employer to use a retrieval line attached to a mechanical retrieval device or fixed point outside the permit space so that non-entry rescue can begin as soon as needed. It also requires an employer to use a mechanical device to retrieve personnel from spaces more than five feet deep. This provision reduces the elapsed time between an attendant determining that a rescue is necessary and commencing the PRCS rescue operation by requiring the essential parts of the retrieval system to already be in place and attached to the mechanical device or fixed point. This requirement will eliminate further injury or death due to the delay resulting from locating and attaching retrieval-system parts and equipment.

The requirement to use a mechanical device for spaces more than five feet deep is consistent with the general industry standard and ANSI Z117.1. Securing the line to an anchor point or using an un-mechanized pulley for retrievals over five feet could endanger the authorized entrant because designated non-entry rescuers may not have sufficient strength and stamina to lift a disabled entrant over a vertical distance of more than five feet.

One commenter asserted that OSHA should require a mechanical retrieval device for all heights when the employer conducts non-entry rescue (ID–211, Tr. pp. 43–44). Another commenter asserted that OSHA should recognize that mechanical winches and pulleys are sometimes necessary based on job conditions (ID–108, p. 2). Neither commenter provided any evidence that attendants encountered difficulty retrieving entrants from distances of less than five feet, or pointed to any problems that arose in the context of the general industry standard or ANSI Z117.1, both of which include the same five-foot threshold. Without additional support for imposing this requirement, OSHA decided to retain the language from the general industry standard. Nothing in this standard, however, precludes use of mechanical retrieval devices for retrievals from heights of less than five feet.

Proposed § 1926.1213(a)(2)(iv)(B) also provided that movable equipment (for example, earth-moving equipment) that is "sufficiently heavy to serve as an anchor point," may be used for that purpose only if effectively locked out or tagged out. Two commenters expressed concern about movable equipment as an anchor point. One commenter stated that many accidents occurred in the past when using a pick-up truck as a fixed point without notifying the driver of the truck, who then unexpectedly moved the truck. This commenter urged that this provision include "proper protocols" to ensure that such a situation did not recur (ID–025, p. 4). Another commenter noted that OSHA's construction standards do not include an equivalent to the Lockout/Tagout standard for general industry. The commenter, therefore, urged OSHA to include a more protective requirement, asserting that a requirement to "lock out" or "tag out" equipment, without additional detail, would "be subject to various interpretations," and could result in unexpected activation of the equipment (ID–143, p. 2).

OSHA recognizes that on a construction site, a piece of moveable equipment may sometimes be the most accessible fixed point, but acknowledges the commenter's concern that such equipment is moveable, even if it has sufficient weight. Thus, under this final rule, an employer must ensure that any movable equipment used as a fixed point is "fixed," meaning that it is sufficiently heavy (such as earth-moving equipment) to prevent movement, and that it is subject to additional precautions to prevent unexpected movement. Accordingly, as in the proposed requirement, to determine whether a retrieval line that is attached to moveable equipment is "attached to a . . . fixed point" under final § 1926.1211(c)(2), OSHA will evaluate whether the moveable equipment is effectively locked out or tagged out. In particular, OSHA will use the final rule's definitions of "lockout" and "tagout" in making that determination, which partially address the commenter's concern by bringing the lockout/tagout process closer to the protection offered by the general industry standard. For example, as part of the tagout process, an employer must ensure that tagout provides "equivalent protection" to lockout or that lockout is infeasible. Consequently, the employer must take whatever measures are necessary to prevent unexpected energization or movement of the equipment. Placing a "do not move" tag in the truck or other equipment would not be sufficient by itself. Typically, such measures include activating an emergency brake or similar device, removing the key from the equipment after ensuring that duplicates are not readily available on the site, placing a tag on the equipment to warn others not to start it, and informing any potential operator(s) not to move the equipment while it is serving as a fixed point for rescue. If the equipment is capable of activation by remote control, then the employer must secure the remote control or disable that capability to prevent unexpected movement.

Final § 1926.1211(c)(2) is performance oriented, and allows flexibility in the design specifications of the retrieval equipment, subject to the requirements of § 1925.1211(c)(3) (equipment must be suitable). One commenter asserted that there are many instances when the use of a tripod assembly with a three-way retrieval system is effective (ID–060, p. 1). Final § 1926.1211(c)(2) does not prohibit the use of such a device if it meets the requirements of this subparagraph. A different commenter asserted that final § 1926.1211(c)(2) should be performance based because of ongoing advancements in confined-space retrieval equipment, and suggested incorrectly that the proposed rule limited retrieval by specifying the use of anchor points or simple pulleys (ID–116, p. 3). The definition of "retrieval system" in final § 1926.1202 is performance based, and allows for technological advancements in retrieval equipment. This definition does not limit retrieval to the use of anchor points or simple pulleys.

One commenter asserted that final § 1926.1211(c)(2) should require an employer to have the retrieval system located at the confined space opening (ID–025, p. 4). Final § 1926.1211(c)(2) requires the employer to have the retrieval system available as soon as needed, which ensures that rescue can begin immediately. Another commenter asserted that the proposed language "available as soon as needed" was too vague, and that a retrieval device could satisfy this provision even if kept elsewhere on the worksite and not installed (ID–095, p. 4). Final § 1926.1211(c)(2) addresses this commenter's concern by requiring attachment of the retrieval line to the appropriate retrieval mechanism (a mechanical device if the depth exceeds five feet, or a fixed anchor point for shallower entries) "in such a manner that retrieval can begin as soon as the rescuer becomes aware that rescue is necessary," thus ensuring that the line will be available and ready for use when needed. If the retrieval device is not at the opening of the permit space, then the employer is responsible for demonstrating that it could initiate

retrieval immediately as soon as the rescuer becomes aware that rescue is necessary.

Paragraph (c)(3). Final § 1926.1211(c)(3) prohibits an employer from using equipment that is unsuitable for retrieval, such as retrieval lines likely to become entangled or that are ineffective due to the configuration of the PRCS. Final § 1926.1211(c)(3) is similar to proposed § 1926.1213(a)(4). There is no corresponding provision in § 1910.146.

A retrieval device, for example, would not be suitable unless it is designed and rated for human use. The provision does not require certification of the retrieval system, but OSHA will accept certifications by manufacturers, as well as listing by a Nationally Recognized Testing Laboratory, as evidence of the proper design and rating. If the employer fabricates its own retrieval device, OSHA will look for evidence that the employer designed, manufactured, tested, and certified the retrieval device in accordance with generally accepted industry practices (for example, by a registered professional engineer).

This final provision prohibits the use of retrieval lines that have a reasonable probability of becoming entangled with the retrieval lines used by other authorized entrants, or due to the internal configuration of the PRCS. The Agency believes that there are situations in which the retrieval lines of two or more employees can become entangled, such as when the employees' work requires that they move around each other. There are also a variety of situations in which the configuration of the PRCS would interfere with a non-entry rescue and cause further serious injury to authorized entrants in need of rescue. For example, the permit space may have objects or equipment protruding from its walls, or sharp corners that may damage rescue equipment or prevent the use of certain types of non-entry rescue equipment.

Final § 1926.1211(c)(3) also prohibits the use of other unsuitable equipment, such as equipment that increases the overall risk of entry or impedes rescue of an authorized entrant. Under final § 1926.1211(c)(3), the mechanical retrieval device used must be appropriate for rescue service. This requirement follows the general industry standard, which was based on the record in that rulemaking indicating that incapacitated entrants could easily be bounced around, torn apart, or impaled if too much torque was applied to the retrieval line or the retraction of the line was not precisely controlled (see the general industry preamble discussion at 58 FR 4531). Accordingly, the employer must not use any mechanical device, such as a fork lift or backhoe, that could injure the entrant during rescue. Using a material hoist to both haul material and to serve as a rescue retrieval system during an entry operation also is not acceptable. In such a situation, the material hoist would not be available for rescue when it is hauling materials; further delay would result when, during a rescue operation, the attendant would have to detach the retrieval line from the materials and attach it to the employee requiring rescue. See Oct. 6, 1995, letter to Mr. Joseph Bouchard. The employer also must not use powered winches without a stop clutch or other power-limiting device. Such winches can cause injuries to an entrant if the entrant becomes entangled on an object inside the permit space, but the winch continues to pull the entrant (58 FR 4462, 4531 (Jan. 14, 1993)).

Prohibiting such unsuitable equipment will reduce the injuries and deaths that would result from the use of unsuitable retrieval equipment during rescue operations. The Agency did not receive any comments objecting to the propriety of this approach and, therefore, finalized this proposed prohibition of unsuitable rescue equipment.

Paragraph (d). Final § 1926.1211(d), which is identical to § 1910.146(k)(4), requires an employer to provide relevant information about a hazardous substance to a medical facility treating an entrant exposed to the hazardous substance if the substance is one for which the employer must keep a safety data sheet (SDS) or other similar information at the worksite. The Agency recognizes that such information may already be available to medical facilities from other sources (such as state emergency-planning commissions), and that SDS or similar written information may not be available in some instances. However, because the timely provision of this information may be critical to the proper medical treatment of an injured employee, and this final standard limits the requirement to SDS or other similar written information that the employer already must keep at the worksite, OSHA concludes that the potential significance of this information to the health of the employee outweighs any minimal burden on the employer associated with providing this information. Such information would aid emergency medical services and medical facilities in correctly diagnosing and treating the employee rescued from the permit space.[27]

Section 1926.1212—Employee Participation

This section provides for employee participation in confined space programs. The provisions in final § 1926.1212 are nearly identical to the provisions in the general industry confined spaces rule at § 1910.146(l). Final § 1926.1212 differs from § 1910.146(l) in that it refers to "each affected employee" rather than "affected employees," to emphasize that an employer's responsibility in this area flows separately to each employee, but the employer's obligation remains unchanged. In the proposed rule, employee participation was limited to the requirement in proposed rule § 1926.1204(e) that employers offer entry employees the opportunity to observe the evaluation and monitoring of the permit space. One commenter suggested that OSHA restore the employee participation requirement from the general industry rule for the reasons OSHA added paragraph (l) to the general industry rule in 1998, and also noted that no commenters who favored using the general industry format raised any objections to its employee participation requirements (ID–0220 p. 26–28). OSHA agrees, and notes that the use of the general industry language is particularly warranted because the final rule requires a written permit-space program in final § 1926.1203(d), which was not required in the proposed rule, so final § 1926.1212(a) would ensure that employees bring their experience to bear regarding that program.

Paragraph (a). Final § 1926.1212(a), which is nearly identical to the general industry standard at § 1910.146(l)(1), requires employers to consult with affected employees and their authorized representatives in the development and implementation of the permit-space program required by final § 1926.1204. Allowing employees and their authorized representatives to participate in this manner will contribute to confined space safety. Commenters on the 1998 amendments to the confined space standard that added § 1910.146(l) noted that employees who work in confined spaces and their representatives are particularly well qualified to contribute to the task analysis that is a necessary step in developing a confined space program

[27] The employer must provide this information if other applicable Federal regulations (such as § 1910.1200—Hazard communication) or state regulations already require the employer to keep the SDS or other written information at the worksite.

(63 FR 66018 (Dec. 1, 1998)). One commenter provided an example of when he, as an employee representative, was able to identify dangerous adhesive fumes in a confined space that could have otherwise harmed the two employees in that space who did not identify the danger (ID–010). These employees are most familiar with the practices used during confined space entries. If those practices differ significantly from the practices planned by the employer, the employer needs to know of the differences and take appropriate steps to remedy any deficiencies in the permit-entry procedures. Likewise, employees may know of hazards within the space that non-entrants are not taking into consideration. This provision leaves the final contents of the confined space program up to the employer, but, by doing so, this provision should promote safety and avoid the need to develop a cumbersome procedure to resolve conflicts between employers and employees regarding confined space entries.

Final § 1926.1212(a) also is consistent with Section 2(13) of the OSH Act, 29 U.S.C. 652(13), which emphasizes employer-employee cooperation by stating that one of the purposes of the Act is to "encourage joint labor-management efforts to reduce injuries and disease arising out of employment." Congress reiterated this purpose in a directive to OSHA to promulgate a Process Safety Management (PSM) standard; this directive explicitly provides for employee involvement in the development of the process safety management programs mandated by that standard (see Chemical Process Safety Management, Pub. L. 101–549, Title III, sec. 304(c)(3) (1990), reprinted at 29 U.S.C.A. 655 note (Supp. 1991)). OSHA also has a longstanding practice of encouraging and promoting employer-employee cooperation as exemplified in its 1989 Safety and Health Program Management Guidelines (54 FR 3904); these guidelines recognize the importance of involving employees in safety and health programs at the workplace. OSHA's experience in enforcing the employee-participation requirements under the PSM standard and the general industry confined spaces standard convinced the Agency of both the value and the utility of the provision in paragraph (a).

Paragraph (b). Final § 1926.1212(b), which is nearly identical to § 1910.146(l)(2), requires that affected employees and their authorized representatives have access to all information developed under this standard, with the clarification that this obligation applies to each employee. Other sections of this standard, such as final § 1926.1203(d), already require that employers make some information available to employees and their representatives. OSHA is adding this provision for purposes of emphasis and clarification. This provision emphasizes that employees and their representatives have a right to all information developed under the rule affecting their health and safety. Final § 1926.1212(b) does not require employees or their authorized representatives to request or review this information; however, it provides them with the option of requesting and reviewing the information should they choose to do so. Employers need not provide separate copies of the information to each employee; employers have flexibility in determining how to distribute the information so long as each employee can access it.

Section 1926.1213—Provision of Documents to Secretary

Final § 1926.1213 requires each employer who must retain documentation under this final rule to make that documentation available to the Secretary of Labor, or a designee, upon request. Final § 1926.1213 is similar to proposed rule § 1925.1219(e). There is no corresponding provision in § 1910.146. OSHA added this provision to enable the Agency to more accurately identify potential safety hazards at a worksite and to monitor compliance with the requirements of this standard.

The request from the Secretary or the Secretary's designee (for example, OSHA) may be either oral or written. Unless another provision of this standard requires employers to maintain a document at the worksite, the employer may maintain these documents off site as long as the employer can produce them readily to the requesting official, such as through electronic transmission to the worksite where OSHA is conducting an inspection. These documents pertain to the determinations made, and actions taken, regarding hazards. They provide valuable information to use when inspecting the worksite, including evaluating any potential safety hazards.

At least one commenter objected to this requirement, asserting that OSHA should have to demonstrate a need for a specific document and obtain a subpoena, and that this requirement is a paperwork burden and will not increase safety (ID–075, p. 11). Requesting such documentation is already part of OSHA's standard inspection practice under the general industry standard, as it is under many other standards. *See* CPL–02–00–100, CPL–02–00–150. This provision creates no new retention requirement—it merely confirms that when employers are already required to maintain records, they must make those records available to the Secretary. The provision provides employers with flexibility in where and how such records are maintained. Though there is a small cost to this provision, OSHA believes the safety benefit of identifying any potential safety hazards supports the inclusion of this provision.

IV. Agency Determinations

A. Legal Authority

The purpose of the OSH Act, 29 U.S.C. 651 *et seq.*, is "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources." 29 U.S.C. 651(b). To achieve this goal, Congress authorized the Secretary of Labor to promulgate and enforce occupational safety and health standards. 29 U.S.C. 654, 655(b), 658.

A safety or health standard "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 and places of employment." 29 U.S.C. 652(8). A safety standard is reasonably necessary or appropriate within the meaning of 29 U.S.C. 652(8) if:

- It substantially reduces a significant risk of material harm in the workplace;
- It is technologically and economically feasible;
- It uses the most cost-effective protective measures;
- It is consistent with, or is a justified departure from, prior Agency action;
- It is supported by substantial evidence; and
- It is better able to effectuate the purposes of the OSH Act than any relevant national consensus standard.

See United Auto Workers v. *OSHA*, 37 F.3d 665, 668 (D.C. Cir. 1994) (Lockout/Tagout II). In addition, safety standards must be highly protective. See *id.* at 669.

A standard is technologically feasible if the protective measures it requires already exist, available technology can bring these measures into existence, or there is a reasonable expectation for developing the technology that can produce these measures. See, for example, *American Iron and Steel Inst.* v. *OSHA* (*Lead II*), 939 F.2d 975, 980 (D.C. Cir. 1991) (*per curiam*). A standard is economically feasible when industry can absorb or pass on the costs of compliance without threatening

industry's long-term profitability or competitive structure. See *American Textile Mfrs. Inst.* v. *Donovan*, 452 U.S. 490, 530 n. 55 (1981); *Lead II*, 939 F.2d 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. See, for example, *Lockout/Tagout II*, 37 F.3d at 668.

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 information-transmittal provisions. 29 U.S.C. 655(b)(7). Finally, the OSH Act requires that when promulgating a rule that differs substantially from a national consensus standard, OSHA must explain why the promulgated rule is a better method for effectuating the purposes of the Act. 29 U.S.C. 655(b)(8). OSHA explains deviations from relevant consensus standards elsewhere in this preamble.

B. Final Economic Analysis and Final Regulatory Flexibility Analysis

1. Introduction

The Occupational Safety and Health Administration (OSHA) finalized its safety standard for confined spaces in construction work. When appropriate, this final standard aligns with the confined-spaces standard for general industry (29 CFR 1910.146), although it also has distinctive characteristics for construction worksites. The pre-existing rule on confined spaces in construction, 29 CFR 1926.21(b)(6), which this final rule replaces, is merely a general training requirement that lacks the specificity and protections that the general industry rule—and this final standard—provide.

The final standard differs from the earlier proposed standard. OSHA revised the proposal in response to numerous stakeholder comments, including those from the Office of Advocacy of the Small Business Administration (ID–119), which indicated that employers in construction in large part followed the general industry standard and, therefore, preferred that this final rule not depart substantially from general industry standard. However, this final rule includes important requirements (also present in the proposed rule) to address communication, worksite evaluation, and training, which are absent from, or not as clearly specified in, the general industry standard.

The final standard establishes practices and procedures that apply to employers that have workers who enter confined spaces during construction work, including major renovation projects. The final standard does not apply to routine maintenance activities, which the general industry standard covers instead.

Work in confined spaces involves a significant risk of death or serious injury, which compliance with this rule will reduce substantially. OSHA estimates that full compliance with this final rule will prevent an average of approximately 5.2 fatalities and 780 lost workday injuries each year. In particular, the Agency believes that compliance with this final rule will avert injuries and fatalities from causes such as asphyxiation, chemical burns, scalds, and poisonings.

Not all confined spaces pose occupational hazards. However, there are spaces that employees can enter only after employers follow specific procedures to ensure safety. Pursuant to the final rule, employers must develop and implement permit programs or use specified alternative procedures when employees work in such spaces. The standard sets forth the requirements for evaluating hazards, identifying and classifying confined spaces, and issuing permits or implementing alternative procedures. When the standard requires a permit to enter a confined space, the employer must maintain a written program and review it annually, and prepare and post a permit for the space. Employers also must adopt a variety of safety measures, including isolation procedures, atmospheric testing, ventilation, monitoring, and arrangements for rescue and emergency assistance.

As shown in Table IV–1 below, OSHA estimates that the final rule will result in yearly compliance costs of $60.3 million (using a discount rate of 7 percent), and yearly safety benefits, based on lives saved and injuries prevented, of $93.6 million. Therefore, the benefits of this final standard outweigh the costs of complying with its provisions, yielding net benefits of $33.3 million a year. Compliance with the final standard will result in approximately $1.55 of benefits for every dollar of costs.

Based on the analysis presented in this FEA, OSHA concludes that this final standard is technologically and economically feasible for all affected industries.

This FEA includes numerous analyses OSHA is required to perform, including the findings of technological and economic feasibility and their supporting materials required by the OSH Act as interpreted by the courts (in sections 5, and 7, which depend on results derived in sections 3 and 6); the analyses required by E.O. 12866 and E.O. 13563 (primarily in sections 2, 4, 6, and 9, though these depend on material in section 3); and those required by the Regulatory Flexibility Act (the final regulatory flexibility analysis is presented in section 8, but depends on or refers to results in section 3, 6 and 7 which in turn depend, in part, on materials presented in other chapters). Terminology and analytic methods and standards appearing in a particular chapter correspond to the source(s) of that chapter's requirements; for example, the legal concept of "economic feasibility," which is a key subject of section 7, is not recognized in E.O.s 12866 or 13563 or their associated guidance document, OMB Circular A–4.

TABLE IV–1—NET BENEFITS

[Millions of 2009 dollars]

	7% Discount rate	3% Discount rate
Annualized Costs		
Evaluation, Classification, Information Exchange and Notification	$12.4	$12.2
Written Program, Issue Permits, Verify Safety, Review Procedures	$4.2	$4.2
Provide Ventilation and Isolate Hazards	$2.8	$2.7
Atmospheric Monitoring	$11.4	$11.3
Attendant	$3.6	$3.6
Rescue Capability	$8.2	$7.6
Training	$11.3	$11.3

TABLE IV–1—NET BENEFITS—Continued

[Millions of 2009 dollars]

	7% Discount rate	3% Discount rate
Other Requirements	$6.4	$6.3
Total Annual Costs	$60.3	$59.2
Annual Benefits		
Number of Injuries Prevented		780
Number of Fatalities Prevented		5.2
Monetized Benefits		$93.6
Net Annual Monetized Benefits (Benefits Less Costs)		
	$33.3	$34.4

The remainder of this FEA contains the following chapters:

2. The Need for Regulation
3. Profile of Affected Industries
4. Benefits and Net Benefits
5. Technological Feasibility
6. Costs of Compliance
7. Economic Feasibility Analysis and Regulatory Flexibility Determination
8. Final Regulatory Flexibility Analysis
9. Sensitivity Analysis
10. References

2. The Need for Regulation

OSHA previously considered non-regulatory alternatives and established the need for regulation of work in confined spaces when it promulgated the general industry standard (58 FR 4548). The Agency asserts that the same need for regulation applies when employers are entering these spaces to perform construction work. Confined spaces in construction expose employees to a variety of significant hazards, including engulfment, electric shock, burn, and atmospheric hazards that cause serious injury and death. Although better compliance with existing safety standards may prevent some of these incidents, research and analyses conducted by OSHA found that many preventable injuries and fatalities would continue to occur even if employers fully complied with the existing standards. Relative to full compliance with the existing standards, OSHA estimates, in Chapter 4 of this FEA, that full compliance with the final standard would prevent an estimated additional 780 injuries and 5.2 fatalities annually.

Executive Order 12866 provides that "[e]ach agency shall identify the problem that it intends to address [via regulation] . . . including, where applicable, the failures of private markets." Executive Order 13563 reiterates that requirement. In the absence of this regulation, many construction employees would not know about or recognize the hazards that confined spaces, or the procedures to follow to protect against such hazards. Even those employees with years of experience in construction work may lack training on confined spaces, information about specific onsite confined-space hazards, equipment needed to monitor and ventilate confined spaces, or rescue procedures and equipment.

The final standard for confined spaces in construction addresses these problems. The benefits analysis presented in Chapter 4 of this FEA shows that many accidents are potentially preventable with better information on confined spaces and worksite conditions and the proper confined-space procedures and equipment. When employers provide confined-spaces training, that training may be incomplete or ineffective in the absence of a specific set of construction requirements addressing training for confined spaces.

To better understand the market failures that make this final rule necessary, OSHA examined the economic incentives that underlie employer decisions with respect to workplace safety and health. An employee typically accepts the risks associated with a particular job in return for two forms of compensation: (1) A wage premium for assuming that risk; and (2) expected compensation for damages in the event of occupational injury or illness. The rational profit-maximizing employer will make investments in workplace safety to reduce the level of risk to employees only if such expenditures result in at least an offsetting reduction in the employer's payouts of wage premiums for risk and compensation for damages. To the extent that the sum of the costs of wage premiums and compensation for damages accurately represent the total damages associated with workplace accidents, the rational employer will accordingly arrive at the socially optimal level of accident prevention from an economic efficiency viewpoint.

Consequently, the major possible sources of market failure, resulting in an "under-provision" of health and safety, would be either: (1) The existence of occupational accident costs borne neither by the employee nor by the employer, or (2) the wage premiums or compensation for damages are not fully responsive to changes in employer-specific workplace risk. Both cases apply here.

In the first case, there are some non-fatal occupational injury and illness costs incurred by neither the employer nor the employee. For instance, neither employers nor employees have a vested interest in Federal and State taxes that go unpaid as a result of an employee injury. Such taxes typically represent 15 percent (for Social Security alone) to 26 percent of the total value of the income loss to the employee (IRS, 2013; Urban Institute/Brookings, 2012).[28] Workers' compensation payments are not subject to Federal income or Social Security taxes (IRS, 2012), and many studies find that income losses not compensated by workers' compensation are significant (NASI, 2012).

In the second case, as discussed below, the costs employers pay in compensation for damages or wage premiums are not fully responsive to changes in employer-specific workplace risk. Accordingly, most employers cover compensation for injured employees

[28] The average Federal tax rate for 2009 for the middle quintile of household income was 11.1 percent (Urban Institute/Brookings, 2012).

through workers' compensation insurance. (Some very large employers may self-insure in some states.) States highly regulate premiums for workers'-compensation insurance and, generally, employ a combination of a class rating and an experience rating in deriving premiums (NCCI, 2013; Ashford, 2006). States base the class rating on the average risk for employees in the same occupations as those working for the employer. The basis of the experience rating is the employer's actual workers'-compensation claims over the past several years. States use class rating for almost all very small firms and some medium-sized firms. Very large firms use either experience rating, but it takes several years before their insurance premiums account fully for changes in their workplace safety performance. States assign many firms a combination of class and experience ratings.[29] As a result, most employers will not receive full or prompt reductions in their workers' reduced premiums for the expenditures they made to prevent workplace injuries, illnesses, and fatalities. From a societal perspective, the result is an insufficient level of worker protection.

Furthermore, workers' compensation covers only a small fraction of most estimates of the willingness to pay to prevent a fatality.[30] Additionally, workers' compensation payments do not fully compensate injuries in that workers' compensation provides no payments for pain and suffering, or losses other than lost wages or medical expenses associated with injuries. There is extensive evidence that workers' compensation does not even fully restore wages lost as a result of long-term disability (Ashford, 2006).

Having to pay wage premiums for risk is another economic incentive for employers to mitigate occupational risk. However, wage premiums do not respond strongly to variations in risk level due to information asymmetries. For an employer to have an adequate incentive to implement measures that will prevent workplace incidents, it is not sufficient that employees simply know that their work is dangerous, or even know quantitatively that their occupation has a specific risk. Employees must know the exact types, and the likely quantitative effects, of safety measures and systems used by their employers; have a reasonable expectation that their employer will continue to provide existing safety measures in the future; and be able to act on their knowledge of risk by readily changing workplaces or wage demands in response to differences in levels of risk.[31] OSHA believes that even skilled construction workers (including some workers injured in accidents preventable by the final rule who fall into that category) lack such detailed employer-specific knowledge, or the ability to act on it. Further, construction employees who typically work at a variety of different sites, including sites controlled by multiple employers, will find it particularly challenging to determine future risk levels, as these levels will vary from site to site.

In summary, OSHA believes that: (1) Neither employers nor employees absorb the full costs of occupational injuries and fatalities; and (2) wage premiums and workers'-compensation insurance are not sufficiently responsive to variations in risk to assure that employers will reduce risk to the socially optimal level. This final rule, therefore, is necessary to address market failures and insufficient levels of worker safety that result from externalities and information asymmetries.

OMB's Circular A–4 (OMB, 2003) states that "a demonstration of compelling social purpose and the likelihood of effective action" may provide the basis for a Federal regulation. The OSH Act provides a Congressional finding as to the compelling social need for assuring occupational safety. Congress declared that 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." 29 U.S.C. 651(b). Further, by emphasizing "every working man and woman," Congress expressed an interest in preventing unsafe workplaces to the extent feasible, not simply in assuring that, on average, workplaces are safe. Thus, while some employers are excessively cautious about risk, while others are insufficiently cautious, OSHA's concern needs to be with the insufficiently cautious employers.

3. Profile of Affected Industries

This chapter presents a profile of the industries affected by the final standard for confined spaces in construction. It includes, for each affected industry, estimates of the number of firms, establishments, and employees, as well as the estimated number of establishments affected annually by the final standard. It also includes the number and characteristics of entries into confined spaces covered by the final standard.

A preliminary profile of industries appeared in OSHA's Preliminary Economic Analysis (PEA) that accompanied the proposed standard (ID–002). For this final analysis, OSHA updated the profile to reflect the latest available data from the Bureau of Labor Statistics, the Bureau of the Census, the Internal Revenue Service, and other authoritative sources and to address public comments. In addition, the Agency organized the industries in this final analysis according to the North American Industry Classification System (NAICS) rather than the Standard Industry Classification (SIC) system used in the PEA. This was necessary because OSHA wished to update the analysis using more recent economic data and the more recent economic data uses the NAICS rather than the SIC system.

An analysis conducted by CONSAD Research Corporation under contract with OSHA served as the basis for the PEA (ID–003). The CONSAD report relied on a variety of sources, including information provided by a panel of construction industry safety experts in 1995 regarding characteristics of, and entries into, confined spaces for 25 categories of construction projects, as well as compliance rates for provisions of the proposed standard. CONSAD used F.W. Dodge data to estimate the number of construction-project starts for each project category, by size of project

One commenter, the Associated General Contractors of America (AGCA), presented an alternative economic analysis of the proposed rule, prepared by Dr. N. Mike Helvacian, based in part on a survey of AGCA's members (ID–222). That economic analysis suggested that the PEA omitted five affected industries, including, by NAICS code: 238210 (Electrical Contractors); 221119 (Utilities—Other Electric Power Generation); 221310 (Utilities—Water Supply Irrigation); 236118 (General Contractors in Residential Modeling); and 238220 (Plumbing, Heating and Air Conditioning Contractors). OSHA included these five industries, other than NAICS 221119 (Utilities—Other

[29] Premiums due to class rating, by definition, do not vary with an individual employer's injury experience. There is some empirical evidence, using a difference in differences methodology, showing that (small) firms that move from class rating to experience rating decrease their total claims by 8 to 12 percent (Neuhauser et al., 2013).

[30] While workers' compensation varies by state, Leigh and Marcin (2012) estimate that the average indemnity benefit for a fatality is $225,919, far less than willingness-to-pay estimates. For example, as explained in Chapter 4 of this FEA, OSHA uses a willingness-to-pay measure of $8.7 million per life saved in 2009 dollars. Other agencies use different estimates, but all the values are in the millions of dollars.

[31] Furthermore, bargaining power differences or external constraints must not interfere in the wage setting process as these factors do in circumstances such as monopsony or multiemployer collective-bargaining agreement.

Electric Power Generation), in the industry profile, and in the estimation of compliance costs, for the final standard.

For electric power-generation industries (NAICS 221111, NAICS 221112, and NAICS 221113, in addition to NAICS 221119, in the 2007 version of NAICS), OSHA believes that most of the confined-space entries performed are for maintenance and repair subject to General Industry requirements under §§ 1910.146 and 1910.269. When the size and scope of a project involving entry into confined spaces is large or complex enough that the work is construction work as defined in § 1910.12(b), electric utilities typically hire contractors in industries that are already included in this FEA to perform the work and confined-space entry. Consequently, OSHA concluded that employers in NAICS 221119 will themselves rarely, if ever, perform work covered by this final rule and, thus, will incur no direct costs or negligible direct costs to comply with the final standard. By the same reasoning, OSHA did not in the PEA, and did not in this FEA, include any other electric power-generation industries in its industry profile or in its estimation of compliance costs for the final standard.

Other commenters, including SBA Advocacy, pointed out that OSHA did not include single-family housing projects in the analysis of compliance costs in the PEA (see ID–119 and ID–219). In its original analysis, the Agency excluded single-family housing projects, in part because the previously mentioned panel of industry experts found that such projects did not have entries into confined spaces covered by the standard (see ID–003, p. 3.54). Comments in the record generally indicate that there are a limited number of confined-space entries in these projects. For example, the National Association of Home Builders (NAHB) noted that "there is very limited exposure to confined space hazards in residential construction" (ID–117). In a post-hearing brief, NAHB explained that "although it will happen only occasionally, permit spaces may arise in residential home construction, perhaps when a subcontractor brings certain chemicals . . . into a confined space, such as into a crawl space, attic, or a basement before steps are installed" (ID–219). OSHA agrees that, although entry into confined spaces to conduct work on home-building construction sites is rare, it cannot rule out some potential for exposure to confined-space hazards for this sector of the construction industry. Therefore, OSHA included single-family home construction projects in this analysis by adding NAICS code 236115, New Single-Family Housing Construction (except Operative Builders), to the scope of this FEA.

In addition, OSHA believes that some residential remodeling projects, such as an expansion of an apartment building or upgrading HVAC systems, plumbing, or electrical systems in multi-family housing, may constitute construction activity. Therefore, for this FEA, OSHA added costs for employers with confined spaces in residential remodeling projects to comply with the final standard.

Another commenter stated that the CONSAD report "specifically excludes gas, water, sewer and municipal work from their analysis. It is erroneous for . . . the entire sewer construction industry to be excluded from the economic analysis" (ID–091). OSHA points out that the PEA did not exclude the entire sewer-construction industry. Rather, the PEA excluded new water- and sewer-line construction projects because such work typically involves smaller lines and, therefore, does not typically involve entries covered by the rule. However, OSHA included entries into existing storm sewers, sanitary sewers, and sewer manholes for construction work, including entries involved in storm sewer and flood-control projects and sewer-, water-, and waste-treatment plants, both in the PEA and in this FEA. OSHA also discusses in the economic feasibility analysis the possibility that establishments in industries that seldom have confined space entries might occasionally have one.

OSHA concludes that the final standard will affect establishments in 15 six-digit NAICS codes. In particular, the standard will affect firms that perform construction work involving buildings, highways, bridges, tunnels, utility lines, and other types of projects. Also potentially affected by the final rule are general contractors, as well as specialty-trade construction contractors and property owners.

Table IV–2 provides information on the estimated number of projects for each type of construction activity, as well as the estimated number of entrants per entry, number of entries, and worker-entry hours in confined spaces. OSHA based this information on the estimates originally provided in the CONSAD report.

Table IV–3 presents profile data on the number of establishments, the number of employees, and revenues and profits for each affected industry sector. The Agency updated this table from the PEA using the more recent data from the 2007 Statistics of U.S. Businesses from the Census Bureau adjusted to 2009 dollars using the GDP deflator. This is the same source of data used in the PEA. These industries contain an estimated combined total of over 500,000 establishments and nearly 5 million employees. The annual combined revenues of these industries in 2007 came to nearly $1.3 trillion (in 2009 dollars). Commercial and Institutional Building Construction (NAICS 236220), the largest of these industries in terms of annual revenue, accounted for about $393 billion of this total. However, due to the type of the activity addressed by this rule, OSHA modeled only a small fraction of establishments in the affected industries as performing construction activities in confined spaces and bearing the associated compliance costs in a given year.[32]

OSHA updated the PEA estimates of before-tax profit rates in Table IV–3 using more recent corporate balance-sheet data from the Internal Revenue Service's *Corporation Source Book* (IRS, 2013). This is a more recent edition of the same source of data used in the PEA. For each of the years 2003 through 2007, the Agency calculated profit rates as the ratio of total receipts to net income by NAICS group, and averaged profit rates across the five-year period (2003–2007). Since some data provided by the IRS were not available at disaggregated levels for all industries and profit rates, OSHA used data at more highly aggregated levels as a proxy for such industries—that is, where data were not available for each six-digit NAICS code, OSHA used corresponding four- and five-digit NAICS codes, as appropriate.

Table IV–4 presents profile data for firms defined as small entities by the Small Business Administration (SBA),[33] and Table IV–5 presents profile data for very small entities, defined as firms with fewer than 20 employees. Table IV–6 presents OSHA's estimated compliance rates for key provisions of the final standard, which it discusses in Chapter 6 of this FEA. Table IV–7 presents the wage rates, in 2009 dollars, for the labor categories used in OSHA's cost analysis, while Table IV–14 in Chapter 6 of this FEA presents other unit-cost data used in the analysis.

[32] Only some construction projects involve entry into confined spaces.

[33] OSHA converted revenue cutoffs for small business designation to the closest employee number cutoffs so that it could apply available business census employment numbers.

TABLE IV–2—SUMMARY STATISTICS ON MODELED WORKER ENTRIES INTO CONFINED SPACES, BY TYPE OF CONSTRUCTION ACTIVITY AND PROJECT SIZE

Project category	Total number of projects	Total number of projects with confined spaces	Average number of confined spaces per project			Total number of confined spaces	Average number of workers in an entry team	Number of entries into confined spaces per project	Total entries into confined spaces, all projects	Number of worker entries into confined spaces per project	Total worker entries into confined spaces, all projects	Number of worker-hours in confined spaces per project	Total worker hours all projects [a]
			Existing	New	All								
Commercial and Public Buildings:													
Small Project	13,931	3,483	2	2	4	13,931	2	8	27,862	16	55,724	32	111,448
Medium Project	4,328	3,246	5	10	15	48,690	2	57	185,022	134	434,964	605	1,962,207
Large Project	852	724	5	10	15	10,863	2	57	41,279	134	97,043	605	437,779
Warehouses:													
Small Project	2,609	130	2	0	2	261	2	12	1,565	18	2,348	72	9,392
Medium Project	4,409	220	0	2	2	441	2	4	882	7	1,543	25	5,511
Large Project	462	23	0	2	2	46	2	4	92	7	162	25	578
Health Facilities and Laboratories:													
Small Project	2,332	117	5	0	5	583	2	29	3,381	77	8,978	294	34,310
Medium Project	4,419	442	4	4	8	3,535	2	13	5,745	22	9,722	65	28,724
Large Project	643	129	4	4	8	1,029	2	13	1,672	22	2,829	65	8,359
Detention Facilities:													
New Construction	163	147	1	14	15	2,201	2	43	6,308	90	13,203	87	12,763
Athletic and Entertainment Facilities:													
All Projects	1,378	69	1	6	7	482	2	24	1,654	46	3,169	66	4,547
Airline Terminals:													
New Construction	59	53	1	14	15	797	2	43	2,283	90	4,779	87	4,620
Aircraft Service:													
All Projects	295	30	0	5	5	148	2	36	1,062	72	2,124	19	551
Auto, Bus, and Truck Service:													
Small Renovation	10	2	0	2	2	4	1	2	4	2	4	3	6
Major Renovation	20	12	0	8	8	96	1	16	192	22	264	92	1,104
New Construction	87	87	0	18	18	1,566	1	46	4,002	77	6,699	362	31,494
Residential Housing:													
Small Project	1,004,721	25,118	0	1	1	25,118	1	3	612	3	612	3	612
Medium Project	3,204	801	0	2	2	1,602	2	6	4,806	10	8,010	14	11,214
Large Project	2,204	882	0	10	10	8,816	2	150	132,240	280	246,848	913	805,195
Apartments, Hotels, and Dormitories:													
All Projects	4,258	426	3	12	15	6,387	2	44	18,735	74	31,509	140	59,612
Streets and Highways:													
Repair Storm Drain/Sewer Local Street	11,893	1,784	4	5	9	16,056	2	17	30,327	29	51,735	113	202,181
Install New Storm Drain/Sewer System	8,325	2,914	10	7	17	49,534	2	321	935,314	544	1,585,080	2,764	8,053,119
Lane Expansion on Major Interstate	3,568	1,784	15	13	28	49,952	2	721	1,286,264	1,463	2,609,992	6,765	12,068,165
Bridges:													
Small Project	952	952	0	46	46	43,792	3	442	420,784	1,324	1,260,448	1,988	1,892,576
Medium Project	2,011	1,006	0	96	96	96,528	3	742	746,081	2,524	2,537,882	2,388	2,401,134
Large Project	808	404	0	196	196	79,184	3	1,342	542,168	4,924	1,989,296	3,188	1,287,952
Dams and Reservoirs:													
Small Project	208	10	1	1	1	10	2	2	21	4	42	32	333
Medium Project	468	164	2	0	2	328	4	40	6,552	160	26,208	640	104,832
Large Project	48	24	0	3	3	72	17	810	19,440	15,300	367,200	46,800	1,123,200
Storm Sewers and Flood Control:													
Small Project	2,489	2,489	21	2	23	57,247	1	26	64,714	26	64,714	80	198,290
Medium Project	350	350	0	59	59	20,650	1	437	152,950	460	161,000	598	209,300
Large Project	59	59	0	193	193	11,387	1	446	26,314	478	28,202	666	39,294
Sewer, Water, and Waste Treatment Plants:													
Small Renovation	2,310	578	4	20	24	13,860	1	69	39,848	88	50,820	280	161,411
Major Renovation	1,012	708	0	34	34	24,086	1	94	66,590	126	89,258	395	279,641
New Construction	1,179	1,179	0	58	58	68,382	2	163	192,177	229	269,991	743	875,408
Tanks:													
Minor Installation/Renovation (Small Contractor)	540	216	0	6	6	1,296	1	9	1,944	9	1,944	5	1,116
Minor Installation/Renovation (Medium Contractor)	294	176	0	9	9	1,588	1	139	24,520	163	28,753	340	59,888
New Construction/Major Renovation (Large Contractor)	147	118	0	11	11	1,294	4	389	45,746	1,421	167,110	5,364	630,748
Hydro-Electric Power Plants:													
Small Project	7	1	5	0	5	5	1	84	88	164	172	656	689
Medium Project	10	8	6	0	6	48	2	48	384	96	768	384	3,072
Large Project	1	1	18	0	18	16	3	433	390	1,012	911	4,048	3,643
Other Power Plants:													
Small Project	49	0	0	0	0	0	0	0	0	0	0	0	0
Medium Project	119	95	11	0	11	1,047	5	252	23,990	1,304	124,141	4,035	384,132
Large Project	92	87	7	0	7	612	18	604	52,790	3,590	313,766	15,880	1,387,912
Electric Substations:													
Small Project	34	31	2	1	3	92	2	22	673	44	1,346	176	5,386
Medium Project	107	102	4	3	7	712	2	138	14,028	276	28,055	1,104	112,222
Large Project	13	12	4	3	7	86	2	138	1,704	276	3,409	1,104	13,634

TABLE IV–2—SUMMARY STATISTICS ON MODELED WORKER ENTRIES INTO CONFINED SPACES, BY TYPE OF CONSTRUCTION ACTIVITY AND PROJECT SIZE—Continued

Project category	Total number of projects	Total number of projects with confined spaces	Average number of confined spaces per project			Total number of confined spaces	Average number of workers in an entry team	Number of entries into confined spaces per project	Total entries into confined spaces, all projects	Number of worker entries into confined spaces per project	Total worker entries into confined spaces, all projects	Number of worker-hours in confined spaces per project	Total worker hours all projects [a]
			Existing	New	All								
Natural Gas Plants:													
Small Upgrade	4	3	0	2	2	7	1	2	7	2	7	4	13
Major Renovation	4	3	0	8	8	27	12	64	218	768	2,611	4,608	15,667
New Construction	8	7	8	28	36	265	12	728	5,358	8,728	64,238	24,135	177,631
Space Facilities:													
Small Project	37	37	0	15	15	555	1	43	1,591	54	1,998	196	7,252
Medium Project	1	1	0	27	27	27	1	78	78	95	95	342	342
Large Project	1	1	0	44	44	44	1	126	126	152	152	572	572
Manufacturing Facilities:													
Major Renovation	1,204	0	0	0	0	0	0	0	n/a	0	n/a	0	n/a
New Construction	1,067	107	0	2	2	213	11	51	5,442	1,001	106,807	24,000	2,560,818

[a] Data in this column rounded to the nearest whole hour.
n/a = not applicable (no confined spaces in this category).
Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

TABLE IV–3—PROFILE OF INDUSTRIES AFFECTED BY THE FINAL STANDARD ON CONFINED SPACES IN CONSTRUCTION

NAICS	Industry	Total number of firms in industry	Total number of establishments in industry	Total employment in industry	Estimated annual number of projects with confined spaces	Estimated number of establishments affected annually
221310	Water Supply and Irrigation Systems	3,579	4,068	33,017	66	65
236115	New Single-Family Housing Construction (except Operative Builders).	61,262	61,613	282,851	1,340	1,321
236116	New Multifamily Housing Construction (except Operative Builders).	4,319	4,373	46,634	1,482	883
236118	Residential Remodelers	99,592	99,791	355,134	13,542	9,602
236210	Industrial Building Construction	3,858	3,963	96,918	107	106
236220	Commercial and Institutional Building Construction.	41,282	42,369	670,043	9,021	6,408
237110	Water and Sewer Line and Related Structures Construction.	13,679	13,872	206,899	3,980	2,765
237130	Power and Communication Line and Related Structures Construction.	5,099	5,750	196,223	341	341
237310	Highway, Street, and Bridge Construction	10,953	11,746	323,289	8,843	4,275
237990	Other Heavy and Civil Engineering Construction.	5,200	5,392	91,545	1,598	965
238190	Other Foundation, Structure, and Building Exterior Contractors.	5,701	5,720	45,035	2,680	1,182
238210	Electrical Contractors and Other Wiring Installation Contractors.	79,011	80,172	825,169	2,680	2,680
238220	Plumbing, Heating, and Air-Conditioning Contractors.	99,374	100,806	1,012,541	2,935	2,934
238310	Drywall and Insulation Contractors	21,785	22,458	320,238	2,680	2,284
238910	Site Preparation Contractors	41,251	41,517	331,237	255	255
	Total	495,945	503,610	4,836,773	51,551	36,066

NAICS	Industry	Revenues ($ thousand)	Average revenues per firm ($ thousand)	Profit rate (percent)	Estimated profits ($ thousand)	Average profit per firm ($ thousand)
221310	Water Supply and Irrigation Systems	$7,999,900	$2,235	5.89	$471,431	$132
236115	New Single-Family Housing Construction (except Operative Builders).	103,600,723	1,691	4.53	4,692,648	77
236116	New Multifamily Housing Construction (except Operative Builders).	24,939,736	5,774	4.53	1,129,658	262
236118	Residential Remodelers	75,344,805	757	4.53	3,412,781	34
236210	Industrial Building Construction	26,486,027	6,865	4.53	1,199,698	311
236220	Commercial and Institutional Building Construction.	392,958,284	9,519	4.53	17,799,246	431
237110	Water and Sewer Line and Related Structures Construction.	51,808,802	3,787	5.98	3,099,719	227
237130	Power and Communication Line and Related Structures Construction.	35,528,777	6,968	5.98	2,125,685	417
237310	Highway, Street, and Bridge Construction	112,052,152	10,230	5.98	6,704,076	612
237990	Other Heavy and Civil Engineering Construction.	24,090,901	4,633	5.98	1,441,358	277
238190	Other Foundation, Structure, and Building Exterior Contractors.	7,085,701	1,243	4.58	324,258	57
238210	Electrical Contractors and Other Wiring Installation Contractors.	129,184,454	1,635	4.54	5,864,637	74
238220	Plumbing, Heating, and Air-Conditioning Contractors.	167,754,151	1,688	3.86	6,470,472	65
238310	Drywall and Insulation Projects	42,281,365	1,941	4.58	1,934,891	89
238910	Site Preparation Contractors	67,939,838	1,647	4.77	3,243,144	79
	Total	1,269,055,615	2,559	4.72	59,913,701	121

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

TABLE IV–4—PROFILE OF SBA-DEFINED SMALL ENTITIES WITHIN INDUSTRIES AFFECTED BY THE FINAL STANDARD ON CONFINED SPACES IN CONSTRUCTION

NAICS	Industry	Total number of firms in industry-size grouping	Total number of establishments in industry-size grouping	Total employment in industry-size grouping	Estimated annual number of projects with confined spaces	Estimated number of establishments affected annually
221310	Water Supply and Irrigation Systems	3,579	4,068	33,017	66	18
236115	New Single-Family Housing Construction (except Operative Builders).	61,065	61,125	241,095	953	953
236116	New Multifamily Housing Construction (except Operative Builders).	4,208	4,218	31,694	828	728
236118	Residential Remodelers	99,571	99,657	347,579	12,848	9,468
236210	Industrial Building Construction	3,687	3,699	33,998	24	24
236220	Commercial and Institutional Building Construction.	40,279	40,424	415,362	4,463	4,463
237110	Water and Sewer Line and Related Structures Construction.	13,348	13,379	140,854	2,272	2,272
237130	Power and Communication Line and Related Structures Construction.	5,012	5,121	84,488	112	112
237310	Highway, Street, and Bridge Construction	10,205	10,255	134,875	2,784	2,784
237990	Other Heavy and Civil Engineering Construction.	5,001	5,011	45,364	584	584
238190	Other Foundation, Structure, and Building Exterior Contractors.	5,638	5,650	35,003	1,763	1,112
238210	Electrical Contractors and Other Wiring Installation Contractors.	77,933	78,115	558,977	1,446	1,446
238220	Plumbing, Heating, and Air-Conditioning Contractors.	98,267	98,468	727,726	1,722	1,722
238310	Drywall and Insulation Projects	21,264	21,304	176,689	1,130	1,130
238910	Site Preparation Contractors	40,840	40,900	257,517	169	169
	Total	489,841	496,340	3,247,574	31,116	26,985

NAICS	Industry	Revenues ($ Thousand)	Average revenues per firm ($ Thousand)	Profit rate (%)	Estimated profits ($ Thousand)	Average profit per firm ($ Thousand)
221310	Water Supply and Irrigation Systems	$2,510,882	$713	5.89	$147,965	$ 42
236115	New Single-Family Housing Construction (except Operative Builders).	76,651,638	1,255	4.53	3,471,975	57
236116	New Multifamily Housing Construction (except Operative Builders).	15,147,671	3,600	4.53	686,122	163
236118	Residential Remodelers	73,283,645	736	4.53	3,319,420	33
236210	Industrial Building Construction	10,421,351	2,827	4.53	472,040	128
236220	Commercial and Institutional Building Construction.	199,388,653	4,950	4.53	9,031,411	224
237110	Water and Sewer Line and Related Structures Construction.	32,860,609	2,462	5.98	1,966,049	147
237130	Power and Communication Line and Related Structures Construction.	15,098,169	3,012	5.98	903,323	180
237310	Highway, Street, and Bridge Construction	43,921,533	4,304	5.98	2,627,824	258
237990	Other Heavy and Civil Engineering Construction.	10,427,684	2,085	5.98	623,888	125
238190	Other Foundation, Structure, and Building Exterior Contractors.	5,277,635	936	4.58	241,517	43
238210	Electrical Contractors and Other Wiring Installation Contractors.	80,826,690	1,037	4.54	3,669,320	47
238220	Plumbing, Heating, and Air-Conditioning Contractors.	111,089,247	1,130	3.86	4,284,841	44
238310	Drywall and Insulation Contractors	23,969,602	1,127	4.58	1,096,903	52
238910	Site Preparation Contractors	49,943,011	1,223	4.77	2,384,056	58
	Total	750,818,022	1,533	4.74	35,447,057	72

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

TABLE IV–5—PROFILE OF VERY SMALL ENTITIES (FEWER THAN 20 EMPLOYEES) WITHIN INDUSTRIES AFFECTED BY THE FINAL STANDARD ON CONFINED SPACES IN CONSTRUCTION

NAICS	Industry	Total number of firms in industry-size grouping	Total number of establishments in industry-size grouping	Total employment in industry-size grouping	Estimated annual number of projects with confined spaces	Estimated number of establishments affected annually
221310	Water Supply and Irrigation Systems	3,413	3,428	12,676	11	11
236115	New Single-Family Housing Construction (except Operative Builders).	59,376	59,385	185,153	580	580
236116	New Multifamily Housing Construction (except Operative Builders).	3,760	3,761	15,035	271	271
236118	Residential Remodelers	97,291	97,294	258,012	7,105	7,105
236210	Industrial Building Construction	3,225	3,227	16,136	8	8
236220	Commercial and Institutional Building Construction.	33,977	33,992	174,975	1,329	1,329
237110	Water and Sewer Line and Related Structures Construction.	11,242	11,242	57,685	642	642
237130	Power and Communication Line and Related Structures Construction.	3,973	3,976	21,403	17	17
237310	Highway, Street, and Bridge Construction	8,011	8,014	42,634	601	601
237990	Other Heavy and Civil Engineering Construction.	4,321	4,323	18,871	166	166
238190	Other Foundation, Structure, and Building Exterior Contractors.	5,244	5,244	19,607	706	706
238210	Electrical Contractors and Other Wiring Installation Contractors.	71,144	71,156	297,375	544	544
238220	Plumbing, Heating, and Air-Conditioning Contractors.	89,245	89,255	388,409	655	655
238310	Drywall and Insulation Projects	18,832	18,837	77,284	336	336
238910	Site Preparation Contractors	37,690	37,691	139,196	64	64
	Total	450,744	450,825	1,724,451	13,035	13,032

NAICS	Industry	Revenues ($ Thousand)	Average revenues per firm ($ Thousand)	Profit rate (percent)	Estimated profits ($ Thousand)	Average profit per firm ($ Thousand)
221310	Water Supply and Irrigation Systems	$1,814,859	$532	5.89	$106,949	$31
236115	New Single-Family Housing Construction (except Operative Builders).	58,016,827	977	4.53	2,627,902	44
236116	New Multifamily Housing Construction (except Operative Builders).	6,202,571	1,650	4.53	280,949	75
236118	Residential Remodelers	53,069,089	545	4.53	2,403,792	25
236210	Industrial Building Construction	4,744,855	1,471	4.53	214,921	67
236220	Commercial and Institutional Building Construction.	77,231,171	2,273	4.53	3,498,225	103
237110	Water and Sewer Line and Related Structures Construction.	12,423,307	1,105	5.98	743,286	66
237130	Power and Communication Line and Related Structures Construction.	3,755,169	945	5.98	224,672	57
237310	Highway, Street, and Bridge Construction	14,530,558	1,814	5.98	869,363	109
237990	Other Heavy and Civil Engineering Construction.	4,349,517	1,007	5.98	260,231	60
238190	Other Foundation, Structure, and Building Exterior Contractors.	2,892,942	552	4.58	132,388	25
238210	Electrical Contractors and Other Wiring Installation Contractors.	40,914,727	575	4.54	1,857,422	26
238220	Plumbing, Heating, and Air-Conditioning Contractors.	55,526,805	622	3.86	2,141,733	24
238310	Drywall and Insulation Projects	11,280,100	599	4.58	516,203	27
238910	Site Preparation Contractors	25,679,366	681	4.77	1,225,818	33
	Total	372,431,864	826	4.72	17,582,974	39

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

TABLE IV–6—ESTIMATED COMPLIANCE RATES FOR CONSTRUCTION PROJECTS AFFECTED BY OSHA'S FINAL STANDARD FOR CONFINED SPACES IN CONSTRUCTION

[By project category]

Project category	Entrant training (a) (percent)	Information exchange (percent)	Written programs (and formal annual review) (percent)	Classify spaces and issue permits (percent)	Lockout/ tagout (percent)	Mechanical ventilation (percent)	Attendants (percent)	Rescue capability (percent)
Commercial and Public Buildings:								
Small Project	65	75	50	83	83	86	83	N/A
Medium Project	83	75	70	93	86	90	86	79
Large Project	86	80	80	97	93	93	93	86
Warehouses:								
Small Project	62	50	50	69	65	48	100	N/A
Medium Project	62	50	50	69	86	48	100	N/A
Large Project	62	50	50	69	86	48	100	N/A
Health Facilities and Laboratories:								
Small Project	58	65	25	58	58	58	100	N/A
Medium Project	58	65	25	58	58	58	100	N/A
Large Project	58	65	25	58	58	58	100	N/A
Detention Facilities:								
New Construction	100	20	0	45	N/A	93	65	86
Athletic and Entertainment Facilities:								
All Projects	33	75	20	47	37	47	N/A	N/A
Airline Terminals:								
New Construction	100	20	0	45	N/A	93	65	86
Aircraft Service:								
All Projects	34	75	20	48	N/A	48	N/A	N/A
Auto, Bus, and Truck Service:								
Small Renovation	38	20	10	65	N/A	31	N/A	72
Major Renovation	38	20	10	65	N/A	31	N/A	72
New Construction	100	80	80	65	N/A	100	N/A	N/A
Residential Housing:								
Small Project	38	0	0	31	45	83	93	N/A
Medium Project	45	5	0	45	58	83	93	N/A
Large Project	65	30	10	72	83	83	93	N/A
Apartments, Hotels, and Dormitories:								
All Projects	38	75	20	51	41	51	N/A	N/A
Streets and Highways:								
Repair Storm Drain/Sewer-Local Street	82	80	75	96	96	94	97	97
Install New Storm Drain/Sewer System	89	85	85	96	98	96	98	98
Lane Expansion on Major Interstate	93	90	90	96	99	96	99	99
Bridges:								
Small Project	82	0	5	100	N/A	100	100	100
Medium Project	82	0	80	100	N/A	100	100	100
Large Project	82	5	5	100	N/A	100	100	100
Dams and Reservoirs:								
Small Project	52	50	60	72	68	52	100	100
Medium Project	72	50	70	84	76	60	100	N/A
Large Project	88	95	100	100	N/A	100	100	N/A
Storm Sewers and Flood Control:								
Small Project	63	50	50	100	N/A	56	N/A	N/A
Medium Project	93	80	80	100	N/A	100	N/A	N/A
Large Project	93	80	80	100	N/A	100	N/A	N/A
Sewer, Water, and Waste Treatment Plants:								
Small Renovation	63	50	30	93	N/A	63	N/A	85
Major Renovation	63	50	30	93	N/A	63	N/A	85
New Construction	63	50	30	93	N/A	63	N/A	85
Tanks:								
Minor Installation/Renovation (Small Contractor)	60	45	40	85	64	71	67	71
Minor Installation/Renovation (Medium Contractor)	71	60	60	93	71	78	82	78
New Construction/Major Renovation (Large Contractor)	85	80	80	96	82	85	89	85
Hydroelectric Power Plants:								
Small Project	64	90	95	96	100	71	86	N/A
Medium Project	82	95	100	100	N/A	78	100	N/A
Large Project	89	95	100	100	N/A	86	100	N/A
Other Power Plants:								
Medium Project	70	95	80	85	N/A	78	78	74
Large Project	96	95	95	100	N/A	96	100	96
Electric Substations:								
Small Project	96	95	95	96	N/A	96	96	96
Medium Project	96	95	95	96	N/A	96	96	96
Large Project	96	95	95	96	N/A	96	96	96
Natural Gas Plants:								
Small Upgrade	55	40	40	93	100	78	55	55
Major Renovation	70	60	50	100	100	93	N/A	N/A
New Construction	93	90	90	100	N/A	93	100	100
Space Facilities:								
Small Project	93	90	90	100	N/A	93	N/A	N/A

TABLE IV–6—ESTIMATED COMPLIANCE RATES FOR CONSTRUCTION PROJECTS AFFECTED BY OSHA'S FINAL STANDARD FOR CONFINED SPACES IN CONSTRUCTION—Continued

[By project category]

Project category	Entrant training (a) (percent)	Information exchange (percent)	Written programs (and formal annual review) (percent)	Classify spaces and issue permits (percent)	Lockout/ tagout (percent)	Mechanical ventilation (percent)	Attendants (percent)	Rescue capability (percent)
Medium Project	93	90	90	100	N/A	93	N/A	N/A
Large Project	93	90	90	100	N/A	93	N/A	N/A
Manufacturing Facilities:								
New Construction	43	50	50	86	N/A	65	43	43

(a) Current compliance rates for attendant training are nearly identical to the rates for entry training, but may be somewhat lower for some project categories based on estimates provided by CONSAD's 1995 industry expert panel. See CONSAD report (2005) for details.

N/A = Not Applicable (treated as "0%" in calculations).

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

TABLE IV–7—LOADED HOURLY LABOR RATES APPLIED IN OSHA'S COST ANALYSIS OF THE FINAL STANDARD FOR CONFINED SPACES IN CONSTRUCTION

[2009 dollars]

Labor category	Wage rate
Construction supervisor	$42.16
Skilled worker	29.60
General construction employee	24.93
Clerical employee	22.53
Unskilled worker	22.67

Source: Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety, based on data from Bureau of Labor Statistics 2009 Occupational Employment Statistics (OES) Survey.

4. Benefits and Net Benefits

Introduction

The final standard will improve the safety of workers who encounter confined spaces in construction. Confined spaces represent special safety problems because it can be difficult to exit them and it may be difficult to provide aid if an incident occurs in a confined space. There are also certain types of hazards, such as low oxygen levels, accumulations of dangerous gases, and engulfment by water that are particularly likely to be found in confined spaces. As a result, OSHA developed a programmatic approach to assure the safety of workers who must work in the vicinity of confined spaces. This programmatic approach includes provisions for identifying confined spaces and the hazards they may contain; removing the hazards if possible; restricting entry through a permit system where employers cannot remove the hazard; providing appropriate testing and equipment when employees must enter a space; providing for attendants; and arranging for rescue services when emergencies occur in a confined space.

Independent researchers found that a similar system in general industry significantly reduced confined-spaces incidents (Seong and Mendeloff, Assessing the Accuracy of OSHA's Projections of the benefits of New Safety Standards, 2004). The Seong and Mendeloff paper estimates at least a fifty percent reduction in total deaths in two BLS fatality categories: "inhalation in enclosed, restricted, or confined spaces," and "depletion of oxygen in enclosed, restricted, or confined spaces," following the implementation of the general industry rule. These two categories would include a number of kinds of events not covered by the general industry confined space standard, such as inhalation of toxic substances in a room (for example, there are some fatalities every year from using paint or paint strippers in ordinary rooms not adequately ventilated for the purposes of heavy chemical use that nevertheless would not be confined spaces). These kinds of events would be included in the denominator of Seong and Mendeloff analysis but would not be affected by the general industry confined space rule. The Seong and Mendeloff analysis does not attempt to determine if the incidents included in its analysis occurred in a confined space, much less whether the confined spaces rule was being followed. OSHA believes that most of the remaining confined space incidents in general industry are the result of failure to follow that standard. Compliance with the provisions of this standard will reduce accidents, injuries, and fatalities in confined spaces in construction. In particular, the number of injuries and fatalities from causes such as asphyxiation, lethal gas, chemical burns, explosions, drowning, and failed rescue attempts will decline.

For the Preliminary Economic Analysis (PEA), OSHA developed estimates of the benefits associated with the proposed standard by estimating the numbers of fatalities and injuries likely prevented by full compliance, and then applied monetary values to them. Table IV–8 shows the Agency's estimate of the annualized monetary benefits associated with the final standard. The remainder of this section details OSHA's methodology for estimating those benefits.

TABLE IV–8—ESTIMATED VALUE OF ANNUALIZED BENEFITS *

Benefits	Number	Monetized value
Fatalities Avoided.	5.2	$45.2 million. [a]
Injuries Avoided	780	$48.4 million. [b]
Total	.....	$93.6 million.

* In 2009 dollars.

[a] Based on an estimated value of $8.7 million per fatality avoided.

[b] Based on an estimated value of $62,000 per injury avoided.

Estimation of Prevented Fatalities

In the analysis CONSAD Research Corporation (CONSAD) submitted to OSHA and which OSHA reviewed and approved for use in the PEA, the CONSAD researchers used OSHA's Integrated Management Information System (IMIS) and the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) to develop the estimated safety benefits or the number of fatalities and injuries potentially avoided as a result of this standard. Using these sources, CONSAD gathered data on the number of fatal and non-fatal construction-related accidents involving the entry of a confined space by applying a search criterion relevant to both confined spaces and construction work. For data collected from the IMIS database, CONSAD searched for accident reports with construction industry SIC codes of 15, 16, and 17, and then manually reviewed those reports and the narratives of the accidents for factors indicative of an enclosed or confined space-related injury. Such factors included specific

types of environmental hazards, certain events and human errors, as well as the type and source of an injury (see Section 4.1 of the CONSAD Report for a detailed list of the factors; Docket ID: OSHA–2007–0026–0003). Outside of the search criteria, CONSAD also reviewed incident reports where the Agency cited employers for violations of other OSHA standards involving constructions hazards similar to those hazards found in confined spaces; however, OSHA assured that the analysis excluded any cases involving a confined-space entry or cases largely involving work activity covered by OSHA standards—subpart P, subpart S, subpart V or any General Industry standard.

For data collected from CFOI, BLS provided CONSAD with a research data file, procured under a confidentiality agreement, which contained detailed information about work-related fatalities such as employee occupation, industry, worker activity, the type and source of the injury, the event, the location of the accident, as well as a narrative description as to how the injury occurred. CONSAD used the BLS *Confined Space Fatality Study—1992* (BLS, 1992b) as a reference guide for developing the screening criteria used to identify fatal confined-space accidents in the CFOI file since the BLS study also used CFOI data and defined a confined space similar to OSHA's General Industry confined-spaces standard. Figure 4.1 of the CONSAD Report shows a detailed list of the factors used to screen the CFOI data file for confined-space accidents. Like the data used from the IMIS database, CONSAD manually reviewed each CFOI record and eliminated any accident that did not involve a confined space or that involved work activity covered by another OSHA standard.

From the IMIS database, CONSAD reviewed fatality and injury cases that occurred during the period of April 1984 to October 2001, and identified a total of 102 accidents related to confined spaces in construction. These accidents resulted in 84 fatalities and 88 injuries. The complete list of these accidents, along with their narratives, is available in Appendix C.1 of the CONSAD Report. Since the CFOI program did not begin collecting work-related fatality data from all 50 states and the District of Columbia until 1992, any data prior to 1992 was incomplete and, therefore, eliminated from further analysis. As a result, CONSAD only reviewed cases from the CFOI research data file that occurred during the period of 1992 to 2000, identifying a total of 21 accidents related to confined spaces in construction that resulted in a total of 24 fatalities. Due to the confidentiality agreement made between CONSAD and BLS, the details of these cases were not made available for public viewing. In an effort to be consistent with the data-collection process used with the CFOI data, CONSAD limited its analysis of the IMIS fatality and injury data to the period of 1992 to 2000. Using this constraint, the IMIS data yielded a total of 44 accidents related to confined spaces in construction that resulted in 34 fatalities and 39 injuries. Collectively from these two data sources, CONSAD was able to identify a total of 65 accidents related to confined spaces in construction during the period of 1992 to 2000 in which 58 fatalities and 39 injuries occurred.[34]

For the PEA, OSHA used the 58 selected fatalities from the 9-year period of 1992 to 2000 as a baseline to develop an estimate of the number of fatalities and injuries that this standard would potentially prevent. At that time, OSHA estimated that there was an average of 6.44 [35] confined-spaces-in-construction fatalities per year. In Section 4.3 of the CONSAD Report, CONSAD, with the assistance of its safety professional, did a further analysis of the fatality data used to estimate the safety benefits in the PEA and developed a methodology for determining the likelihood of preventing an accident with full compliance with the provisions of this standard. Using the expertise of CONSAD's safety engineer, CONSAD assigned each accident used in the analysis a ranking of 1 to 4, with 1 meaning that it was highly unlikely that the standard would prevent the victim's fatality or injury, and 4 meaning that is was highly likely that the standard would prevent the victim's fatality or injury. CONSAD then translated these rankings into probabilities that the standard would prevent each fatality or injury, using percentages of 5 percent for a ranking of 1, 35 percent for a ranking of 2, 65 percent for a ranking of 3, and 95 percent for a ranking of 4.[36] CONSAD subsequently aggregated the data and drew the conclusion that full compliance with the standard would prevent, on average, 91 percent of the fatalities and injuries.[37] OSHA reviewed and approved the CONSAD analysis and applied this probability prevention rate to the fatality estimate of 6.44 fatalities per year, and estimated in the PEA that full compliance with the provisions of this standard would prevent an estimated 5.9 (rounded to 6) confined-spaces-in-construction fatalities per year.

One commenter, Associated General Contractors of America (AGCA), commissioned a report by Dr. N. Mike Helvacian (ID–222) that made several criticisms of the methodology for estimating prevented fatalities and injuries in the PEA. The report characterized the approach to assigning prevention probabilities to accidents as "a subjective assessment that cannot be reproduced by other safety professionals" (p. 57). Another commenter stated that there was no basis for the estimate that full compliance with the final standard would eliminate 90 percent of fatalities and injuries (ID–100).

In light of such comments, as well as other comments received on the proposed rule and the PEA, OSHA reevaluated the original fatalities used to develop the benefits estimates and revised its values accordingly, as shown in Table IV–8. Based on the IMIS data, the CONSAD analysis showed 44 accidents during the period of 1992 to 2000 (listed in Appendix C.1 of the CONSAD Report, beginning at CONSAD Accident Number 57 and ending with CONSAD Accident Number 100), of which 34 fatalities and 39 injuries were reported.[38] Of those 44 accidents, 27 of them included fatalities listed, along with their narratives, in Table IV–9 below.[39]

Due to a confidentiality agreement made with the Bureau of Labor Statistics, OSHA did not include details

[34] While there is overlap between fatalities and injuries reported in OSHA IMIS and BLS CFOI, using information such as date, time, place, and names of affected individuals and firms allowed the contractor to find the unique incidents reported in each database.

[35] A commenter stated that "it is unknown and not reported how OSHA has determined these figures. Practically, it is unknown how there could be a .44 fatality" (ID–0100). OSHA notes that the estimated number of preventable fatalities can take on decimal values since it is an average value.

[36] CONSAD estimated a maximum effectiveness in preventing fatalities of 95 percent because the researchers believed that even a reasonable effort at compliance would not result in perfect compliance. OSHA believes that this percentage is very conservative as the standard has multiple layers of protection that assure that even fail to comply with some requirements, there are further protections to preventing fatalities and for reducing fatalities to injuries. The standard is unlikely to prevent any fatalities only when the employer completely fails to identify a space as a confined space and, thus, fails to take any of the appropriate measures. However, if there is a complete failure to identify a confined space, the employer will incur no costs.

[37] Thus, the vast majority of the accidents had a rating of 4 and a 95 percent probability of prevention.

[38] Note that an accident could involve several workers, with some injured and some killed.

[39] Table IV–9 only provides the narratives of the fatalities (with injuries omitted) shown in Appendix C.1 of the CONSAD Report; the CONSAD accident number listed for each accident in the table refers to the location of the narrative for that accident in the report.

of the accidents gathered from the CFOI database in the PEA or this FEA. However, the CONSAD report provides detailed description of the methodology used to collect construction-related accidents involving confined-space entries from the CFOI database; OSHA made this description available for public viewing and commenting in the docket under Docket ID: OSHA–2007–0026–003.

OSHA still believes that CONSAD's analysis of the number of accidents that would be prevented by the standard given full compliance is reasonable. First, no existing standard provides a comprehensive approach to confined spaces in construction. There is an existing construction standard requiring employers to train employees in confined-space hazards. However, this existing standard does not specify what constitutes a confined space, nor does it specify the contents of the training that would serve to prevent fatalities or injuries due to confined-space hazards. There are also rules governing specific hazards, such as immediately dangerous to life and health (IDLH) atmospheres and hazardous gases, but OSHA did not adapt these rules to the specific circumstances of confined spaces; therefore, these rules are unlikely to provide adequate protection to workers when they encounter the hazards within confined space. As demonstrated by the number of fatalities and injuries between 1992 and 2000, and confirmed by the supplemental data indicating that the fatalities and injuries continued to mount in more recent years, the existing rules have not been effective in preventing confined-space fatalities in construction. OSHA shares the belief of the ACCSH, as well as the other industry representatives who recommended that OSHA conduct this rulemaking, that a rule specific to confined spaces in construction could prevent these fatalities in a way that existing rules do not.

Table IV–9 shows fatalities occurring as a result largely of atmospheric hazards—either insufficient oxygen or the presence of lethal gases, particularly carbon monoxide or hydrogen sulfide—all of which this standard would prevent. This standard also could prevent fatalities that resulted from construction-related explosions or fires. In addition, a number of the fatalities were the result of would-be rescuers entering a confined space to assist another employee and succumbing to the same hazard, a result this standard would prevent.

Perfect compliance with the final standard would prevent all of these fatalities in several ways. First, identification of confined spaces would trigger the need for analysis and testing for possible hazards, as well as restrictions to prevent unauthorized entry. To the extent employers find hazards but cannot remove them, a system of controls would go into place. This system would prevent casual entry into confined spaces, such as occurred in CONSAD accident number 76 and entry by an employee working alone as occurred in the accidents with CONSAD accident numbers 72 and 84.[40] When entry was necessary, there would need to be appropriate and continuous testing, and employers would have to install ventilation to remove the atmospheric, or explosion and fire, hazards, or provide appropriate PPE. Better data sharing also may prevent some accidents, such as accident number 92. These factors would prevent most fatalities resulting from to atmospheric or explosion hazards.

To the extent these measures failed, the final standard also includes provisions for rescue, and prohibitions against unauthorized rescue entries. Rescue provisions may not prevent all fatalities that result from hazards such as explosions, but they can be crucial when atmospheric hazards are present. Adequate rescue might prevent fatalities that do not result in instant death. For example, quick withdrawal of workers from an explosive atmosphere or workers suffering from asphyxiation (followed by adequate first-aid measures) could prevent many fatalities. The rescue provisions would also prevent fatalities due to entry of inadequately equipped rescuers, either by removing the need for entry (providing non-entry rescue capability) or by assuring that the rescuers have adequate equipment for entry. Such rescue-related fatalities occurred in accidents 72, 84, and 97, and nearly occurred in several other accidents such as accident number 92.

In addition to atmospheric hazards, Table IV–9 shows a few other types of hazards. These include drowning and physical hazards such as dislodged plugs. The provisions for upstream-warning systems might prevent some of these drownings. Several of the accidents involved physical hazards posed by pipe plugs (or exposure to the physical hazards only temporarily restrained by the pipe plug); the requirements in the final standard to remove or isolate physical hazards through physical barriers or other means, rather than temporarily controlling the physical hazards, would eliminate employee exposure to such hazards during a confined-space entry and prevent some of these drownings. For example, having water bypass an area, rather than relying on a plug to hold the water, would prevent some of these accidents. The ability to quickly remove an injured employee with a retrieval line would also prevent a fatal accident in some cases. In many cases, better hazard awareness, compliance with permit-program requirements that prohibit entry when hazards are present, and the use of retrieval lines and other rescue procedures would make a difference.

Based on this review, OSHA believes that CONSAD's estimate that the standard would prevent 91 percent of the confined-space fatalities in their database seems reasonable. In almost all cases, multiple provisions would, if fully followed, completely prevent the fatalities. However, this estimate is in some senses a maximum estimate of the effectiveness of the standard. The estimate assumes full compliance, and OSHA's experience in general industry shows that perfect compliance with a similar standard was not achieved.[41] It is also possible, though none of the accidents examined illustrate this phenomenon, that an employer might have confined space incident even when in compliance with the standard due to an unanticipated equipment failure (such as an air hose developing leaks) or gross human error (such as an attendant falling asleep). However, not a single incident OSHA has examined occurred in a situation in which an employer was in compliance with the provisions of the standard.

In this Final Economic Analysis (FEA), OSHA revised its estimates with the same methodology used in the PEA, but also added supplementary data (*i.e.*, Table IV–10, described later in this section) whereby the Agency used new data to address a commenter's point and to confirm the continuing validity of the original data.

Several commenters questioned generally whether OSHA properly included the accidents used to estimate benefits in the PEA, but did not point

[40] Hereafter, this discussion will refer to all incidents by their CONSAD accident numbers.

[41] Seong and Mendeloff (2004) have found that past OSHA safety regulations' effectiveness at reducing occupational hazard-related mortality has been substantially lower than estimated by OSHA. It should be noted that (1) OSHA is forecasting effectiveness with full compliance and Seong and Mendeloff measured effectiveness given actual compliance, and (2) OSHA uses a fundamentally different approach to estimating benefits to this (and most other) safety standards than was used in the analyses the Seong and Mendeloff study reviewed. Nevertheless, this study potentially provides empirical support for the characterization of 91 percent as an upper bound in terms of the benefits that will actually be realized.

to any specific accidents that they would remove from the list of IMIS fatalities provided in the public record of this rulemaking. One of these commenters, the Associated General Contractors of Texas—Highway, Heavy, Utilities and Industrial Branch (AGCT), stated that OSHA did not specify the industry sectors in which the fatalities and injuries occurred (ID–0124).

AGCT also asserted that "most potential exposures to confined space hazards in the construction industry occur in connection with excavation operations," and that other standards adequately address these hazards (ID–124). Another commenter stated that the PEA included accidents in trenches, while the proposed standard excluded trenching work (ID–035). In response, OSHA notes that the proposed standard did not apply to non-sewer construction work regulated by 29 CFR part 1926, subpart P—Excavations. However, the proposed standard applied to sewer work that fell under subpart P and, therefore, the inclusion of some accidents in trenches was consistent with the scope of the proposed rule. Final § 1926.1201(b) eliminates the distinction between non-sewer construction work and other construction work; the final standard clearly states that it does not apply to work regulated by 29 CFR part 1926, subpart P. As a result, the FEA does not include the costs and benefits associated with accidents occurring in trench-related activities unless they also involve confined spaces other than the trench (*e.g.*, a pipe placed inside the trench).

In addition, AGCT asserted, without support, "Most sewer related fatalities involve municipal workers who are not covered by OSHA standards" and expressed concern that it would be unfair and improper for OSHA to include benefits to municipal workers not covered by OSHA standards (ID–124). AGCT did not, however, point to any examples in the IMIS fatality data on the record that involved municipal workers. OSHA reexamined the 1992–2000 IMIS data and did not find any indication that these examples involved fatalities of municipal workers. Moreover, while AGCT's assertion may hold true with respect to the normal maintenance activities in sewers typically performed by municipal workers, AGCT did not distinguish in its comments between municipal-worker fatalities resulting from sewer work performed as part of construction and normal maintenance activities. To the contrary, it is OSHA's understanding that private contractors perform most sewer-construction activities.

Another commenter, Edison Electric Institute, stated that the analysis did not explain the basis for determining how the included accidents involved construction work, and that the analysis should exclude "public sector" work (ID–210, Tr. pp. 98–100). OSHA limited the accidents that served as the basis of the benefits analysis in the PEA to construction work based on the industry code of the employer of the worker involved in the accident. The final standard covers employers subject to OSHA enforcement authority and engaged in construction activity not covered by 29 CFR part 1926, subparts Y—Commercial Driving Operations, P—Excavations, or S—Underground Construction, Caissons, Cofferdams, and Compressed Air, so the final standard covers "public sector" work only to the extent that such work is within OSHA's enforcement authority. To the extent that "public sector" work means work conducted by municipal employees, OSHA refers to its response in the previous paragraph.

In response to these criticisms, OSHA reviewed the fatalities in the CONSAD IMIS database with respect to the issue of whether a construction standard would cover those accidents. First, the standard would cover municipal workers in state-plan states. However, there is not a single instance in Table IV–9 that identifies a municipal worker as a fatality. As CONSAD reported, all fatalities were for firms in a construction SIC code, and not for firms in a local government SIC code. Some commenters may believe, incorrectly, that contracted construction work funded by a municipality in a non-state plan state is not subject to OSHA standards; if the work involves an employee of a private-sector employer, that employer is subject to OSHA standards regardless of whether or not a local government funds the work.

OSHA then examined whether the general industry standard or any other OSHA standards covered the fatalities. It is difficult to determine coverage from the IMIS descriptions alone, so OSHA examined what standards it cited at the time of the fatality investigation. Even this approach may be unreliable because there may be a citation for a violation associated with a fatality inspection that did not involve a violation that directly contributed to the fatality. OSHA found that only two fatality accidents (89 and 99) had any citations under general industry standards. Absent a clear indication of a causal link between the general industry work cited and the fatality, OSHA is reluctant to remove these accidents. Moreover, even if these fatalities were the result of general industry activity, OSHA believes that it should include these two fatalities as prevented by the construction standard because it is possible that the employer believed the activities constituted construction work and, therefore, not covered by the general industry standard. With the promulgation of this final rule, it will now be clear that all confined spaces are subject to an OSHA standard, and that similar precautions apply to these spaces.

With respect to excavations, OSHA found only three accidents in which it cited the excavation standard (66, 80, and 86). However, OSHA believes that in all three cases, the fatality occurred in a confined space. The accident investigator identified the worksite in Accident 66 as a confined space. Accident 80 describes an entry into a manhole, which normally means a confined space. Accident 86 describes the activities as "finish up work," implying the excavation phase of the project was complete when the accident occurred.

Several of the accidents involved underground activities, so OSHA examined the accidents for citations to subpart S, OSHA's underground construction standards. OSHA did not find any such citations and, therefore, did not exclude any accidents on that basis.

As a result of the decision, discussed in the cost analysis in this FEA, to exclude costs in state-plan states that adopted some provisions of a confined-spaces standard for construction, OSHA examined whether any of the fatalities involved citations to a state confined-spaces-in-construction standard. OSHA found two such cases—Accidents 67 and 82. Accident 67 occurred in Alaska, which has a comprehensive confined-space-in-construction standard that included almost all of the provisions in this final confined-space standard. OSHA decided not to include this fatality in the list of fatalities that this standard would prevent given full compliance with the rule. Accident 82, however, occurred in a state that required only mechanical ventilation of confined spaces, and no other provisions of this OSHA standard. OSHA believes that a full confined-space program compliant with this standard would prevent this accident, while a simple ventilation requirement would not.

TABLE IV–9—CONFINED SPACES IN THE CONSTRUCTION INDUSTRY
FATAL ACCIDENTS AND INJURIES—1992–2000

[As listed in the Consad report]

Consad accident No.	Year	Industry SIC code	Type of confined space	Number of reported fatalities	Inspection/ activity No.
57	1992	1623	sewer/pipe/manhole	1	109472456

Description of Accident:
At approximately 11:30 a.m. on April 16, 1992, Employee #1 entered a 15 ft. 9 in. deep manhole that was part of a new sewer line installation project in order to plug two sewer lines with wing nut plugs. Employee #2 and a third employee were at the top of the manhole watching as Employee #1 entered the hole and inserted one plug near the top, then proceeded down the ladder to the bottom to install the second plug, which took approximately 4 minutes to install. Employee #1 then stated he was hot, started up the ladder, and fell unconscious to the floor. Employee #2 entered the manhole and attempted to sit Employee #1 upright. Employee #2 then began feeling faint and started up the ladder to exit. A little more than halfway up he passed out and was left hanging from the ladder. The third employee then ran for help. A superintendent tied a rope around himself, held his breath, and rescued Employee #2, who was transported to the hospital, where, after undergoing a blood gas test, he was treated for carbon monoxide exposure. Employee # 1 died from acute carbon monoxide poisoning before he was retrieved from the manhole. The company had no confined space entry procedure in place for this particular job site because they did not consider new manholes to reasonably pose a risk to workers. No measuring equipment was used to detect toxic or combustible gases and oxygen levels. No mechanical ventilation was used. No rescue equipment was available.

61	1992	1799	Other	1	115562290

Description of Accident:
At approximately 7:45 a.m. on October 27, 1992, Employee #1 was preparing to fiberglass the interior surface of a swimming pool that measured 30 ft long and 16 ft wide with a depth of 4 ft at the shallow end and 9 ft at the deep end. Overnight, a water faucet adjacent to the pool had leaked water into the pool. Employee #1 was removing the standing water in the bowl of the deep end. Initially, he used a sponge and bucket to remove the water. Later, he used about 2 gal of acetone to help accelerate evaporation of the remaining water. He then used a non-explosion-proof shop vacuum to vacuum the remaining water-acetone mixture. Switching on the vacuum created a spark that ignited the acetone vapor in the bowl of the pool. The resulting explosion and fire caused second- and third-degree burns on 70 percent of his body. Employee #1 was hospitalized until November 12, 1992, when he died of complications.

64	1993	1623	sewer/pipe/manhole	1	114834930

Description of Accident:
On September 17, 1993, Employee #1, of Dan's Excavating Inc., a laborer on a sewer construction crew, entered a 26 ft deep manhole to check the line sight glass for water levels. After he had climbed to the bottom of the manhole, Employee #1 made a noise as if he were clearing his throat and then started climbing back out. When Employee #1 was 6 to 8 ft from the top he looked up, let go of the ladder, and fell backward to the bottom of the manhole. Employee #1 died of asphyxia. The atmosphere had not been tested before he entered the manhole. When it was later tested at the manhole level from which Employee #1 fell, an oxygen deficiency was found. Citations were issued for serious violations of R408.40121(1), R408.40121(2), and R408.41115(8).

65	1994	1771	sewer/pipe/manhole	1	124771049

Description of Accident:
Employee #1 was applying grout in a manhole. There had been a 20 to 36 in. rubber plug installed into a 36 in. sewer line that entered the manhole in which Employee #1 was working. For some unexplained reason, the rubber plug exploded, hitting Employee #1 and forcing him down the downflow side of the sewer line. Employee #1 died at the scene of severe head injuries.

66	1994	1629	Undetermined	1	107232167

Description of Accident:
Employee #1 entered a confined space with a lighted torch. The atmosphere was not tested and contained an explosive concentration of propane gas. The propane gas exploded, sending the employee approximately 20 feet in the air, and igniting his clothing. Employee #1 sustained 2nd- and 3rd-degree burns over 70 percent of his body. He died of respiratory arrest two days later. A propane torch had been left on in the space overnight and the flame had gone out, allowing propane to accumulate. Citations were issued.

67	1994	1623	Undetermined	1	124078163

Description of Accident:
Employee #1 died of asphyxia when he was directed to enter a confined space without full compliance with confined space standards and associated procedures.

68	1994	1623	sewer/pipe/manhole	1	109054866

Description of Accident:
Employees #1, #2, and #3 were in a dry well modifying sewer mains. Fluids left in the pipe for three months flowed into the work area. The fermenting fluids released hydrogen sulfide gas. Employees #1 and #2 were hospitalized. Employee #1 died of asphyxiation. Employee #2 is in a long term health care facility in Westchester, NY. Employee #3 was treated and released.

TABLE IV–9—CONFINED SPACES IN THE CONSTRUCTION INDUSTRY—Continued
FATAL ACCIDENTS AND INJURIES—1992–2000
[As listed in the Consad report]

Consad accident No.	Year	Industry SIC code	Type of confined space	Number of reported fatalities	Inspection/ activity No.
69	1994	1794	sewer/pipe/manhole	1	110465739

Description of Accident:
At approximately 7:00 a.m. on November 21, 1994, Employee #1 and a coworker, laborers, began removing the rubber bladder plugs from a 48 inch storm sewer drain system to allow the construction site to drain off standing water captured by the blocked line. They climbed into the 10 foot deep manhole D–2, and placed two jointed pieces of 2 by 4s against the end of the metal portion on the rubber bladder plug and the manhole wall to prevent the plug from being swept downstream in the 48 inch storm sewer drain pipe. They then climbed out of manhole D–2. Air pressure was released from the plug installed in the storm sewer drain pipe in manhole D–2 to allow the stored water to pass. Employee #1 told his coworker to release the air pressure from the plug in manhole mixing box D–3, located approximately 71 feet away and upstream adjacent to the flightline. When the coworker arrived at mixing box D–3, it was under water. The employees conversed and the coworker was told to take the air release valve assembly out of the air vent hose to completely deflate the upstream plug. The employees knew this plug was secured by a rope attached to mixing box D–3. They stood around the opening to manhole D–2, and conversed when they noticed the 2 by 4 brace holding the rubber bladder plug in manhole D–2 in the inflow pipe was coming loose. Employee #1 entered manhole D–2 without an access ladder and attempted to shore up the brace by stomping it back into a horizontal position while standing on the lip of the outbound pipe. He was washed down the storm drain and drowned.

70	1995	1623	sewer/pipe/manhole	1	116508169

Description of Accident:
Employee #1 was standing on a ladder while removing the rubber plug of an 8 inch sewer line in a manhole. He fell from the ladder into the bottom of the manhole, which contained waste product. Employee #1 attempted to climb out, but fell backward into the manhole. Employee #1 drowned in the bio-residue that was at the bottom of the manhole.

72	1995	1542	Pit	2	108724915

Description of Accident:
At approximately 7:45 a.m. on November 9, 1995, Employees #1 and #2 were dismantling a scaffold that was approximately 12 ft above an open 45 ft by 60 ft excavation. Employee #1 allegedly fell into the pit on the west side. Employee #2 ran to the ladder on the east side of the pit to help. He collapsed at the bottom of the pit by the ladder. Employees #3 and #4 also went into the pit by the east side ladder. Employee #3 collapsed behind the ladder on a dirt mound about 3 to 5 ft above the bottom of the pit. While descending the ladder, Employee #4 began to feel lightheaded and weak in the knees, and was pulled out of the pit by two Reynolds employees. Two coworkers, who were fire brigade members, also responded to the emergency. One descended the ladder without SCBA and collapsed at the bottom of the pit on top of Employee #2. The other coworker also started down the ladder without SCBA, began to feel lightheaded and weak in the knees, and was pulled out by Reynolds employees. Employees #1 through #3 died of asphyxia and Employee #4 was hospitalized for approximately one month. Argon gas had been used instead of compressed air to operate a pump that removed water from the pit.

76	1996	1623	sewer/pipe/manhole	1	300602943

Description of Accident:
Employee #1 and a coworker were assigned to search for a missing plug in one of several manholes in an active sewer system. They opened three manholes, climbed down 12 ft, and used a flashlight to look in the 15 in. pipes. Employee #1 then went into a fourth manhole, where he was overcome by toxic gases. He died several hours later.

77	1996	1629	sewer/pipe/manhole	1	300947256

Description of Accident:
Employee #1, a laborer, and his foreman arrived at a manhole to open a mechanical valve at the bottom of the manhole. While Employee #1 was removing the manhole cover, the foreman was 5 ft away at his truck getting the air tester. When the foreman turned around to go back to the manhole, he saw the top of Employee #1's head disappear into it. The foreman then looked down into the manhole and saw that Employee #1 was unconscious. The foreman tested the air in the manhole and obtained a reading of 14% oxygen. He immediately called 911, and Employee #1's body was retrieved by the local fire department with the use of SCBAs. OSHA's testing of the manhole showed oxygen levels of between 12 and 14 percent. Tests for carbon monoxide, hydrogen sulfide, and flammable vapors were negative. Tests for carbon dioxide were positive, with a reading of 35,000 ppm.

78	1997	1711	Pit	1	116308453

Description of Accident:
Employee #1 was working at the bottom of a 10 ft deep pit when he passed out. A coworker who went down to rescue him started to feel sick, so he emerged from the pit and called for help. He then reentered the pit with a second coworker, who passed out before Employee #1 could be rescued. The first coworker was again able to escape. Emergency Services arrived and extricated Employee #1 and the second coworker from the pit. Employee #1 died of asphyxia from inhalation of argon gas.

TABLE IV–9—CONFINED SPACES IN THE CONSTRUCTION INDUSTRY—Continued
FATAL ACCIDENTS AND INJURIES—1992–2000
[As listed in the Consad report]

Consad accident No.	Year	Industry SIC code	Type of confined space	Number of reported fatalities	Inspection/ activity No.
79	1997	1794	sewer/pipe/manhole	1	127317493

Description of Accident:
At approximately 11:00 a.m. on March 4, 1997, Employee #1 entered a recently constructed 8 ft deep by 4 ft diameter manhole to retrieve a clod of dirt on the bottom. He was one his way out when he fell back in and lost consciousness. Employee #1 died of asphyxia. He apparently was overcome by high levels of methane gas.

80	1997	1623	sewer/pipe/manhole	1	122227283

Description of Accident:
At approximately 4:30 p.m. on August 4, 1997, Employees #1 through #3 were working on a sewer system project in a residential area. Employee #1 descended into a 12 ft deep manhole to apply jointing compound and to remove some laser sighting equipment. After several minutes, Employees #2 and #3 noticed that Employee #1 had collapsed. They shouted to the foreman, who ran to the manhole, surveyed the situation, and immediately called 911 from his truck. Meanwhile, Employees #2 and #3 entered the manhole to rescue Employee #1. Employee #3 later stated that he did not notice any unusual odors, but that he and Employee #2 began to feel dizzy during their rescue efforts. They lifted Employee #1 to coworkers at the surface, after which Employee #3 climbed out of the manhole and collapsed. Employee #2 tried to ascend the ladder, but collapsed to the bottom of the manhole. Employees #2 and #3 were taken to separate hospitals and treated for carbon monoxide exposure. Employee #1 was taken to the emergency room, where he was pronounced dead. The autopsy report listed the cause of death as carbon monoxide inhalation. The employer had confined space entry procedures in place, but did not implement them. At the time of the accident, there was no rescue equipment near the manhole and testing was not done for toxic or combustible gases prior to the employees' entry. No mechanical ventilation was used for the manhole.

82	1998	1794	sewer/pipe/manhole	1	127298925

Description of Accident:
Employee #1 died of asphyxiation when he entered a sewer bore casing. Employee #1 entered the sewer bore casing when the casing struck a rock and was unable to get out. A second employee also went into the casing but managed to get out.

83	1998	1623	sewer/pipe/manhole	1	301312757

escription of Accident:
A construction crew of four men was tying an old sewer line into the new sewer system. Employee #1 broke a plug within the new sewer line and began to climb up the ladder toward the opening of the manhole. Gas rushed from behind the plug and overcame him, causing him to fall back into the hole. The second employee saw Employee #1 fall back into the manhole. He quickly went down to rescue him. The second employee partially reached the bottom of the hole before he decided to come back up. The two remaining employees eventually went down into the hole. The second employee managed to get out of the manhole and summon help. The Fire Department Rescue Team retrieved the third and fourth employees before they became totally incapacitated. Employee #1 died of asphyxiation. The other three employees were sent to the hospital for medical treatment.

84	1998	1623	sewer/pipe/manhole	2	110040383

Description of Accident:
Employees #1 and #2 were part of a construction crew building an extension sewer line that was to tap into an existing city line. The crew had exposed one side of a manhole in the city sewer line and a subcontractor had core-drilled a hole in it for placement of the new line. Some concrete remained intact after the drilling was completed. Employee #1 was lowered into the manhole using a chain draped over a rock bar. He was immediately overcome by the high levels of hydrogen sulfide. Employee #2 attempted to rescue him but was also overcome by the fumes. Both workers were killed.

85	1998	1623	sewer/pipe/manhole	1	302098892

Description of Accident:
Employee #1 entered a 9 ft deep manhole to apply sealant to the connecting concrete rings. This was the last, and the deepest, of the six manholes he had entered. Shortly after reaching the bottom, Employee #1 was overcome by hydrogen sulfide gas that had collected in the manhole. He was killed.

86	1998	4911	sewer/pipe/manhole	1	301768784

Description of Accident:
Some employees were installing a French drain system to collect water seeping from a slurry pond. The employees were entering the catch basin to do the final touch-up work by riding the bucket of a backhoe down into the basin. One of the employees, a 57-year old supervisor, was engulfed by vapors that were later found to be hydrogen sulfide. He died of inhalation of toxic fumes. Four other employees were hospitalized for exposure to the hydrogen sulfide.

TABLE IV–9—CONFINED SPACES IN THE CONSTRUCTION INDUSTRY—Continued
FATAL ACCIDENTS AND INJURIES—1992–2000

[As listed in the Consad report]

Consad accident No.	Year	Industry SIC code	Type of confined space	Number of reported fatalities	Inspection/ activity No.
89	1999	7699	Tank	1	302710413

Description of Accident:
An employee was painting the interior of a 15,000-gallon water storage tank with epoxy primer paint. An airless spray was being used for this task. An organic vapor air purifying respirator was in use and three small exhaust fans were drawing from the 12-in. pipe openings in the tank. The employee was found dead at the bottom of the section of the tank used for initial filling and settling. There was no confined space program or procedure in place at the time of the incident and the employee was working alone without the knowledge of the supervisor(s). The medical examiner's report stated that death was caused by an overexposure to organic vapors consistent with those found in the paint formulation (MiBK, Toluene, Xylene). The Atlantic City Fire Department Confined Space Rescue Team had measured approximately 3 of the LEL for these vapors at the time they removed the deceased from the tank.

90	1999	1799	Other	1	302558580

Description of Accident:
Employee #1 was spraying Sunflex, a waterproofing substance, inside the bottom half of a 7 ft by 5 ft by 9 ft concrete stoop while the coworker went to their truck to get more insulating boards. When the coworker returned, he found Employee #1 collapsed at the bottom of the stoop. Employee #1 was rushed to the hospital, where he later died.

92	1999	1794	sewer/pipe/manhole	1	303139166

Description of Accident:
Employee #1 entered a new manhole approximately 21 ft in depth and was overcome, lost consciousness, and was unresponsive. Employee #2 entered the manhole in an attempt to rescue Employee #1 and was also overcome and lost consciousness. Two additional co-workers attempt[ed] to rescue Employee's #1 and #2 but became dizzy, disoriented and experienced shortness of breath. These employees were able to exit the manhole. The manhole had been installed approximately two weeks earlier and was placed over an existing and active sewer line which had not yet been tapped. Employee #1 was pronounced dead at the scene and Employee #2 was hospitalized.

95	2000	1731	sewer/pipe/manhole	2	119947521

Description of Accident:
Two employees of an electrical contractor were working in a 7.9-meter-deep sump manhole at a water desalination facility site under construction. An employee of a general contractor found the employees unconscious at the bottom of the manhole. An outside rescue service from a local fire department responded and found the atmosphere in the manhole to contain 8 percent oxygen at the bottom of the sump. The two employees died of hypoxic asphyxia. Post accident evaluations found oxygen levels as low as 2 percent and elevated levels of nitrogen and carbon dioxide. The sump was found to be in contact with warm, moist soil through a series of interconnected perforated pipes designed to drain excess groundwater. It was suspected that biological activity in the surrounding soil consumed the available oxygen and generated excess levels of nitrogen and carbon dioxide.

97	2000	1623	sewer/pipe/manhole	2	303961155

Description of Accident:
At approximately 12:15 p.m. on September 26, 2000, Employees #1 and #2 were trying to unclog a sewer line. Employee #1 entered the north manhole to place a bucket that would catch all the debris coming out of the pipe. Employee #2 was able to release the blockage in the south manhole, and the water moved to the north manhole. Employee #1, who was still there, called for help and Employee #2 ran to his assistance. Both workers succumbed to gas present in the pipe, and died of asphyxia.

98	2000	1771	sewer/pipe/manhole	1	303185839

Description of Accident:
Employee #1 inserted an inflatable plug into a storm sewer pipe located at a street drain so that the pipe could be pumped of water in order to perform concrete work at the other end of the pipe. He was half way in the drain and was pushing on the inflatable plug to check its fit. The plug burst and blew him down an intersecting pipe where he drowned.

99	2000	1799	Other	1	303682223

Description of Accident:
Employees #1 and #2, who worked for a nested maintenance contractor, were finishing the turnaround of the sulfur recovery complex at a refinery. They were removing a 14 in. isolation blind from the overhead inlet of a horizontal receiver vessel. The vessel was part of an amine treating unit that had been emptied, steamed out, and drained a few days before. After several attempts, the overhead piping had been replaced and the blinds had been removed and reinstalled. Employees #1 and #2 were working from a scaffold when they were exposed to strong hydrogen sulfide emissions from the vessel. Employee #1 staggered away, but within minutes had lapsed into unconsciousness and died. Employee #2 managed to escape and reach grade level. He was hospitalized for observation and released with no lasting effects. The vessel had accumulated sour gas from a connected overhead gas line, tied into nearby sulfur trains that were operating at relatively low pressure. The source was a single leaking 12 in. gate valve that had been closed and locked out. Employees #1 and #2 were working without respiratory protection or gas detection equipment. The valve inspection program, lockout/tagout program, and respiratory protections were found lacking. At the time of the accident, the foreman was also overseeing other crews at the site.

TOTAL NUMBER OF FATALITIES: 31

TABLE IV–9—CONFINED SPACES IN THE CONSTRUCTION INDUSTRY—Continued
FATAL ACCIDENTS AND INJURIES—1992–2000
[As listed in the Consad report]

Consad accident No.	Year	Industry SIC code	Type of confined space	Number of reported fatalities	Inspection/ activity No.
TOTAL NUMBER OF FATALITIES PREVENTABLE BY THE CONFINED–SPACES–IN–CONSTRUCTIONS PROVISIONS: 30					

Source: OSHA IMIS database, analyzed by OSHA, Directorate of Standards and Guidance and Directorate of Construction.

OSHA also reviewed the narratives for accuracy. OSHA found duplicate fatalities reported for CONSAD Accident Numbers 65, 69, and 72, and removed those duplicates from the analysis. In this regard, Appendix C.1 of the CONSAD Report erroneously shows two fatalities for accident number 65, two fatalities for accident 69, and three fatalities for accident 72. The IMIS database for these cases, however, reported a total of one, one, and two fatalities, respectively. OSHA then reduced the 34 fatalities cited in the initial IMIS data report to a final total of 30 fatalities for the period of 1992 to 2000 to account for the three duplicative fatalities, in addition to removing the fatality described in CONSAD Accident number 67, discussed previously. OSHA notes that the original CONSAD analysis may not include all confined-space accidents. For example, the supplemental analysis at the end of this chapter found several confined spaces where there were electrical hazards; the CONSAD analysis did not include any electrical hazards. It is possible that the original analysis incorrectly excluded confined spaces when the only hazards were electrical.

Due to a confidentiality agreement with BLS, OSHA could not publish detailed information about the CFOI data used in the PEA, and OSHA no longer has access to the research file containing the data. To account for the possibility of human error of the initial review of the CFOI data, OSHA made a proportionate reduction in the total fatality count of the CFOI data used in the PEA. Applying a factor of 30/34 (derived from the adjusted count for IMIS fatalities due to reporting errors) to the initial CFOI fatality count of 24, the total number of CFOI fatalities decreased to 21.

Therefore, for this FEA, OSHA concluded that a total of 51 construction-related fatalities due to confined-spaces entries occurred during the nine-year period from 1992 to 2000. Full compliance with the provisions of this standard would prevent an average of 5.7 fatalities each year related to confined spaces in construction; applying a probability prevention rate of 91 percent, the standard would prevent 5.2 fatalities each year.

AGCA noted that the results from a survey of 74 of AGCA's members, employing 28,900 full-time workers, showed no fatalities in confined spaces, and only two fatalities in construction, between 2005 and 2007 (p. 59). The finding that 74 employers had no fatalities in confined spaces over a three-year period does not detract from, or contradict, OSHA's analysis. OSHA believes that such a result is perfectly consistent with the estimate that, from 1992 to 2000, there was an average of 5.7 preventable confined-space fatalities per year among the millions of workers engaged in construction covered by this standard.

Another comment from the AGCA report made several points asserting that a standard on confined spaces in construction was unnecessary. First, AGCA claimed that the rate of fatal and serious injuries "in the affected industries" is declining, and, second, that OSHA's analysis is deficient because it does not compare the construction rates with rates across other industries. The report states that "[t]he injury trends have cost and benefit implications for assessing the proposal on a forward looking basis, which are not considered in the OSHA report" (p. 58). In this case, the analysis of confined space incidents for the period 2006 to 2009 show a slight increase, rather than a decline, in the number of fatalities as compared to the original 1992 to 2000 period analyzed for the original PEA. OSHA therefore finds no reason to reduce benefits or costs as result of a long term trend toward safer practices in confined spaces. The report does not support its claim that OSHA's analysis was somehow deficient in not comparing the rates of injury in construction with the rates in other industries, but OSHA notes that construction activities generally have high injury rates. Moreover, contrary to the commenter's assertion that the fatality rate is declining in comparison to the older set of data analyzed in the PEA, when OSHA analyzed newer fatality data from between 2006 and 2009 (see Table IV–10) for the purpose of confirming the result under the older data, OSHA did not observe any decline. Instead, it found the annual fatality rate for confined spaces in construction over this period to be higher than during the earlier period.

The National Utility Contractors Association (NUCA) urged OSHA to model the construction rule on the general industry rule, as OSHA did in this final rule. In this comment, NUCA stated:

> It is also our opinion that there is no sound evidence to support the view that a new and separate standard for construction will reduce the number of confined space injuries and fatalities. * * * Therefore, issuing a new, separate standard for construction will not only create untold confusion, but also an unnecessary burden—with no improvement in safety—on all contractors who have been successfully using the General Industry Standard as a guideline to safe entry into confined spaces.

(ID–075.)

NUCA also suggested the new classification system in the proposed rule would have little benefit in terms of reduced accidents in confined spaces, but did not provide specific data to support their claims (ID–075). Other commenters pointed to the absence of fatalities among employers that complied with the general industry standard when engaged in construction activities (*e.g.*, ID–035 and ID–113).

As discussed extensively in the preamble, this final rule is much more similar to the general industry rule than was the proposed rule, and it includes a number of cost-saving measures not in the proposed rule. For example, this final rule excludes work performed under subparts S and entirely from the scope of the standard and allows suspension of the permit in certain circumstances. At the same time, the final rule for construction also includes several important distinctions and clarifications in comparison to the general industry standard. For example, the new rule defines the term "controlling employer" and shifts some of the duties that the general industry

standard assigns to the host employer to the controlling employer. This difference is important in the many situations, of which there are several reported in the database, involving host employers who need construction work but may not directly run the confined-space program.

This final rule for construction also requires continuous monitoring for atmospheric hazards during permit entries and during entries under the alternative procedures specified in § 1926.1203(e). With the improved technology available today, continuous monitoring involves few costs beyond the cost of the regular monitoring required by the general industry standard. Further, such monitoring is necessary in confined spaces where conditions change as the work progresses, either through the introduction of an unexpected substance into the permit space, as in accidents number 68 and 78, or the substances used as part of the work result in new hazards as in accidents number 89 and 90.

To further evaluate and confirm its finding that this final standard would reduce the number of fatalities and injuries when entering construction-related confined spaces, OSHA added a supplemental table (Table IV–10 shown below) using more recent accident data, and modified its methodology for selecting relevant confined-space fatalities. The Agency did not rely on this data in reaching any of the findings legally required to support this rulemaking, but the Agency concludes that this supplemental analysis confirms the overall validity of the data on which it based those findings.

The Agency examined selected narratives of fatal accidents that occurred in the years 2006 through 2009 and recorded in OSHA's IMIS database. To identify fatal accidents in confined spaces, OSHA conducted a terminology search of fatal accident narratives using a list of several terms appearing in confined-spaces-in-construction work.[42] To limit the analysis to accidents related to construction activities, OSHA identified construction-related accidents by those employers classified under the two-digit Standard Industrial Classification codes of 15, 16, and 17. As with the older data, OSHA also screened the accidents for citations to subparts P (Excavations) and S (Underground Construction). OSHA reviewed the cases and selected only those cases covered by this final standard and that the final standard would, with reasonable certainty, prevent if employer complied fully with its provisions. In sum, OSHA identified 23 records involving 31 fatalities from 2006 through 2009 that met all of the above criteria (construction-related activities; in SIC 15, 16, or 17; involved a confined space covered by this final standard; and were preventable by compliance with the provisions of the final standard). Table IV–10 presents these cases, along with a brief narrative for each case taken verbatim from the IMIS records.

As the narratives demonstrate, these accidents usually resulted from a failure to follow multiple provisions in the final standard. For example, in several of the accidents listed in Table IV–10, workers died or received injuries after entering confined spaces to attempt rescue. These accidents were preventable had employers followed appropriate rescue procedures, provided proper training, posted an attendant to prevent unauthorized entry, or through a combination of these steps, all prescribed by this final standard. In most other examples, the prohibition on entry without a permit program in place would prevent employee exposure to the hazard.

For the purposes of determining how the different provisions of the standard prevent the accidents identified in the supplemental analysis, OSHA grouped the provisions by general purpose. For example, OSHA grouped all provisions related to evaluation and classification of standards into one heading called "Classification and Evaluation," and grouped all of the provisions related to setting up and implementing a permit system under the heading of "Permit System". OSHA used these headings to avoid a confusing list of overlapping and interdependent provisions, and to compare benefits to costs later in this section.

The Agency sometimes attributed an accident to a set of provisions even though it was unclear from the accident abstract whether the employer followed that provision on a voluntary basis. Therefore, although OSHA accounts for baseline compliance in terms of costs, it does not account for baseline compliance in terms of potential monetized benefits. OSHA believes from the descriptions of the fatalities and injuries presented in Table IV–10 that baseline compliance with most provisions, though high when examining compliance across all affected industries, was minimal in the situations in which these accidents occurred. It is unlikely that the accidents detailed in this chapter would occur had the affected firms had a proper confined-spaces program in place. Following some groups of provisions, such as ventilation and hazard isolation, would have assured that the accidents could not have possibly happened.

OSHA also used the term "potentially" in this analysis to describe the prevention of some accidents because, as noted above, some accident descriptions are unclear. The Agency also used the term because some provisions, such as the training and information-exchange provisions, do not directly and automatically prevent accidents, but instead contribute to the likelihood that employers will correctly follow other provisions and, therefore, prevent accidents. In the final section of this chapter, OSHA presents a break-even sensitivity analysis to examine further the number of injuries and fatalities that would need to be prevented for the benefits of this standard to equal its costs.

In some cases, a state had a confined-spaces rule in place at the time the accident occurred. In one accident, the state rule was a comprehensive rule similar to this final rule. OSHA removed this accident from the database. In other cases, the state rule included only some of the provisions in OSHA's final standard. In these cases, OSHA did not list provisions in the OSHA standard that are also mirrored in the state rule, but listed the OSHA provisions not mirrored in the state rule.

In the remainder of this section, OSHA describes the groups of provisions that it used in analyzing accidents, and the criteria for determining whether the provision could potentially prevent the accident. Some accidents involved more than one fatality, and, in these cases, different sets of provisions might be relevant to different fatalities.

Evaluation, Classification, and Notification Provisions: This group includes all provisions related to requirements to identify and classify confined spaces, such as §§ 1926.1203(a) and 1926.1203(b). The evaluation and classification provisions can trigger other employer duties, such as an employer duty to prevent entry under § 1926.1203(c), or to condition entry in accordance with § 1926.1203(d). For the purposes of this analysis, this group includes the provisions of § 1926.1203(c) that require employers to use barriers or other means

[42] The list of search terms included the following: Confined space, hole, pit, bin, boiler, manhole, tank, incinerator, scrubber, pier, sewer, transformer, vault, duct, storm drain, water main, drilled shaft, enclosed, enclosed beam, crawlspace, trench, tunnel, vessel, digester, lift station, cesspool, silo, air receiver, sludge gate, air preheater, step up transformer, turbine, chiller, bag house, mixer, reactor, and cofferdam.

necessary to prevent unauthorized entry to a confined space. Since no other preventive measures would go into effect without such evaluation and classification, OSHA found that these provisions had potentially preventive effects for all accidents examined.

Information-Exchange Provisions: This group includes all provisions related to requirements for host contractors, controlling contractors, and other contractors to exchange information, such as § 1926.1203(h). The accident descriptions are unclear regarding information-exchange activities. OSHA classified an accident as potentially prevented by these provisions if the description indicated the presence of more than one contractor or if the accident took place in an existing structure (mainly sewers) where information about the existing structure would almost certainly be known beforehand. OSHA did not consider the accident potentially prevented by this provision if it took place in a home or in new construction projects, unless there was an indication of multiple contractors present. In those cases, there is not typically a host employer with relevant knowledge about hidden hazards available, but there may be multiple employers present. Because the accident descriptions do not typically indicate whether there were multiple employers on a site, this approach may underestimate the number of multi-contractor sites.

Permit-Program Provisions: This group includes the provisions requiring a permit program or alternative procedures for entry, as well as the requirements for setting up and implementing systems, such as §§ 1926.1203(d), 1926.1203(e), and 1926.1204(a). OSHA determined that these provisions could have a role in potentially preventing accidents in all situations except where the entry took place by explicit orders of a supervisor or where the entry was for rescue purposes. (These two exceptions might be violations of these requirements, but it is unlikely that a permit system could prevent casualties related to rescue entry (though they might prevent the need for such entry) or entries explicitly approved by supervisors.) OSHA also noted situations in which an entry seemed to be unnecessary (such as entries to retrieve dropped items) and, therefore, was extremely unlikely to take place under a permit system with clear prohibitions on unauthorized entry. OSHA determined that all such accidents involving unnecessary entries would be preventable had employers complied with these provisions.

Early-Warning-System and Atmospheric-Testing or -Monitoring Provisions: This group includes all provisions that require or imply the need for atmospheric testing or monitoring, including § 1926.1203(a) (when monitoring is necessary for identification), §§ 1926.1204(b), 1926.1204(c), and 1926.1204(e). OSHA determined that these provisions could have a role in preventing accidents in all situations involving asphyxiation (whether due to lack of oxygen or toxic gasses) or a build-up of explosive vapors. This group also includes the requirement in § 1926.1204(e)(1)(iii) to monitor for non-isolated engulfment hazards, such as liquids flowing through a sewer system. OSHA determined that this provision could prevent accidents in which employees drown or asphyxiate when liquids or other flowables that were not previously in the confined space entered the space in the absence of barriers or other isolation methods designed to contain such hazards.

Ventilation and Hazard-Isolation Provisions: This group includes all provisions that require or imply the need for ventilation, as well as isolation of physical hazards, such as parts of § 1926.1203(e) and portions of § 1926.1204. OSHA included an accident as potentially preventable by these provisions whenever the accident occurred as a result of a hazard inside the confined space. For most of these accidents, either ventilation or hazard-isolation measures, such as disabling and locking out electrical hazards temporarily, could prevent the accident. For other accidents, such as some drownings, arranging for the bypass of water or other liquid solutions might have been possible, thereby preventing the accident.

Provisions Requiring an Attendant: This group includes all provisions that require or imply the need for an attendant when someone is inside the confined space. The attendant in most cases has two duties: (1) Assuring that continuous monitoring takes place (if it is appropriate) and warning the person to exit the space if necessary; and (2) conducting an appropriate non-entry rescue. For the purposes of this analysis, OSHA listed an accident as potentially preventable had an attendant been present if there was no notation of another person present when someone entered the confined space. There are many other situations in which the lack of an attendant may have been responsible for the accident because the person present was not continually assessing the conditions inside the permit space or was incapable of conducting a non-entry rescue or summoning rescue or emergency services; however, other provisions are more likely to potentially prevent such accidents.

Rescue-Capability Provisions: This group includes all provisions, such as §§ 1926.1204(i) and 1926.1211, that require the development and implementation of a plan addressing rescue capability and summoning emergency services, with the plan involving non-entry rescue when feasible. For the purposes of this analysis, OSHA listed an accident as potentially preventable by improved rescue capability for (1) all cases of asphyxiation when quick removal of endangered workers from the confined space and prompt treatment were necessary to prevent the fatality, and (2) for other accidents, such as drowning and electroshock, when timely removal and treatment might have an effect. OSHA did not consider this provision to have the potential to prevent deaths resulting from burns, even though it is possible that more immediate treatment or rescue before combustion occurred would mediate or prevent the accident. OSHA also noted under this provision the special, and all too numerous, cases when the rescuer(s) became a fatality.

Training Provisions: This group includes all provisions that require employers to develop and implement training, such as §§ 1926.1207 and 1926.1208. OSHA found that better training could potentially prevent all of the accidents, except for one accident that was preventable using only appropriate physical barriers.

Equipment Provisions: This group includes all provisions that require the employer to (1) provide necessary equipment, such as communication equipment, necessary for attendants to perform their duties (§ 1926.1203(d)(3)), or (2) develop appropriate lighting (§ 1926.1204(d)(5)). For the purposes of this analysis, OSHA listed an accident as potentially preventable by these provisions when employees working together had difficulties communicating or there was an indication of inadequate lighting or general difficulty locating physical hazards before contacting them. There are some provisions in this group that OSHA did not analyze in terms of their potential to prevent accidents. These provisions include requirements for barriers and disposable coveralls. However, OSHA's methods of searching for confined-space accidents could not identify the accidents that these provisions would prevent.

TABLE IV–10—CONFINED SPACES IN THE CONSTRUCTION INDUSTRY
FATAL ACCIDENTS AND INJURIES—2006–2009

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 1
2006	1611	sewer	2	309775443

Description of Accident:
An employee climbed down into a sewer vault to retrieve a tool he dropped and lost consciousness. A second employee entered the sewer vault in an attempt to rescue his co-worker and also lost consciousness. Both employees died.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program (1 of 2 fatalities)
(Not Ventilation and Hazard Isolation; Early Warning System and Atmospheric Testing or Monitoring; or Rescue Capacity because these were already required in the State where the accident took place)
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 2
2006	1623	storm drain	1	308437631

Description of Accident:
Employee #1 and his crew were installing storm drainage pipes in an older neighborhood. During the installation of the drainage pipes, damage had been caused on the existing natural gas pipe lines in the neighborhood. The odor of gas was present prior to the day of the installation, and the local gas company had been contacted to identify and repair the leaks. The smell of gas was still present and noticed by the supervisor, employees and others; however, the supervisor did not contact the gas company to investigate the odor, and to locate the leak. The supervisor also did not remove the employees from the excavation where the gas odor existed, and did not test the atmosphere of the excavation to determine if there was a hazardous atmosphere or condition in the excavation. The supervisor directed Employee #1 to enter the 48-inch diameter drainage pipe line to retrieve a laser surveying machine that was located approximately 90 feet within the pipe line. Natural gas that had escaped from two breaks in the gas line had accumulated within the storm drain pipe line. While Employee #1 was in the pipe line, the natural gas within it ignited. The specific ignition source was not identified. Even though severely burned, Employee #1 was able to exit the storm drain pipe line, and was taken to the hospital. Six days later, he died as a result of his injuries.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring
Attendant
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 3
2006	1623	sewer	1	310350418

Description of Accident:
Three employees were working on a sewer system that was newly installed and not yet in use. A section of the line had been plugged and tested for leakage. Employee #1 entered the sewer vault, which was approximately 15 to 20 feet deep, to remove a plug. Employee #1 collapsed into approximately 6 inches of unidentified liquid at the bottom of the sewer vault. Employee #2 entered the sewer vault to assist Employee #1. Employee #2 also collapsed at the bottom of the sewer vault. Employee #3 attempted to provide assistance to Employees #1 and #2. Employee #3 began to feel ill about halfway down and then decided to emerge from the sewer vault. Fire/EMS Department responded to the scene. Co-workers of the employees attached a hose approximately 19 feet long to an air compressor and used it to blow air into the sewer vault. Employee #2 regained consciousness and was able to assist in rescuing Employee #1 and himself from the sewer vault. All three employees were transported to area hospitals. Employee #1 later died at the hospital. Employees #2 and #3 were treated, hospitalized, and released in the following days.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program
(Not Ventilation and Hazard Isolation, Atmospheric Monitoring, or Rescue capacity because these were already required in the State where the accident took place)
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 4
07	1541	manhole	1	311032809

Description of Accident:
Employee #1, while doing an elevation survey of the invert of a storm water pipe in a manhole, entered the manhole to find the bottom of the pipe. While in the manhole, Employee #1 was overcome due to a lack of oxygen and died. Employee #2 entered the same manhole, and was also overcome. Employee #2 was hospitalized and released the next day.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program (Entry very preventable)
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring Attendant
Rescue Capacity
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 5
2007	1623	lift station	4	307043844

Description of Accident:
The victim was in the process of assisting another company with the replacement of a sump pump in an underground lift station which collected draining and leached water from a construction debris landfill. Three employees of the other company entered the lift station and succumbed to exposure to hydrogen sulfide gas. The victim had entered the lift station in an attempt to assist/rescue the three victims from the other company, and also succumbed to hydrogen sulfide gas. Rescue services arrived at the scene and performed air quality monitoring which revealed that the victim and the three victims from the other company were exposed to concentrations of up to 200 PPM of hydrogen sulfide gas. Body retrievals were initiated at that point. The lift station was determined to be a permit-required confined space. The other company (host employer) had not evaluated the lift station to determine that it was a permit-required space. Both companies had not developed and implemented a written permit space program.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program (3 of 4 fatalities)
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring
Rescue Capacity (Attempted rescue resulted in a fatality)
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 6
2007	1623	manhole	2	310177456

Description of Accident:
Employees #1 and #2 were working in an approximately 7 ft diameter water vault located about 16 ft underground. The vault contained a 12 in. water main and a 4 in. water main that was equipped with a water meter. The vault had been constructed approximately ten days earlier and had sat undisturbed until the day of the accident, when the employees were scheduled to conduct a pressure test of the system. Employee #1, the foreman, went down into the vault to read the meter. When he did not return, Employee #2, a laborer, looked down through the manhole cover and saw Employee #1 laying on the ground. Employee #2 called out to a coworker that Employee #1 was down and then entered the vault through the manhole and climb down the ladder. The coworker came over to the manhole and saw Employee #1 on the ground and Employee #2 hanging upside down, with his leg caught between the ladder rungs. Neither employee responded to the coworker's calls. The coworker also started down the manhole but noticed an overpowering musty odor and abruptly stopped and exited. The Fire Department and paramedics responded to the job site and retrieved Employees #1 and #2, both of whom had died. At the time of rescue the Fire Department's four gas meters measured the oxygen level in the vault at approximately 9.2 ppm. In its referral to OSHA, the Fire Department referenced two workers who succumbed to an IDLH atmosphere.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program (1 of 2 fatalities)
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring
Rescue Capacity (Attempted rescue resulted in a fatality)
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 7
07	1623	manhole	2	310253398

Description of Accident:
Employee #1 and Employee #2 were both asphyxiated when they entered a 12 ft manhole to perform grouting work. Employee #1 entered the 12 ft manhole and collapsed. Employee #2 entered the manhole to help Employee #1 and then Employee #2 collapsed. This was the company's first time performing sewer line work and Employee #1 and #2 entered the space without required testing. The employer did provide a tripod winch system over the manhole with cable attached to rescue harness. In addition, a scott gas detector was used to detect any gases in hole; none was detected. The oxygen level however was 8 near the top of the hole and 3 at or near the bottom of the hole.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit program (1 of 2 fatalities)
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring Provisions
Rescue Capacity (Attempted rescue resulted in a fatality)
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 8
2007	1623	manhole	1	311354807

Description of Accident:
Employee #1 entered manhole to remove line plugs to activate a manhole sewer system, the manhole was 10.5 ft deep. The probable cause of death was H2S poisoning as a result of employee working in a sewer manhole; this is according to the county's forensic science department. The manhole had not been entered and was not monitored for toxicity, oxygen level or explosive levels. No tripod was in-place for emergency retrieval of Employee #1.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring Provisions
Attendant
Rescue Capacity
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 9
2007	1721	crawl space	2	126192012

Description of Accident:
Employee #1, a painting contractor, was hired by the property owner to apply primer over the creosote floor joists. Employee #1 and #2 were working in a crawl space under the bedroom of the residence applying primer to the floor joists. The incandescent work lamp or a broken light bulb ignited the vapors from the primer. The two employees were burned and died. The other employees suffered minor burn injuries. The contributing causal factors: The air in the crawl space was not flushed or purged of flammable vapors and no air testing to determine whether dangerous air contamination or oxygen deficiency existed. Arson and homicide investigators were called to the scene and were investigating the cause of the accident, which appeared to be accidental. The crawlspace was located underneath one of the bedrooms and was measured between 21 in. to 22 in. from the foundation to the floor of the bedroom.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit Program
(Not Ventilation and Hazard Isolation because this was already required in the State where the accident took place)
(Not Early Warning System and Atmospheric Testing or Monitoring because this was already required in the State where the accident took place)
Attendant
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 10
2008	1711	lift station	2	312320666

Description of Accident:

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 10

ployee #1 entered a sewer lift station to check for leaks in the line. Employee #1 was overcome by hydrogen sulfide gas. A second employee entered the station to retrieve Employee #1, and also was overcome by the gas. Both employees died from overexposure to hydrogen sulfide gas.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring Provisions
Rescue Capacity (Attempted rescue resulted in a fatality)
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 11
2009	1623	manhole	1	313122616

Description of Accident:
Employee #3 fell into a manhole and suffered a head injury and was life-flighted to the hospital. Employee #2 became unconscious in a manhole and was rescued and life-flighted to the hospital. Employee #1 entered the manhole to attempt rescue of employee #2 and became unconscious and died before he could be rescued.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring Provisions
Rescue Capacity (Attempted rescue resulted in a fatality)
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 12
2009	1791	tank	1	311964886

Description of Accident:
Employee #1 was found unresponsive on scaffolding in the residential water tank in which he was performing stick welding on the interior overhead of the tank. He was removed from the tank, and emergency services summoned. He could not be revived. The medical examiner determined that core body temperature of employee #1 exceeded 109 degrees Fahrenheit, indicating that the preliminary cause of death was hyperthermia.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit Program
Ventilation and Hazard Isolation (ventilation required beyond the amount needed to address welding fumes)
Attendant
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 13
2009	1794	manhole	1	309620219

Description of Accident:
An employee entered into 18-in. manhole to retrieve part of laser equipment and was overcome by methane and lack of oxygen. He died of asphyxiation.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program (Entry very preventable)
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring Provisions
ttendant
Rescue Capacity
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 14
09	1794	tunnel	1	313553604

Description of Accident:
Employee #1 was inside a 24 inch pipe that ran through a tunnel underneath a highway. Employee #1 was approximately 140 feet inside the pipe when a rain storm flooded the pipe drowning the employee.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Information Exchange
Permit Program
Attendant
Rescue Capacity
Training
Early Warning System

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 15
2006	1711	Crawl space	1	309539559

Description of Accident:
On August 7, 2006, Employee #1, of Mesquite Plumbing Company, entered the crawl space of a house undergoing renovations to insulate a new plumbing fixture that a coworker had installed. During the course of his work he contacted a live wire and was electrocuted.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit program
Ventilation and Hazard Isolation
Attendant
Rescue Capacity
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 16
2006	1623	manhole	1	310345053

Description of Accident:
On September 28, 2006, Employee #1, a construction worker, fell into a concrete manhole structure. He suffered a fractured neck and back. Employee #1 was flown by helicopter to the hospital, where he died.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Equipment (lack of cover or methods of assuring safety when a cover is removed)

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 17
2007	1521	crawl space	1	120205794

Description of Accident:
On July 23, 2007, Employee #1, age 19, and a coworker were reinstalling an electrical outlet into a new bathroom wall after it had been removed from the pre-existing wall. The 120-volt outlet electrical box was energized and lying on the floor. Employee #1 went into a crawl space under the house while the coworker went to the electrical panel and shut off the power to the home. Employee #1 was having trouble seeing in the darkness of the crawl space, and he asked the coworker to turn on the power so he could use a halogen lamp that had a cord running up through the floor and into an outlet in the kitchen. When the coworker turned on the power, this also energized the electric conductors that Employee #1 was wiring in the junction box. He was lying on his back under the floor, on top of the water line for the home. This pipe had been used to ground the electrical system of the house when it was built and Employee #1 was electrocuted when he connected the wires. The coworker, hearing a noise, tried to communicate with Employee #1. When he did not get a response, he again turned off the electricity to the house. The coworker alerted the owner and tried to call 911 on his cell phone, but could not get through. He and the owner tried to call 911 on the house's land line, but it was electrically-based, and so they once again turned on the power to place the call. The owner then cut a hole in the floor, removed Employee #1 from the crawl space, and attempted CPR until paramedics arrived. The coroner stated cause of death was low voltage electrocution.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit Program
Ventilation and Hazard Isolation
Attendant
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 17

uipment (lighting)
escue Capacity

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 18
2007	1741	boiler	1	311213326

Description of Accident:
On December 11, 2007, Employee #1 was part of a crew engaged in stone work at a residential site. To complete the job, they covered the chimney with plastic. Once the plastic was in place, the coworkers went to put away the tools for the night, and left Employee #1 to stitch close [ ] any openings in the plastic covering. The chimney housed the vent for an Ultra 310 boiler system. When the coworkers returned, they found Employee #1, unconscious, in the plastic enclosure. He died of carbon monoxide poisoning.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit Program (Entry very preventable)
(Not Ventilation and Hazard Isolation or Rescue Capacity because this was already required in the State where the accident took place)
Attendant
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 19
2008	1711	crawl space	1	311794093

Description of Accident:
On or about 3:30 p.m. on November 6, 2008, Employee #1, a 31 year-old-male working for Atm Plumbing, was working in a crawl space under a private house. The crawl space was wet from recent rains. Employee #1 was using a manual operated pipe cutter to cut a water pipe when he received an electrical shock and became unconscious. Employee #2 was also under the house using a trouble light to illuminate the work area was not using a GFCI. Unbeknown to Employee #1 the water pipe that he was working on was also used for the electrical grounding sys- m for the house. Employee #2 pulled him out of the crawl space. Paramedics transported Employee #1 to a local hospital where he was pro- ounced dead.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit Program
Ventilation and Hazard Isolation
Attendant
Training
Equipment
Rescue Capacity

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 20
2008	1711	duct	1	311815492

Description of Accident:
On May 21, 2008, Employee #1 was with a crew installing a steel security grate inside the duct system of a 10-ton Trane air conditioning system (Model Number THC120A4RGAOW2B, Serial Number 8044100711L) that was located on a roof. As he crawled into the duct to weld the grate into place, the back of his head contacted an energized heat strip on the air conditioning unit coil. Employee #1 was electrocuted. The electrical power to the air conditioning unit had not been deenergized and locked or tagged out.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit Program
Ventilation and Hazard Isolation
Rescue Capacity
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 21
2008	1742	attic	1	312098551

Description of Accident:

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 21

May 17, 2008, Employee #1 was spraying foam insulation in the enclosed attic space of a two story, single-family home that was undergoing renovations. He had accessed the attic via an aluminum ladder through a hole in the second floor ceiling. A flash fire occurred, killing Employee #1. Inadequate ventilation contributed to the buildup of vapors. The ignition source was not determined.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit Program
Ventilation and Hazard Isolation
Early Warning System and Atmospheric Testing or Monitoring (Work may have caused build-up of vapors)
Attendant
Training

Year	Industry SIC	Type of confined space	Number of reported fatalities	Activity No. 22
2009	1731	crawl space	1	313555591

Description of Accident:
On August 18, 2009, Employee #1 was installing a new direct TV cable. Employee #1 was crawling under the house and came into contact with an energized wire. He was electrocuted.

Provisions That Could Potentially Have Prevented the Fatality:
Evaluation and Classification
Permit Program
Ventilation and Hazard Isolation
Rescue Capacity
Attendant
Training
Total Number of Fatalities: 30

Source: OSHA IMIS database, analyzed by OSHA, Directorate of Standards and Guidance and Directorate of Construction.

For the FEA's supplemental data as shown in Table IV–10, OSHA, as previously noted, carefully reviewed and selected from the IMIS database only those cases determined preventable by full compliance with the provisions of the final standard. As a result, OSHA did not need to apply a probability prevention rate to estimate the number of preventable fatalities. As itemized above, OSHA identified 30 preventable fatalities over the four-year period, 2006–2009, for an average of 7.5 fatalities prevented annually by full compliance with this final standard. This supplemental analysis supports OSHA's conclusions that the problem of confined-space fatalities did not diminish in the construction industry over this period, and that the regulated community still needs the final standard. OSHA does not believe this supplemental analysis is necessary, but believes that it will aid the public in understanding OSHA's conclusions.

It is important to note that the approach used in this estimation is conservative in that there are other fatal events that were likely preventable but not included in the IMIS database. For example, the Bureau of Labor Statistics' Census of Fatal Occupational Injuries for 2011 showed 111 fatalities in construction from exposure to harmful substances or environments, and 123 fatalities from contact with objects and equipment (these numbers include 4 fatalities in new single-family housing construction from contact with objects and 10 fatalities in residential remodeling from exposure to harmful substances or environments). Some fatal injuries that are preventable by the final standard may not appear in the IMIS database because the database only includes accidents involving a fatality or a catastrophe with three or more injuries that result in hospitalization.

Estimation of Averted Injuries

In a 1994 report to OSHA, the Confined Spaces Work Group of the Advisory Committee on Construction Safety and Health (ACCSH) estimated that the ratio of lost time injuries (LTI) to fatalities in confined spaces was approximately 100:1 for general industry and 200:1 for construction (see ACCSH, 1994, pg. 6). In the PEA, OSHA used this range of 100 to 200 LTIs per fatality to estimate the number of injuries prevented by the proposed rule. At the public hearing on the proposed rule, the Edison Electric Institute's representative noted, "There's no explanation or support for the assertion that there has been under-counting of injuries, however, and we cannot discern any basis for multiplying these numbers by 100 and 200" (ID–210, Tr. p.99). As noted above, OSHA explained that those estimates came from the ACCSH report, which was the best available evidence. The commenter did not dispute those numbers or, more importantly, provide any alternatives numbers as its best evidence. Perhaps the commenter mistakenly concluded that OSHA multiplied the IMIS *injury* numbers by 100 and 200; however, the multiplication applied to the numbers of *fatalities*, because OSHA does not have data on the number of non-fatal injuries.

In this FEA, OSHA provided updated estimates of the number of non-fatal injuries involving confined spaces in construction and further clarified the basis for its estimates. As a preliminary matter, the Agency notes again that OSHA's IMIS database, which is the source of information about fatal accidents, does not report most injuries. As noted above, the IMIS database includes only accidents involving a fatality or a catastrophe with three or more injuries that result in hospitalization. Therefore, the IMIS database seldom captures injuries involving accidents that do not result either in a fatality or hospitalization of three or more workers.[43] Because OSHA

[43] The Survey of Occupational Injuries and Illnesses (SOII) produces annual estimates of counts and rates of new workplace injuries and illnesses,

could not find a data source for reliable estimates of non-fatal injuries in confined spaces in construction,[44] OSHA again relied on the expertise of ACCSH for these estimates.

Recognizing the age of the ACCSH Work Groups' LTI estimates of 100:1 and 200:1, OSHA attempted to corroborate these estimates using data from the BLS CFOI and the BLS Survey of Occupational Injuries and Illnesses (SOII). According to BLS,[45] in 2009, there were a total of 4,090 occupational fatalities and 3,277,700 nonfatal occupational injuries for private industry overall, and 834 fatalities and 251,000 nonfatal injuries for the construction industry. Using these estimates of fatalities and injuries, the ratio of injuries to fatalities is 800:1 for all private industries, and 300:1 for the construction industry.

In light of the large injury-to-fatality ratios apparent in the recent CFOI and SOII data, OSHA confirmed that the ratios recommended by the expert ACCSH Confined Spaces Work Group are reasonable and conservative, and used the average of the two ratios (150 injuries per fatality) in this FEA to estimate the number of non-fatal injuries. Calculations relating publicly reported injury-to-fatality statistical data in construction also confirm the reasonableness of the estimates OSHA used.[46]

Based on OSHA's annual estimate of 5.2 confined-spaces-in-construction fatalities avoided when fully complying with the provisions of this standard, and the 91 percent preventability rate, OSHA estimated that there would have been a total of between 520 and 1,040 confined-spaces-in-construction non-fatal injuries during the period of 1992 to 2000, with a midpoint of 780 as the total number of non-fatal injuries avoided each year when fully complying to the provisions of this standard. Applying a similar methodology of a 100:1 to 200:1 fatality-to-injuries ratio to the supplemental data in Table IV–10, OSHA estimates that, given 30 fatalities between the period of 2006 to 2009, there would be a total of 3,000 and 6,000 non-fatal injuries prevented by the final standard in that time period, or an average of 750 and 1,500 (with a midpoint of 1,125) injuries prevented per year.

Assignment of Monetary Values to Avoided Injuries and Fatalities

In the PEA, OSHA used a willingness-to-pay approach to estimate a monetary value of $50,000 for each prevented injury and $6.8 million for each prevented fatality. One commenter stated that the estimated value of $50,000 per prevented injury had "absolutely no foundation or source for accuracy" and was "substantially inflated," but did not provide any specifics or suggest an alternative (ID–100). The AGCA report suggested that OSHA instead use workers' compensation claims, which it estimated to be $242,770 per fatality and $31,664 per injury (ID–222).

Workers' compensation claims do not reflect a willingness-to-pay approach or represent the full costs associated with workplace fatalities and injuries. Workers' compensation systems cover medical expenses and partial payment of wages lost as a result of workplace accidents, or, in the case of fatalities, burial costs and part of lost future wages. However, workers' compensation does not cover other costs resulting from fatalities and injuries, such as pain and suffering. Therefore, it would be inaccurate to base estimates of total societal costs of injuries and illnesses on workers' compensation claims.

As in the PEA, and following the approach recommended by OMB Circular A–4 (OMB, 2003) and common analytic practice, OSHA developed estimates of the benefits of avoided injuries and fatalities in this FEA based on the willingness-to-pay to avoid a marginal increase in the risk of a fatality or injury, as explained below. In addition, in this FEA, OSHA updated the estimated monetary value of reductions in fatalities and injuries presented in the PEA from 2002 to 2009 dollars. While a willingness-to-pay (WTP) approach clearly has theoretical merit, an *individual's* willingness to pay to reduce the risk of fatality may underestimate the total willingness to pay, which could include the willingness of others—particularly the immediate family—to pay to reduce that individual's risk of fatality.[47]

For estimates using the willingness-to-pay concept, OSHA relied on existing studies of the imputed value of fatalities avoided based on the theory of compensating wage differentials in the labor market. These studies rely on certain critical assumptions for their accuracy, particularly that workers understand the risks to which they are exposed and that workers have legitimate choices between high- and low-risk jobs. These assumptions are far from realized in actual labor markets.[48] A number of academic studies, as summarized in Viscusi & Aldy (2003), show a correlation between higher job risk and higher wages, suggesting that employees demand monetary compensation in return for a greater risk of injury or fatality. The estimated trade-off between lower wages and marginal reductions in fatal occupational risk—that is, workers' willingness to pay for marginal reductions in such risk—yields an imputed value of an avoided fatality: The willingness-to-pay amount for a reduction in risk divided by the reduction in risk.[49] OSHA used this approach in many recent proposed and final rules. (See, for example, 69 FR 59305, 59429 (Oct. 4, 2004) and 71 FR

but also is subject to under-reporting for a variety of reasons, including missing cases, the reporting of sample cases from large establishments, timeliness of updates to the logs and data collection, and employer doubts about the recordability of some cases (see Ruser, 2008). Furthermore, OSHA is unable to confirm the determination of accidents in "confined spaces" as defined by SOII and, therefore, relied on OSHA's IMIS database.

[44] OSHA takes note of the AGCA survey finding of only 2 confined-space injuries among the 74 responding employers (ID–0222, p. 29). However, this finding does not furnish a basis for estimating the number of injuries preventable with full compliance with this rule due to its lack of representativeness. Not all of the respondents even had confined spaces on their job sites. Moreover, AGCA designed the survey explicitly not to learn about injuries in confined spaces, but "to determine the impact of compliance costs for contractors under OSHA's Proposed Rule on Confined Space [sic]. . . . " It instructed respondents to "carefully review the background information detailed below . . . before submitting your information. OSHA's proposed rule for confined space [sic] in construction is complicated, costly to implement, and does not provide significant increases in safety above the existing general industry standard." The survey did not provide a definition of a confined space or otherwise seek to ensure that the person filling out the survey was familiar with the appropriate definition.

[45] Table A–1, Fatal Occupational Injuries by Industry, Event and Exposure, available at *http://www.bls.gov/iif/oshwc/cfoi/cftb0241.pdf*, and Table Number of Nonfatal Occupational Injuries and Illnesses by Case Type and Ownership for Selected Industries, 2009 News Release USDL 10–1451, available at *http://www.bls.gov/news.release/pdf/osh.pdf*.

[46] See, for example, Dong, X., et al. (2011).

[47] See, for example, Thaler and Rosen (1976), pp. 265–266; Sunstein (2004), p. 433; or Viscusi, Magat and Forrest (1988), the last of whom write that benefits from improvement in public health "consist of two components, the private valuation consumers attach to their own health, plus the altruistic valuation other members of society place on their health." This paper uses contingent valuation methods to suggest that the effect of altruism could significantly alter willingness-to pay estimates for some kinds of health improvement. There are, however, many questions concerning how to measure this and the conditions under which it might matter.

[48] See, for example, the discussion of wage compensation for risk for union versus nonunion workers in Dorman and Hagstrom (1998).

[49] For example, if workers are willing to pay $90 each for a 1/100,000 reduction in the probability of dying on the job, then the imputed value of an avoided fatality would be $90 divided by 1/100,000, or $9,000,000. Another way to consider this result would be to assume that 100,000 workers made this trade-off. On average, one life would be saved at a cost of $9,000,000.

10099 (Feb. 28, 2006), the preambles for the proposed and final hexavalent chromium rule, and 78 FR 56274, 56388 (Sept. 12, 2013), the preamble for the proposed respirable crystalline silica rule.) The Agency views the WTP approach as the best available, and relied on it to monetize benefits. Viscusi & Aldy (2003) conducted a meta-analysis of studies in the economics literature that use a willingness-to-pay methodology to estimate the imputed value of life-saving programs and found that each fatality avoided valued at approximately $7 million in 2000 dollars. Using the GDP Deflator (U.S. BEA, 2010), this $7 million base number in 2000 dollars yields an estimate of $8.7 million in 2010 dollars for each fatality avoided.[50 51]

OSHA views these estimates as the best estimates currently available, and will use them to monetize avoided fatalities and injuries resulting from this final standard.

Net Benefits

Table IV–11, which repeats Table IV–1 for the convenience of the reader, provides a summary of the estimated costs, benefits, and net benefits of the final standard, using discount rates of 7 percent and, alternatively, 3 percent, as recommended by OMB Circular A–4. OSHA estimated the total benefits of the final standard to be $93.6 million annually—of which $45.2 million come from prevented fatalities and $48.4 million from prevented injuries. OSHA took the annualized costs of $60.3 million, using a 7 percent discount rate, from Table IV–13 in Chapter 6 of this FEA. OSHA estimated net benefits of the final rule to be $33.3 million annually, using a 7 percent discount rate. OSHA estimated that compliance with the final standard will provide $1.55 of benefits per dollar of cost.

TABLE IV–11—NET BENEFITS

[Millions of 2009 dollars]

	7% Discount rate	3% Discount rate
Annualized Costs		
Evaluation, Classification, Information Exchange, and Notification	$12.4	$12.2
Written Program, Issue Permits, Verify Safety, Review Procedures	4.2	4.2
Provide Ventilation and Isolate Hazards	2.8	2.7
Early Warning System and Atmospheric Testing or Monitoring	11.4	11.3
Attendant	3.6	3.6
Rescue Capability	8.2	7.6
Training Provisions	11.3	11.3
Other Requirements	6.4	6.3
Total Annual Costs	60.3	59.2
Annual Benefits		
Number of Injuries Prevented		780
Number of Fatalities Prevented		5.2
Monetized Benefits		$93.6
Net Annual Monetized Benefits (Benefits Less Costs)		
	$33.3	$34.4

Potential Net Benefits of the Individual Provisions of the Rule

As indicated in Table IV–11, the estimated benefits of the final standard are nearly 50 percent larger than the estimated costs. Nevertheless, it is possible that the costs of particular provisions could exceed their benefits. To address this possibility, OSHA conducted a supplemental analysis of the net benefits of the individual provisions of the final rule that have associated costs.

Because the final rule contains jointly interacting and overlapping provisions, there are two logistical issues with performing a provision-by-provision sensitivity analysis of whether benefits exceed costs in this case: (1) The available data do not permit OSHA to determine the numbers of accidents that every combination of provisions could prevent; and (2) a simple marginal analysis will not fully address the question of whether benefits exceed costs for the rule as a whole. It might, for example, take two or more provisions to prevent a class of accident: An analysis of the effects of a requirement to do x if situation y is the case would be dependent on not only the requirement to do x if situation y is the case, but also a requirement to train workers to do x, as well as a requirement to inform workers of when y is the case. In such circumstances, while each provision alone might pass a marginal benefit-cost test, all of the provisions together might not pass a benefit-cost test because the provisions would prevent the same accidents. The three provisions, each costing $5 million (for a total cost of $15 million), might prevent only $12 million worth of accidents because the three provisions would prevent the exact same accidents. Thus, even if a provision-by-provision sensitivity analysis were possible for

[50] The Agency notes that two recent studies mentioned in this chapter—Kniesner et al. (2010) and Kniesner et al. (2012)—report similar estimates. The median quintile estimate of the imputed value of an avoided fatality in Kniesner et al. (2010) is $9.2 million in 2010 dollars, while Kniesner et al. (2012) provide a range of estimates between approximately $5 million and $12 million in 2012 dollars. For the purpose of this PEA, OSHA chose to rely on the Viscusi and Aldy (2003) meta-analysis rather than the two more recent individual studies.

[51] An alternative approach to valuing an avoided fatality is to monetize, for each year added to a life, an estimate from the economics literature of the value of that statistical life-year (VSLY). See, for instance, Aldy and Viscusi (2007) for a discussion of VSLY theory and FDA (2003), pp. 41488–9, for an application of VSLY in rulemaking. OSHA did not investigate this approach.

this rule, that analysis might still not demonstrate the total benefits of the overall combination of provisions. Moreover, for the purpose of determining whether benefits of a rule exceed the costs, one cannot simply test each provision individually, but must find ways to examine situations involving likely joint effects of the provisions of the rule.

This provision-by-provision analysis addresses both of these problems and takes the form of a break-even sensitivity analysis that compares the potential benefits of a set of provisions against the costs of those provisions and, separately, all provisions that, when combined, achieve those particular benefits. Thus, a break-even sensitivity analysis in this case represents an estimate of the percentage of potentially preventable accidents that an individual provision, or a combination of provisions, must prevent for the benefits to equal the costs. Any percentage of preventable accidents a provision or combination of provisions prevents that are greater than this percentage would result in benefits exceeding costs.

For each narrative of the 30 preventable confined-spaces-in-construction fatalities and injuries for the period 2006–2009 presented in Table IV–10, OSHA listed the sets of provisions of the final rule that, if followed, would potentially prevent the fatalities. For some provisions, such as requirements to evaluate and classify spaces and to develop and implement permit systems, the narratives do not clearly state whether or not employers met these requirements. In these cases, OSHA listed those provisions as being among those that would potentially prevent the fatality, even though it is possible that the employer took steps to implement the required provisions. For other provisions, such as those for early warning system and atmospheric testing or monitoring, the narratives do not clearly state that there was such monitoring, but it seems unlikely that someone would enter some of these extremely dangerous atmospheres had information on that danger been available as a result of an early warning system and atmospheric testing or monitoring. Finally, it is clear from the descriptions that employers simply did not follow provisions relating to ventilation and hazard isolation. Table IV–12 shows the aggregate results for each set of provisions organized according to the organization of costs provided in Chapter 5. Table IV–12 then monetizes the prevented fatalities and injuries associated with each cost category and compares that monetized total to the estimated costs for each cost category. Finally, OSHA estimated the percentage of benefits that a given provision needs to produce zero net benefits (that is, when the estimated value of the prevented injuries and fatalities equals the estimated cost of the related provision). Any percentage greater than zero net benefits will produce positive net benefits. Table IV–12 also shows the results of this analysis.

Before examining the benefits attributable to the provisions of the final standard, OSHA examined the break-even sensitivity of the standard as a whole and found that if compliance with the standard prevented 45 percent of the fatalities recorded, then the benefits would equal the costs; with any higher percentage prevention, benefits would exceed the costs. OSHA considers it a near certainty that compliance with the final standard would achieve this level of benefits. For example, full compliance with the final standard would avoid almost all fatalities involving asphyxiation, and 60 percent of the accidents involved asphyxiation. Thus, if full compliance with the final standard prevents just one class of accidents, the standard would result in benefits that exceed costs.

To discuss the results shown in Table IV–12, OSHA will consider the results for each provision in turn, as described in the following paragraphs.

Evaluation and Classification: The portions of the standard covered by this cost category are only effective if combined with other measures. Evaluation and classification alone, without taking the further steps needed to ameliorate the hazards, would be largely pointless. The need for this provision, in the context of benefit-cost analysis, is to assure that employers do not have to treat every confined space as containing hazards; rather, it allows employers to simply restrict entry or to implement the subsequent parts of their confined-spaces program only when a hazard exists within a given confined space.

This set of provisions is critical to reducing the costs of all other provisions more than directly preventing fatalities. If the evaluation and classification provisions reduce the costs of the standard as a whole by 5 percent ($3.1 million costs of this provision divided by $60.3 million costs of the remaining provisions), then these provisions will be useful. Given the vast number of confined spaces that do not require the ensuing steps, these provisions are almost certainly cost effective, and are necessary given the standard as a whole has positive net benefits—as was shown above.

To further evaluate the necessity and benefit of the evaluation and classification provisions, it is necessary to examine state programs. Only two of the accidents examined from 1992–2000 and 2006–2009 occurred in states with comprehensive programs similar to what OSHA is proposing. Five accidents occurred in states that required some provisions included in OSHA's confined-spaces-in-construction rule, such as ventilation and atmospheric monitoring, but did not require evaluation or permit systems. This result may suggest that there may be advantages to a full, comprehensive program that explicitly requires evaluation and classification. However, OSHA has not been able to do any quantitative analysis of the rates of confined space fatalities in these states as against other regulatory regimes.

Information Exchange: The exact economic benefits of information exchanges are particularly difficult to pinpoint. Nevertheless, the benefits of these provisions will exceed the cost if the final standard prevents 10 percent of the potentially affected accidents.

Permit Programs: Table IV–12 shows that if these provisions prevent 4 percent of the accidents where they are potentially relevant, then the benefits will equal the costs, and if they prevent more than 4 percent, the benefits will exceed the costs. A system of permits might prevent, or have been a key part of preventing, many fatalities. As a result, achieving a 4 percent prevention rate seems reasonable. Further, at least 12 percent of the accidents potentially prevented by this provision (Incidents 2 and 13) involved casual entry (*e.g.*, to retrieve a dropped item), or entry prior to testing, that a proper permit system would completely prevent. Preventing these two accidents alone would assure that the benefits of the provision exceed the costs.

Early Warning Systems, and Atmospheric Testing and Monitoring: Early warning systems, and atmospheric testing and monitoring, can prevent accidents that result in asphyxiation or caused by explosive gases, or where early warning of oncoming liquids would prevent drowning. The presence of atmospheric testing or monitoring data would prevent most of these accidents because it is unlikely that anyone would knowingly enter a space with a lethal or explosive atmosphere, especially when provisions are in place to assure against unauthorized entry. Table IV–12 shows that if these provisions prevent 14 percent of the accidents for which they are potentially

relevant, then the benefits will equal the costs, and if they prevent more than 14 percent of the accident, the benefits will exceed the costs. OSHA believes that it is likely that atmospheric monitoring could prevent a much higher percentage of these accidents. In addition, there is one accident potentially prevented by an early warning system.

Requirement for an Attendant: This heading includes the provisions that require an attendant whenever an employee enters a permit-required confined space, such as §§ 1926.1204(f), 1926.1209(f) and 1926.1209(h). These provisions function in conjunction with the requirements for adequate rescue capacity. In the absence of appropriate rescue capacity, persons standing by a confined space may attempt a rescue that exposes them to the hazard. Table IV–12 shows that if these provisions prevent 6 percent of the accidents in which the person who died entered a confined space completely alone, then the benefits will equal the costs, and if the provisions prevent more than 6 percent of the accidents, the benefits will exceed the costs. OSHA believes that it is reasonable that appropriately trained and equipped attendants could prevent this percentage of accidents.

Ventilation and Hazard Isolation: The standard generally requires the use of ventilation when possible to address atmospheric hazards, but it can be difficult for the purposes of this sensitivity analysis to determine in which situations ventilation, rather than PPE, might be sufficient. It is clear, however, that when ventilation is appropriate, assuring its effectiveness would completely prevent ventilation-related fatalities. The same is true for hazard-isolation methods such as deactivating and locking out electrical sources and creating by-passes for water around confined spaces. Table IV–12 shows that if these provisions prevent 3 percent of the accidents for which they are potentially relevant, then the benefits will equal the costs, and if they prevent more than 3 percent of these accidents, the benefits will exceed the costs. Therefore, even if proper ventilation or isolation prevented one in five of the fatalities identified as potentially avoidable with proper ventilation or isolation, then the benefits of these provisions would exceed the costs. While the exact number of situations in which ventilation or isolation would have been the hazard-reducing measure of choice is uncertain, OSHA is confident that at least 3 percent of those identified would require ventilation or isolation.

Rescue Capacity: These provisions include all requirements related to rescue, including the requirement for non-entry rescue whenever feasible. Table IV–12 shows that if these provisions prevent 9 percent of the accidents for which they are potentially relevant, then the benefits will equal the costs, and if they prevent more than 9 percent of the accidents, the benefits will exceed the costs. Given that 15 percent of the accidents for which OSHA identified inadequate rescue capacity as a factor in a fatality involved deaths of additional workers during an attempted rescue, then following provisions for non-entry rescue would reasonably prevent more than 9 percent of all accidents involving inadequate rescue capacity. However, if employers follow all other provisions of the rule, then there will be less need for rescue. As a result, this set of provisions will be necessary if other provisions are not available or are not followed 9 percent of the time, or if conditions change after the confined-space entry in ways that result in a need for rescue.

Equipment: These provisions cover the requirement that employers provide adequate lighting and other equipment needed for confined-spaces work as specified in § 1926.1204(d). Table IV–12 shows that if these provisions prevent 47 percent of the accidents for which they are potentially relevant, then the benefits will equal the costs, and if they prevent more than 47 percent of the accidents, the benefits will exceed the costs. However, as noted above, OSHA did not include many of the accidents that proper equipment would prevent, such as accidents caused by vehicles hitting persons working near a confined space or illnesses caused by improper clothing. As a result, it is likely that OSHA underestimated the number of fatalities and injuries prevented by proper equipment.

TABLE IV–12—COMPARISON OF BENEFITS ASSOCIATED WITH INDIVIDUAL COST CATEGORIES AND COSTS *

Cost provision	Number of fatalities potentially affected by provision (2006–2009)	Estimated number of fatalities per year potentially affected by provision	Monetized value of annual fatalities [a]	Estimated number of injuries per year potentially affected by provision	Monetized value of injuries [b]	Total monetized value of annual fatalities and injuries potentially affected by the provision	Costs of provision	Percentage of potential benefits needed to break even with costs [c] (percent)
All	30	7.5	$65,250,000	1125	$69,750,000	$135,000,000	$60,300,000	45
Evaluation and Classification	30	7.5	65,250,000	1125	69,750,000	135,000,000	3,100,000	2
Information Exchange	18	4.5	39,150,000	675	41,850,000	81,000,000	9,300,000	11
Permit System	22	5.5	47,850,000	825	51,150,000	99,000,000	4,200,000	4
Early Warning System and Atmospheric Testing or Monitoring	18	4.5	39,150,000	675	41,850,000	81,000,000	11,300,000	14
Ventilation and Hazard Isolation	22	5.5	47,850,000	487.5	51,500,000	99,000,000	2,800,000	3
Attendant	13	3.25	28,275,000	487.5	30,225,000	58,500,000	3,600,000	6
Rescue Capability	20	5	43,500,000	750	46,500,000	90,000,000	8,200,000	9
Training	29	7.25	63,075,000	1087.5	67,425,000	130,500,000	11,300,000	9
Equipment	3	0.75	4,350,000	112.5	6,975,000	13,500,000	6,3000,000	47

* In 2009 dollars.
[a] Based on an estimated value of $8.7 million per fatality avoided.
[b] Based on an estimated value of $62,000 per injury avoided.
[c] Costs of provision divided by total monetized value of fatalities potentially prevented by the provision.
* **Note:** OSHA did not apportion the benefits of a prevented fatality among the provisions that could prevent the fatality; instead, the Agency attributed the entirety of the benefits of a prevented fatality to each provision that could prevent the fatality.
Source: OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

5. Technological Feasibility

In accordance with the OSH Act, OSHA must demonstrate that occupational safety and health standards promulgated by the Agency are technologically feasible. OSHA demonstrates that a standard is technologically feasible "by pointing to technology that is either already in use or has been conceived and is reasonably capable of experimental refinement and distribution within the standards deadlines." *American Iron and Steel Inst.* v. *OSHA (Lead II),* 939 F.2d 975,

980 (D.C. Cir. 1991) (per curiam) (internal citation omitted). OSHA reviewed each of the requirements imposed by the final rule and determined that compliance with the requirements of the rule is technologically feasible for all affected industries, that employers can achieve compliance with all of the final requirements using readily and widely available technologies, and that there are no technological constraints associated with compliance with any of the final requirements.

Several factors support OSHA's determination regarding the technological feasibility of the final rule. First, OSHA concluded that compliance with existing § 1910.146 was technologically feasible when it promulgated those standards in 1993 (58 FR 4539), and that conclusion held true over OSHA's two decades of experience with that standard. Likewise, this conclusion holds true with respect to provisions in the final rule that OSHA based on the existing general industry standard. A number of commenters stated that they are complying with the general industry standard in construction operations, which also supports a finding of technological feasibility. (See *e.g.*, ID–047, –075, –086, –092, –120, –124, –180).

Second, the provisions in the standard not based on the existing standard are also technologically feasible. The new standard requires employers to identify confined spaces at their worksites, establish a written program and issue permits for qualifying confined spaces, exchange information on the hazards of permit spaces with other affected employers, train affected employees, provide for rescue and emergency services, and assign duties to authorized entrants, attendants, and supervisors. None of these requirements, including the new requirements not in § 1910.146, present any technological feasibility concerns. These provisions simply require observation of hazards, training, and communication among all parties, including employees and all employers at a worksite—all of which are clearly feasible.

In Section III of the preamble to the final rule, "Summary and Explanation of the Final Rule," OSHA responded to issues associated with the technological feasibility of specific provisions. In that section of the preamble, OSHA discussed technological feasibility concerns raised by rulemaking participants and the technological feasibility of provisions that differ from the general industry rule, including the requirement for continuous monitoring of atmospheric hazards in final § 1926.1203(e)(2)(vi) and § 1926.1204(e)(1)(ii). In addressing potential concerns about the technological feasibility of continuous monitors that would be capable of identifying various types of atmospheric hazards, OSHA included an exception that applies if the employer can demonstrate that the appropriate devices are not commercially available for this purpose.

One commenter suggested that requirements to exchange information and coordinate entry operations represent "an unnecessary burden" and "in some cases may be infeasible," which OSHA takes to mean technologically infeasible, for the homebuilding industry (ID–124). Although this commenter cited industry statistics indicating that homebuilders tend to be small businesses that rely on subcontractors to handle specialized tasks, the commenter failed to show how this situation renders multi-employer communication requirements of the rule technologically infeasible for that industry. OSHA does not mandate any particular equipment for coordinating communications, and the Agency did not find evidence in the record suggesting that the exchange of information and entry coordination, which OSHA believes already occurs in the course of regular communications conducted by employers on construction worksites, is infeasible. At a time when most individuals have mobile phones, remote communication should be possible in most locations. In any case, in construction work, home-building contractors are able to successfully communicate with a variety of specialists about what work needs to be done and at what time. Therefore, there should be no feasibility problems in communicating essential safety information in the same way.

There was only one other provision of the proposed standard that elicited concerns from industry stakeholders about technological feasibility. That provision, which appears as § 1926.1204(e)(1)(iii) of the final standard, requires that employers provide an early warning system that will detect non-isolated engulfment hazards as a part of the permit-required confined space program. Such hazards can result, for example, when runoff from a heavy storm upstream in a sewer flows downstream into the work area. As noted in the IMIS reports, an employee died in 2009 when a rainstorm sent water rushing into a 24-inch pipe inside which the employee was working. Other examples would be if sewage, sand, grain, or other "flowable" solid substances flow into the area in which an employee is working.

Two commenters questioned the availability of early warning system technology (ID–059 and –098). A third commenter (ID–216) raised similar objections and, in particular, expressed concerns about the technical demands imposed on the employer to account for all of the factors involved in properly positioning the system.

In response to these comments, OSHA observes that manufacturers have designed early warning systems for years to alert workers to migrating engulfment hazards, including migrating engulfment hazards present in a space subject to final § 1926.1204(e)(1) (see, for example, *http://www.memecosales.com/products/level/blok-aid/* or *http://www.flygt.com/en-us/Pumping/Products/Monitoring-and-Control-equipment/Pages/Alarm-telemetry.aspx*). The range of available early warning systems runs from customized high-flow warning devices to simple fluid-level meters with audible alarms. The wide availability and application of such systems attest to their affordability and practicability under a range of circumstances. OSHA also notes that, in a series of stakeholder meetings in October 2000, various participants discussed the range of early warning systems, including monitors, cameras, and attendants positioned upstream outside confined spaces (see transcripts of stakeholder meetings, available at *https://www.osha.gov/doc/reference_documents.html*). The commenters generally characterized the systems as easy to implement and commonly used.

Even though this technology is clearly available, the standard does not require employers to use a device such as the early warning system. An employer may determine that an effective compliance solution would simply be to position detection and monitoring devices to provide early warning, or to station an employee to accomplish that function. In any case, given the option of using an employee to provide direct observation as one potential method of fulfilling the requirement, there is no doubt that the requirement may be accomplished with existing technology.

In conclusion, employers can achieve compliance with all of the requirements of the final standard with readily and widely available technologies or through the use of human observers. To demonstrate technological feasibility, OSHA must establish a "reasonable possibility that the typical firm will be able to . . . meet the [standard's

requirement] in most of its operations." *Lead II*, 939 F.2d at 980 (internal citation omitted). Given the wide availability of options for early warning systems, the final rule meets this legal test.

6. Costs of Compliance

Introduction

In this chapter, OSHA presents the estimated costs of the final rule for confined spaces in construction. These are the costs that employers would incur to achieve full compliance with the final rule, relative to the current baseline. They do not include costs employers incurred to achieve current compliance with the existing requirements.

Table IV–13 presents OSHA's estimate of the total annualized costs of the final rule by provision and by industry sector, expressed in 2009 dollars. As OSHA typically does, it annualized capital costs over the estimated useful life of the equipment, and annualized one-time costs over 10 years. Consistent with OMB's Circular A–4 (OMB, 2003), OSHA calculated annualized costs using two alternative discount rates: 7 Percent and 3 percent. As shown, OSHA estimated the total annualized cost of the final rule to be about $60.3 million using a discount rate of 7 percent, and $59.2 million using a discount rate of 3 percent.

TABLE IV–13—ANNUALIZED COMPLIANCE COSTS OF OSHA'S FINAL STANDARD FOR CONFINED SPACES IN CONSTRUCTION, BY PROVISION

Provision or hazard control	7 Percent rate	3 Percent rate
Evaluation, Classification, and Notification	$12,363,600	$12,208,018
Classify	948,249	948,249
Notice	2,091,862	1,936,279
Information Exchange	9,323,489	9,323,489
Issue Permits, Verify Safety, Review Procedures	4,196,574	4,190,373
Annual Review	154,746	154,746
Issue Permits	2,710,594	2,710,594
Written Program	1,331,234	1,325,033
Ventilation and Hazard Isolation	2,830,611	2,748,652
Isolation	784,364	771,079
Vent	2,046,247	1,977,573
Atmospheric Monitoring	11,395,322	11,282,168
Test Prior/During	10,661,160	10,551,394
Calibrate	734,162	730,773
Standby Person	3,623,866	3,623,866
Rescue Capability	8,157,084	7,576,244
Rescue	5,745,876	5,379,002
Retrieval	2,411,208	2,197,241
aining	11,340,155	11,296,556
Training	5,696,017	5,676,653
Supervisor Training	5,644,139	5,619,903
Other Requirements	6,402,728	6,269,690
Clothing	2,744,697	2,744,697
Barriers	2,801,408	2,723,063
Communication Equipment	624,044	584,200
Lighting	183,363	171,656
Alarms	61,252	57,644
Total Compliance Costs	60,321,976	59,207,135

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

The structure of the equations which calculate the costs is the following equation:

$$TC = \sum_{k=1}^{27} \sum_{j=1}^{25} \sum_{i=1}^{3} NP_{ijk} \times NC_{ijk} \times H_{ijk} \times UC_{ijk}$$

Where TC = Total Cost, k subscripts each cost category, j subscripts each industry type, i subscripts the project size, NP is the number of projects in that size category, NC is the current non-compliance rate, H is the number of hours, and UC is the unit cost.

Using a discount rate of 7 percent, OSHA estimates that the annualized compliance costs for the major provisions of the final standard are as follows: Evaluation and classification of enclosed spaces, information exchange, and notification ($12.4 million); developing and reviewing written programs, issuing entry permits, and verifying the safety of confined spaces ($4.2 million); isolating hazards and providing sufficient ventilation ($2.8 million); conducting atmospheric monitoring ($11.4 million); having an attendant ($3.6 million); planning and providing rescue capability ($8.2 million); providing training ($11.3 million); and other requirements ($6.4 million).

Estimating Compliance Costs

The approach to compliance-cost estimation in this FEA follows the approach in the PEA and in the CONSAD analysis. However, the cost

estimates in this FEA changed relative to the PEA to reflect changing construction practices over time, changes from the proposed to the final rule (including more closely aligning the final rule with the confined-spaces rule for general industry), and OSHA's responses to comments on the proposal and on the PEA.

For each type of construction activity identified by the CONSAD expert panel, OSHA took an estimate of the total number of construction projects from the F.W. Dodge data (the same source used for the PEA) and applied a category-specific number of confined spaces per project to derive the number of confined spaces. OSHA then used the number of confined spaces along with other pertinent estimates to determine the number of affected workers, and applied unit-cost estimates to calculate the costs of each provision of the standard, taking into account current compliance. OSHA derived many of the costs of this final rule by multiplying hourly wages by the labor hours required to fulfill a given requirement. As previously noted, OSHA annualized equipment purchase costs based on the estimated useful life of the equipment, and annualized one-time expenditures over a 10-year period.

AGCA presented an alternative economic analysis, prepared by Dr. Helvacian, of the compliance costs of the proposed rule, stating that the analysis in the PEA "must be updated for the most recent data on establishments, employees, wages and benefits, and for prices for construction machinery and equipment" (ID–222). In this FEA, OSHA updated its analysis of compliance costs to reflect more recent data, when these data were available. Specifically, to account for changes in wages and prices over time, OSHA updated the wages and capital and equipment costs presented in the PEA to 2009 dollars based on the percentage change in the GDP price deflator from 2002 to 2009, published by the U.S. Commerce Department, Bureau of Economic Analysis.[52] Dr. Helvacian's economic analysis was based partially on a survey of AGCA's member employers. The survey respondents have an average of 98.8 confined spaces per job, with a median of 3 spaces per job. This large disparity between the average and the median suggests the possibility that there was widespread misunderstanding among the respondents regarding what constitutes a confined space. By comparison, the average number of confined spaces per project based on the CONSAD report is 5.7, with an average of 193 entries per project.[53] OSHA believes that it would be unsound to extrapolate the commenter's survey results, based on only 74 respondents and 5 categories of construction projects, to the entire construction industry. In contrast, CONSAD based its estimates on results stratified by 25 project categories organized by project size. Furthermore, OSHA notes that adjusting the estimated average number of confined spaces and entries to reflect the commenter's reported median estimate would reduce OSHA's estimated compliance costs.

OSHA chooses not to adopt the commenter's estimated number of confined spaces. OSHA believes that the research conducted by CONSAD continues to provide detailed information that is not available elsewhere (for example, information related to entries into confined spaces and the distribution of confined spaces across construction projects). Therefore, OSHA finds that the CONSAD report, with appropriate updates and adjustments for the changing rule provisions and industry practices, provides the best available data related to entries into confined spaces in construction, and continues to rely on data published in that report to estimate compliance costs.

Dr. Helvacian's analysis also suggested that the number of hours required to comply with the proposed rule was greater than that estimated in the PEA (ID–222). However, although the report provided some aggregate time estimates, they were not sufficiently detailed for OSHA to analyze the estimates by specific requirements. Furthermore, OSHA notes that Dr. Helvacian based the survey results on the AGCA members' understanding of the proposed rule rather than the final rule, which the survey's introduction described as "complicated, costly to implement, and does not provide significant increases in safety above the existing general industry standard" (ID–222). For these reasons, OSHA is not adjusting its time estimates based on the AGCA survey results.

OSHA received a number of comments stating that many construction contractors were already complying with the general industry standard. For example, an association of utility contractors commented that its members "enter into confined spaces on a regular basis in the course of their construction operations. They have been using the General Industry Standard (29 CFR 1926.146) since it was issued in 1993 and have customized their confined space programs and training to comply with that standard" (ID–075). Another commenter, a construction-safety consultant, stated that employers were already complying with a state standard on confined spaces, which the state based on OSHA's general industry standard (ID–047). Tom Skaggs, representing the Mechanical Contractors Association of America, testified that the industry was successfully protecting workers "through voluntary compliance with OSHA's general industry standard" (ID–210, Tr. p. 278; see also ID–180 for his written testimony). Other commenters also stated that much of the construction industry adheres to the general industry standard (*e.g.*, ID–086, –092, –120, –124).

Based on these comments, and in light of the changes from the proposed rule to the final rule that more closely align the final rule with the general industry rule, OSHA revised its estimated rates of current industry compliance upward in this FEA for many of the provisions of the final rule. Table IV–6, introduced earlier in Chapter 3 of this FEA, presents these revised compliance rates. Because the final rule requirements concerning information exchange, continuous monitoring, and early warning systems and rescue vary from the general industry rule, the Agency did not adjust the estimated compliance rates related to these provisions in this FEA.

To adjust compliance rates, OSHA used information on state confined-space standards for construction. The states that have confined space standards for construction are: California, Kentucky, Maryland, Michigan, Minnesota, Virginia, Washington, and Alaska. These eight states have different confined-space requirements that comply with some or all of the OSHA requirements in the final rule, depending on the state. OSHA assumed that the original CONSAD compliance rate would be applicable in states without state standards, and assumed full compliance with the provisions of the standards specific to each of these eight states. The content of the state construction standards varies by state, so OSHA calculated weighted average compliance rates for each provision of the standard based on the proportion of establishments in each state having that provision. As the record shows, this approach may underestimate the actual compliance rates since many construction employers have come into compliance with the general industry

[52] Source: *http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&903=13.*

[53] This estimate excludes single-family housing projects. OSHA added these projects to the analysis in this FEA.

standard, and, therefore, with provisions of this final rule, whether or not they are located in the states with confined-space standards for construction. These employers come into compliance with the general industry standard because, in part, they perform both general industry and construction work. OSHA also modified some compliance rates from the CONSAD report to account for large projects having greater compliance rates than smaller projects within the same activity type.

Table IV–14 presents the estimated unit costs associated with each requirement in the final rule. Following this table is a discussion of OSHA's estimated compliance costs by requirement.

TABLE IV–14—UNIT-COST ESTIMATES FOR CONTROLS NECESSARY TO ACHIEVE COMPLIANCE WITH THE FINAL STANDARD

Activity or equipment	Unit cost/useful life
Construction supervisor wage (including benefits)	$42.16 per hour.
Skilled worker wage (including benefits)	$29.60 per hour.
General construction employee wage (including benefits)	$24.93 per hour.
Clerical employee wage (including benefits)	$22.53 per hour.
Unskilled worker wage (including benefits)	$22.67 per hour.
Confined-space notification signs	$18.92/5 years.
Host employer/controlling contractor information exchange	8 minutes of supervisor time.
Controlling contractor/entry employer information exchange	20 minutes of supervisor time for each entity involved.
Controlling contractor/other worksite employer information exchange	5 minutes of supervisor time for 10 percent of employers.
Entry coordination	10 minutes of supervisor time for 3 supervisors per coordinated entry.
Written program	1 hour per project.
Issue permits/maintain records/review procedures	10 minutes of supervisor time and 5 minutes of clerical time per permit issued.
Implement and verify alternative entry procedures	5 minutes of supervisor time and 5 minutes of clerical time per non-permitted space entry.
Time to isolate a hazard (*e.g.*, with double block and bleed method, lockout/tagout system, etc.).	5 minutes skilled employee time.
Lock	$13.80/2 years.
Tag	$1.61 each.
Portable ventilation system	$1,332/5 years.
Operation and maintenance costs for ventilation system	Add 10% per year to cost of system.
Set up ventilation system	10 minutes skilled employee time.
Ventilate confined space prior to entry	45 minutes skilled employee time.
Set up atmospheric monitoring equipment	20 minutes skilled employee time per entry.
Atmospheric-monitoring equipment (three-gas monitor)	$1,000/5 years.
Atmospheric-monitor calibration test	1 calibration per 160 hours of use.
Attendant	1 additional construction employee for duration of entry for anywhere from 3 hours to 3,400 hours.
Establish rescue procedures	1 hour supervisor time per project.
Entry rescue equipment	$5,328.56 per set/5 years.
Non-entry rescue equipment	$3,248.54/20 years.
Rescue team training	For each team of 4 employees: 16 hours skilled worker time (4 hours per employee) plus 4 hours supervisor time; plus for 1 employee: 4 hours skilled worker time for CPR training.
Training for entrants and attendants	Entrants (3–75 workers per project): 0.25 hours construction worker time; attendants (2–6 workers per project): 0.25 hours construction worker time; plus 1.5 minutes supervisor time per trained worker and 1.5 minutes clerical time per worker.
Training program development	4 hours supervisor time plus 1 hour clerical time for program development plus 6 hours supervisor time for training plus 1 hour clerical time per project.
Disposable coveralls	$8.94 per set.
Traffic barricades (pair)	$165.64/3 years.
Barricade tape	$2.12 per 100 feet.
Sign	$18.92/5 years.
Installation of sign or barricade	5 minutes per sign or barricade.
Two-way radios	$214.13/3 years.
Safety lantern for emergency lighting	$19.04/3 years.
Air horn for emergency evacuation	$23.79/3 years.

Sources: Wage data from Bureau of Labor Statistics. Other data from CONSAD report, Tables 6.1, 6.2, D.1, and D.2; and OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

Evaluation and Identification, Information Exchange, and Notification

The proposed standard required employers to evaluate confined spaces and their hazards, and to classify them as one of several types of confined spaces. In the PEA, OSHA estimated that compliance with the requirements would primarily involve a supervisor's time to categorize the confined space and evaluate its hazards.

Many commenters found the proposed multiple classification system for confined spaces unnecessarily burdensome. One commenter stated that "[t]he four new classifications . . . will require drastic changes to existing confined space programs at great financial expense to the construction industry" (ID–124). Another commenter objected to "the cost to the contractor for re-educating employees in the new terminology," and supported the continued use of the "the existing

process" in § 1910.146, the general industry standard (ID–035).

In contrast to the proposed standard, the final rule requires employers to evaluate confined spaces and their hazards (*i.e.*, determine whether a workspace is a confined space and identify the types of hazards that workers may encounter), and to identify those confined spaces that are permit spaces or covered by alternate procedures. This simplified requirement mirrors the requirements of OSHA's general industry standard for confined spaces. OSHA estimates that the time required to evaluate confined spaces as permit-required spaces would be substantially less than the time required to comply with the more complex proposed classification system, and, therefore, the Agency estimated an average time of about 12 minutes to evaluate a permit space and identify hazards. OSHA believes this estimate is appropriate given the many comments indicating that employers are already familiar with the general industry rule and its required classification process. For example, one commenter, which surveyed its members about the proposed standard, reported that "identifying confined spaces [is] currently performed as part of normal business activities," and that "within the past 15 years, many contractors have become accustomed to 29 CFR 1910.146 and have adjusted their safety programs to comply with this standard" (ID–222).

For purposes of estimating the extent of current compliance, OSHA considers that projects in compliance with the proposed requirements to issue entry permits would also be in compliance with the final requirements for evaluating spaces as permit-required or not. Therefore, OSHA bases its compliance rates for these provisions on the compliance rates estimated for the provisions related to issuing entry permits. OSHA calculated the annual compliance cost for evaluating and classifying confined spaces by multiplying the supervisor's hourly wage rate by the number of hours per project required to identify and evaluate confined spaces, which can vary by project type. OSHA applied this total to the percentage of projects not already in compliance and summed across all projects. Using this approach, OSHA estimates an annualized cost of about $948,249 to comply with this requirement.

For example, to see how OSHA determined the cost of classification, we will examine one of the 25 types of projects: Construction on warehouses. Within this category there were 130 small projects, 220 medium projects, and 23 large projects.

The total cost for the large projects was derived by taking the number of projects (23) times the current non-compliance rate (42%) times the number of hours per project (1.5). This calculation yields a product of 14.49 hours. Multiplying that number by the unit cost ($42.16 per hour)—the cost of an hour of supervisor's time—yields $610.90, the cost of classification of large warehouse construction project confined spaces.

To determine the total cost of classification of all permit required confined spaces, the costs of all types of projects (small, medium, and large) for all 25 types of construction, weighted by each project-cell-types current non-compliance rate, are summed up. A total of 94 cells are added up to produce the total cost of classification.

The final rule includes specific requirements for employers at worksites with confined spaces to share information they may have about the hazards confronting their workers or other workers. One commenter stated that "[i]t is essential to add in the costs to implement this proposed rule by all the employers on each construction site . . . ," and that the "estimated time necessary to attend to each confined space on each construction project by the proposed controlling contractor is 6 to 8 hours" (ID–100). In providing this estimate, the commenter delineates several requirements that fall under the duties of entry employers and host employers. The commenter correctly notes the requirement that the controlling contractor exchange information with other worksite employers; however, by counting requirements for entry employers with the requirements for controlling contractors, the commenter overstates the time burden on controlling contractors. Another comment, in the report prepared by Dr. Helvacian, noted that employers had concerns about the costs of complying with requirements for "information gathering" and "information sharing and coordination" (ID–222). Although OSHA believes that employers on construction sites currently conduct the information exchange described in this chapter as part of their usual and customary business practices, in this FEA (unlike in the PEA) the Agency included estimated costs for information-exchange requirements, as follows.

Under final § 1926.1203(h)(1) and (h)(2), the host employer and the controlling contractor must exchange information about known permit spaces, such as location, past experiences with hazards in the spaces, and other pertinent information. Neither the host employer nor the controlling contractor has to enter the confined spaces to obtain this information. OSHA estimates that supervisors for the host employer and the controlling contractor will engage in eight minutes of conversation per project to fulfill this information-exchange requirement.

Under final § 1926.1203(b)(2), (h)(2), (h)(3), (h)(5), and (i), controlling contractors and entry employers must exchange information about permit spaces and their hazards. They also must share most of this information with employee representatives. OSHA estimates the information exchange requirement can be fulfilled with an average of 20 minutes of communication (one pre-entry and one post-entry conversation, each lasting 10 minutes) per project between a supervisor for the controlling contractor and an entry employer plus a worker-authorized representative of that entry employer

Under final § 1926.1203(h)(2), before entry operations begin, the controlling contractor must provide information about the permit-required spaces to employers with employees whose activities could foreseeably expose them to a hazard in the permit-required space. OSHA expects that employers on a worksite will not usually have employees engaged in work that could foreseeably expose them to such a hazard. To estimate the cost of compliance with this provision, OSHA anticipates that the controlling contractor's supervisor will engage in one 5-minute conversation with 10 percent of all non-entry employers on a worksite. OSHA calculated the number of non-entry employers on a worksite from estimates made by CONSAD of the number of non-entry workers on projects, assuming an average employer size of 20 employees.

Under final § 1926.1203(h)(4), the controlling contractor must coordinate entry operations when multiple employers enter simultaneously or when an employer makes an entry while other work performed at the site (outside the confined space) may result in a hazard in the confined space. To obtain the cost of compliance with this information-exchange provision, OSHA estimates that the controlling contractor and two employers will engage in one 10-minute conversation per coordinated entry. To estimate the number of coordinated entries, OSHA used estimates in the CONSAD report on the number of simultaneous entries per project. OSHA assumes that all estimated simultaneous entries will require coordination, and estimates that

10 percent of all entries will be subject to hazards as a result of work outside the confined space.

Although the CONSAD report did not provide direct estimates of compliance rates for the information-exchange requirements, OSHA believes that these compliance rates are similar to the compliance rates associated with the requirements for notification to non-entrant employees (ID–003, Table D.2). OSHA also believes it is reasonable to assume that projects in compliance with requirements addressing notification to non-entrant employees would also be in compliance with requirements addressing employer-to-employer communication.

OSHA calculated the annual compliance cost for information exchange on each project by multiplying the supervisor's hourly wage rate by the number of hours per project for each type of required information exchange. To estimate the cost of information exchange between host employers and controlling contractors, OSHA modeled eight minutes of three supervisors' time per project. Similarly, to estimate the cost of information exchange between controlling contractors and entry employers, OSHA modeled 20 minutes of supervisor time for the controlling contractor, a worker-authorized representative, and each of the entry employers on the project. To estimate the cost of information exchange between the controlling contractor and employers on the worksite having employees whose work may result in a hazard in the confined space, OSHA modeled five minutes of supervisor time for the controlling contractor and 10 percent of non-entry employers present. Finally, to estimate the cost of coordinating simultaneous entries, OSHA modeled 10 minutes for 3 supervisors (*i.e.*, the controlling contractor and two entry employers) for each such entry. For all of these calculations, OSHA applied the totals to the percentage of projects not already in compliance (*i.e.*, 1 minus the compliance rate) and summed these values across all projects. Using this approach, OSHA estimates an annual cost of approximately $9.3 million to comply with the information-exchange requirements in the final rule.

One commenter stated that the requirements to exchange information and coordinate entry operations represent "an unnecessary burden" and "in some cases may be infeasible" (ID–124). OSHA addresses this comment as a technological-feasibility issue in the section on technological feasibility, but the commenter's unsupported argument also would fail if directed at economic infeasibility. Although this commenter cited home-building industry statistics indicating that homebuilders tend to be small businesses that rely on subcontractors to handle specialized tasks, the comment did not explain how this condition renders the multi-employer and communication requirements of the rule economically infeasible for that industry.

Under final § 1926.1203(b) and (c), employers must inform exposed employees of the existence of permit spaces and the dangers they pose. In the PEA, OSHA estimated that complying with this requirement involved an average of five minutes per notified worker. In the FEA, the Agency no longer includes such notification costs. Rather, OSHA followed the PEA in assuming that employers will achieve compliance with the notification requirement by posting a sign at each confined space. OSHA estimates that signs have a five-year life, and that installation takes five minutes per sign. The Agency calculates the cost of signs as the unit cost of one sign times the number of signs per project, and calculates the installation costs as five minutes (1/12 of an hour) times the unskilled worker's hourly wage times the number of signs per project. OSHA applies these totals to the percentage of projects not already in compliance, summed across all projects. Treating the installation cost as a recurring cost, and treating signs as a capital cost with a useful life of five years, OSHA estimates that the annualized cost of signs, including materials and labor, to be $2.0 million.

Two stakeholders representing utility contractors, in similarly worded comments, stated that notifying non-authorized entrants "could mean informing 25–100 or more employees on the jobsite, which would be extremely time consuming" (ID–124 and ID–075). However, OSHA believes that, beyond posting the signs, there should be no additional costs associated with the requirement to inform exposed employees of the existence of permit spaces and the danger posed by unauthorized entry. OSHA notes that, under 29 CFR 1926.21(b)(2), employers must already provide general training to employees engaged in construction work to ensure that they recognize the hazards on the worksite, including applicable signage warning of hazards. As one commenter stated, "In reference to warning employees not to attempt an unauthorized rescue, it should be part of every construction employee's training . . . because this warning applies to all construction rescue operations" (ID–075).

In summary, OSHA estimates the total annualized costs related to the final requirements for evaluation and classification, information exchange, and notice to employees to be $12.1 million.

Written Program, Permit Issuance, and Annual Review

The proposed standard required that employers on worksites with confined spaces either develop a confined-space program and maintain a copy of the written program, or, alternatively, maintain a copy of the standard at the site. For analytical purposes, OSHA assumed that employers would choose the least-cost alternative and maintain a copy of the standard at the site in lieu of developing a written program. In contrast, final § 1926.1203(d) is similar to the general industry provision in that it requires entry employers to develop and implement a written permit-space program, and final § 1926.1204(n) requires employers to review the permit-space program.

In this FEA, OSHA estimates one hour of supervisor time per project to write a program. OSHA based this estimate on the paperwork-burden determination made in the proposed rule for developing such a program, which no commenter disputed. OSHA also notes the wide availability of written model permit-space programs provided by government entities, trade associations, and others, that employers could adapt with a limited number of revisions to comply with the new standard (see, for example, *http://www.purdue.edu/rem/home/booklets/ConSpProg.pdf*). OSHA calculated compliance costs associated with the requirement to develop a written program as a one-time cost consisting of one hour times the supervisor's hourly wage times the number of projects. OSHA applied this total to the percentage of projects not already in compliance, and annualized the costs using assumptions on the share of projects that are new to a contractor each year—yielding a total annualized cost of approximately $1.3 million. OSHA notes that, in practice, an employer is likely to develop one, somewhat generic, program, and then apply it later to other projects. Given the ready availability of model programs online and elsewhere, adapting one with limited revisions to a company's particular needs is not especially difficult or time consuming. In addition, following the PEA, OSHA estimates five minutes of supervisor time per program for the annual review, and computes the cost for this review as five minutes (1/12 of an hour) times the supervisor's hourly wage times the number of

projects not already in compliance—yielding an estimated annual compliance cost of about $155,000.

Final § 1926.1205 requires employers to issue entry permits, and final § 1926.1206 specifies the information employers must include in the permits. In the PEA, OSHA estimated that compliance with the requirements to issue written entry permits when necessary, and to review procedures periodically, would primarily involve supervisor time; OSHA estimated that 15 minutes of supervisor time per permit issued was sufficient for this purpose. For this FEA, OSHA estimated compliance costs associated with issuing permits separately from the compliance costs associated with the annual review of the permit-space program. Following the analysis by CONSAD, OSHA estimates that compliance with these provisions will involve 10 minutes of supervisor time to issue a permit, 5 minutes of clerical time to write the permit, as well as 5 minutes of supervisor time to provide written verification regarding the safety of non-permit spaces, and 5 minutes of clerical time for recordkeeping for non-permit spaces. The total estimated annual costs in this final standard associated with issuing entry permits and written verifications of safety are $2.7 million.

In summary, OSHA estimates that the annualized costs of the final requirements to provide a written program, issue written permits, and conduct an annual review of the program total to $4.2 million.

One commenter stated that the requirement to develop a confined-space program might require the assistance of a third party, and asserted that program development could cost contractors $10,000 (ID–112). However, the commenter did not explain the basis for the $10,000 estimated cost of program development, and did not specify which elements of "program development" were in its estimate. For example, OSHA separately estimated the costs of providing a written confined-space program and developing a training program. Furthermore, OSHA notes that the final rule does not require employers to engage a third party in the development of a confined-space program. Indeed, a variety of examples of confined-space programs are widely available on the Internet, which employers may adapt for their needs; in addition, OSHA will provide a small entity compliance guide to aid employers in developing such programs.

Isolating Hazards and Providing Ventilation

Final §§ 1926.1203(e) and 1926.1204 refer to isolating hazards and providing ventilation to ensure safe entry conditions for permit-required spaces and confined spaces covered by alternate procedures. As in the PEA, OSHA estimates that isolating hazards and providing ventilation would require the time of a skilled construction employee, additional costs for locks and/or tags, the purchase costs, and the operating and maintenance costs for a portable ventilation system. OSHA included the unit costs for these items in Table IV–14 above. OSHA received no specific comments on the preliminary compliance costs in the PEA related to these provisions. While recognizing that isolation costs may vary according to the hazards isolated, OSHA nevertheless considers the cost estimates in the PEA for blanking and bleeding and lockout/tagout to be reasonable estimates of isolation costs; therefore, OSHA applied the same cost methodology to this section of the final standard.

OSHA estimated isolation costs by multiplying the skilled worker hourly wage times 10 minutes (1/6 or an hour) times the number of entries per project requiring blanking, plus the skilled worker hourly wage times 5 minutes (1/12 of an hour) times the number of entries per project requiring double block and bleed, plus the skilled worker hourly wage times 10 minutes (1/6 of an hour) times the number of entries per project requiring lockout/tagout, plus the cost of tags and locks annualized over a 2-year useful life. OSHA applied these totals to the percentage of projects not already in compliance, summed across all projects. Similarly, OSHA estimated ventilation costs as the purchase costs and operating and maintenance costs for portable ventilation systems applied to the percentage of projects not already in compliance, summed across all projects. OSHA based this estimate on a unit cost of about $1,332 per portable ventilation system, annualized over a useful life of 5 years, and 10 minutes (1/6 of an hour) of setup time multiplied by the unskilled worker hourly wage. The Agency applied these totals to the percentage of projects not already in compliance, summed across all projects. Based on this method, OSHA estimates total annualized costs related to isolating hazards and providing ventilation to be $2.5 million for this final rule.

Monitoring, Early Warning Systems, and Attendants

Final §§ 1926.1203(e) and 1926.1204(e) set forth requirements for monitoring hazards, which generally include continuous monitoring, or periodic monitoring of sufficient frequency, to ensure acceptable entry conditions, as well as an early warning system for non-isolated engulfment hazards. The monitoring provision reflects the requirements in § 1910(d)(5) of the general industry standard, while the requirement for an early warning system is unique to the construction standard (that is, not included in the general industry standard).

Costs related to monitoring and early warning consist of both equipment costs and labor costs associated with attendants and other employees who perform these functions. The following paragraphs include a discussion of the costs related to attendants and other employees who perform monitoring and early warning for hazards under specified conditions.

One commenter stated that the early warning system for engulfment hazards will be "quite expensive for a contractor to purchase, install and maintain with calibration" (ID–098), while some other commenters suggested that the requirement for an early warning system would force employers to hire more employees for the purpose of monitoring for these hazards (ID–059 and ID–112). OSHA provides a choice to employers for how they comply with the early warning requirement: They may use early-warning equipment or they may rely on personnel to provide warning. OSHA expects that employers will do whatever is less costly; in some cases this will be a worker exclusively assigned to monitoring duty, and in other cases it will be cheaper to use a monitoring device. OSHA calculated the costs based on the use of personnel to perform this function because it is simpler to calculate on a per-instance basis; however, OSHA does not expect that the cost of purchasing a device would be significantly higher on a per-instance basis when employer can use the device over a number of projects and over several years. In some cases the equipment cost will be lower than the labor estimates included in this analysis.

OSHA expects that incumbent workers can discharge the early warning-monitoring duty, and estimates the total cost as the construction worker's hourly wage multiplied by the number of entry hours per project, which varies by project. OSHA applied these totals to the percentage of projects

not already in compliance, summed across all projects. Based on this method, OSHA estimates total annualized costs of $3.6 million to comply with the requirement to provide an early warning system.

To assign costs to the use of equipment required to monitor atmospheres in confined spaces, OSHA estimated in the PEA that gas monitors have an average useful life of 2.5 years, and that their unit cost (in 2009 dollars) is $1,660. One commenter (ID–222, p. 12) stated that an average monitor would cost "around $2,000," and that an employer would need to have two units and additional sensors due to reliability problems with such equipment. The Agency notes that employers in general industry have successfully used monitoring equipment under the general industry standard, and the Agency believes that reliable equipment is commercially available. Moreover, based on OSHA research, the price of a gas monitor has fallen to around $1,000, and industry practice suggest that a gas monitor has a useful life of 5 years; these are the estimates used in this FEA.

OSHA estimated 20 minutes of supervisor time to set up the monitoring equipment, taking into account the possibility that, in some cases (with a cost occurring after 160 hours of use—a conservative estimate according to industry experts). OSHA calculated the costs related to monitoring as the equipment cost ($1,000) annualized over a useful life of 5 years, plus operating and maintenance costs equal to 5 percent of equipment costs, plus calibration costs based on use time, plus observation and testing costs based on the duration of entries, which varies by project. OSHA applied these totals to the percentage of projects not already in compliance, summed across all projects. Based on these calculations, OSHA estimates that annualized compliance costs for monitoring total to $11.3 million.

A commenter stated that employers had concerns about the recordkeeping cost of retaining monitoring data for 30 years (ID–222). However, OSHA notes that although employers must make exposure records for employees exposed to hazards available for 30 years under pre-existing OSHA requirements (*i.e.*, 29 CFR 1910.1020), this final rule does not require that routine monitoring records be kept for 30 years.

Final § 1926.1204(f) requires employers to post an attendant outside the permit space for the duration of authorized entry operations, and final § 1926.1209 sets forth the duties of attendants, which include assessing the entrants and the conditions inside and outside the permit space to detect prohibited conditions and summoning rescue and other emergency services. The requirement for an attendant is similar to a requirement in the general industry standard. In this FEA, as in the PEA, OSHA estimates that the cost of posting an attendant is the wage rate of a skilled construction worker multiplied by the time that entrants spend in the confined space.

Rescue Capability

The proposed standard sets forth several requirements for non-entry and entry rescue, including provisions for preparing, protecting, and training entry-rescue employees. In the PEA, OSHA estimated that compliance with rescue-related provisions would have a total annualized cost of approximately $9.6 million, including costs for non-entry rescue and in-house entry rescue teams for many construction projects. One comment characterized the estimated costs related to rescue "planning and compliance" as "drastically low and inaccurate" (ID–124). Several commenters seized on the proposed requirement to summon an entry-rescue team whenever an employer initiates a non-entry rescue. For example, at the hearing, testimony from the National Utility Contractors Association suggested that the proposed rule required employers to have "a standby entry rescue team that can respond to the incident in a timely manner" (ID–210, Tr. p. 177). Another commenter stated that the rescue requirements are "unreasonable and burdensome" (ID–075). This commenter, representing utility contractors, elaborated on its concerns:

> It is not always practical or feasible to have a rescue team onsite and it is very expensive to have a team on standby unless it is the local fire/police rescue squad. The proposed rule should be revised to permit entry into the average PRCS without having a rescue team onsite or on standby. Most fire department rescue squads can handle the majority of confined space rescues, such as manhole, pipe, vault and underground tank rescues. However, due to liability, most fire departments will not assume the responsibility of being the *designated* rescue team on standby, although they will respond to a call and perform the rescue. In our opinion it is safer to have professionals respond than to depend on employees who have had some training and probably no experience handling an actual rescue. *Id.* (emphasis in original).

Other commenters suggested that rescue equipment costs could be high. One commenter stated: "At the very least, the equipment would include a tri-pod, retrieval device, ventilation equipment, air monitors, two air-supplied respirators, air cart and air bottles or air compressor designed to provide breathing air, stokes stretcher and necessary equipment to package the victim and much more" (ID–075). Another commenter stated that the "rescue equipment required could vary greatly. A Confined Space Rescue Team Kit, consisting of a tripod, rescue harnesses/helmets, blower, rope, hardware, software, etc., can easily cost upwards of $17,000 per set" (ID–112).

In response to these and other comments, OSHA revised the requirements for rescue and emergency services for the final rule. For example, OSHA dropped the requirement in proposed § 1926.1211(h)(2) that required employers to summon an entry-rescue team every time they initiated non-entry rescue. OSHA also clarified the Agency's preference for non-entry rescue, which typically consists of a retrieval system and is, therefore, less expensive than entry rescue. Moreover, it appears that some of the commenters mistakenly included costs for equipping contracted rescue services (rather than in-house services of employees) when asserting that OSHA's estimates were too low; employers would not incur such costs as the result of this final rule, and OSHA, therefore, did not include these costs in this analysis.

Final § 1926.1204(i) requires employers to develop and implement procedures for: Providing rescue and emergency services, including procedures for summoning emergency assistance in the event of a failed non-entry rescue; rescuing entrants from permit spaces; providing necessary emergency services to rescued employees; and preventing unauthorized personnel from attempting a rescue. Paragraph (a) of § 1926.1211 specifies the criteria according to which employers can choose rescue and emergency services; § 1926.1211(b) specifies requirements for employers who choose to designate their own employees as the rescue service; and § 1926.1211(c) sets forth requirements related to retrieval systems used to facilitate non-entry rescue from permit spaces. These provisions are similar to the general industry standard for confined spaces. For cost-estimation purposes in the PEA, OSHA judged that entry employers would designate employees who use self-contained breathing apparatuses to provide entry rescue services. OSHA also determined that the rescue-related compliance costs incurred by these employers include expenditures for training and equipment. The Agency used the time of

a skilled construction worker to estimate the labor costs associated with training four employees in rescue operations, conducting practice rescue operations, and training one employee in CPR. Separately, OSHA estimated costs of retrieval lines for employers electing non-entry rescues. Thus, for the proposed rule, the Agency estimated costs for entry rescue and non-entry rescue separately.

Final § 1926.1211(c) requires employers to use non-entry rescue, such as retrieval equipment, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Therefore, for this FEA, OSHA estimated that employers that use non-entry rescue (retrieval lines) would not also designate employees for entry rescue for the same project, but would instead continue to rely solely on emergency services in the event of non-entry rescue failure. OSHA estimated a unit cost per entrant of $3,250 for retrieval systems. The cost of retrieval systems includes the cost of harnesses, which, according to one commenter, cost $100 each and have a useful life of 5 years (ID–112). However, harnesses are a small part of a retrieval system's total cost. In addition to the equipment cost of retrieval lines for each entrant, employers using non-entry rescue would incur additional costs, including one hour of supervisor time to establish rescue procedures and one hour of practice annually for a supervisor and team of 4 non-entry rescuers.

OSHA judges that, when employers do not employ non-entry rescue, they will rely on in-house rescue teams only when entrants use a self-contained breathing apparatus, and will rely on outside rescue service in other situations. OSHA estimates one hour of supervisor time to establish rescue procedures for all employers electing entry-rescue procedures. Following the PEA, OSHA modeled additional costs only for employers using in-house rescue teams; these costs include one hour of practice annually for a supervisor and a team of four rescuers, as well as costs for annual training, CPR training, and entry-rescue equipment.

OSHA did not receive any comments addressing its method of estimating costs for employers using in-house rescue services.

In the PEA, OSHA estimated that confined-space entry-rescue team kits will cost approximately $5,330 per unit (in 2009 dollars). While rescue team kits, such are not required by the standard, they are a simple way for an employer to obtain the equipment *typically* necessary for an adequate rescue team. OSHA concurs with the comment that unit costs for these rescue kits can vary considerably, but a review of commercially available kits shows that the estimate developed by OSHA is reasonable. For example, one commercially available system priced at $2,735 includes a tripod rescue/retrieval system, blower, gas monitor with calibration capability, and a harness. Another system, priced at $4,450, includes a two-way communication system, talk box, cable splitter, operator headset, face masks, speaker harnesses, cables, hooks, and connectors. Confined-space rescue kits are available at a price range of $3,000–$4,500. These kits typically include a wide range of items such as a tripod with bag, spine splint, collar kit, 4:1 rescue kit, full-body harnesses, tag line, belay line, anchor sling, continuous-loop sling, handled ascender, helmets, ascending stirrup, rope pad, rope guard, and carabiners.[54] Based on these prices, and given that OSHA estimated costs for communication devices, ventilation equipment, and gas monitors elsewhere in this analysis, OSHA believes that its estimate of $5,330 for a rescue kit more accurately reflects the requirements of the standard than does the estimate of $17,000 suggested by the commenter. Indeed, OSHA's cost estimate may be an overestimate of the true cost to the extent that a particular confined space covered by the final standard may not require some of the equipment included in commercially available kits.

The final rule requires non-entry rescue unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. To calculate compliance costs, OSHA estimated that employers will use non-entry rescue with retrieval lines for projects whenever required under the standard, and will select entry rescue for all other projects. OSHA estimated that, for all projects, one hour of supervisor time is necessary to set up procedures, and estimates this cost as the supervisor's hourly wage, applied to all projects not already in compliance. In addition, OSHA estimated costs for projects that use non-entry rescue based on the equipment costs for retrieval lines ($3,250) multiplied by the number of entrants on a project. The Agency annualized this cost over a useful life of 20 years, with the total applied to the percentage of projects not already in compliance, adjusted for the number of projects with retrieval lines onsite but not properly used. OSHA estimated four hours of skilled worker time per year to capture the cost of non-entry rescue practice, and applied this total to the percentage of projects not already in compliance.

OSHA estimated costs for projects using entry rescue as the cost of providing in-house rescue for a subset of projects. For all other projects, OSHA estimated that employers will rely on local emergency responders to provide entry rescue, as most employers who have programs do today. For projects using in-house rescue, OSHA calculated the cost of 2 days of entry-rescue training for 4 skilled construction workers (16 hours times 4 workers times the skilled construction worker's hourly wage), 4 hours of CPR training for one skilled worker, and a set of rescue equipment annualized over a useful life of 5 years. OSHA estimated 4 hours of skilled worker time per year to capture the cost of non-entry rescue practice, and applied this total to the percentage of projects not already in compliance. Based on this method, OSHA estimates that the annualized costs for the requirements in the final standard to provide rescue capability total to $8.3 million.

Training

Final § 1926.1207 sets forth requirements for training entrants, attendants, and supervisors to ensure safe performance of the duties assigned under the standard.

In the PEA, OSHA estimated that annualized training costs associated with the proposed standard would total to $8.1 million. As stated in the PEA, this total reflected an adjustment to the estimates in the CONSAD report based on comments received from potentially affected small businesses, and the findings and recommendations made by a panel of reviewers. Several commenters stated that training under the proposed rule would be expensive. However, since the final rule represents a significant simplification of the requirements in the proposed rule, OSHA reduced the cost estimates accordingly. OSHA further notes that, although it anticipates that most affected employers will train workers once using a procedure that covers many topics, and conduct refresher training as appropriate along with training newly arrived employees, the Agency modeled training costs on a per-project basis to be consistent with the rest of the CONSAD-derived analysis. This assumption, along with the unit-

[54] See *http://www.majorsafety.com/index.cfm/product/450_105/confined-space-tripod-rescue-system-with-bw-gasalert-max-xt-and-blower.cfm; http://www.rocknrescue.com/acatalog/Con-Space-Rescue-Kit-3.html#aCSI_2dRES_2dKIT3; http://www.rocknrescue.com/acatalog/Skedco-Evac-Confined-Space-Rescue-Kit.html.*

cost figures used, results in a large and inflated estimate of the training costs.

OSHA notes that the duties of entrants and attendants as set forth in the final standard are now similar to the duties of comparable employees covered by the general industry standard, and that many commenters stated that they were already complying with the general industry standard. In addition, 29 CFR 1926.21(b), a decades-old provision applicable to confined spaces in construction, already requires some training on the characteristics of confined spaces and associated safety practices. Many comments echoed the statement that "affected construction workers are already extremely familiar with the existing general industry standard" (ID–148). Therefore, consistent with the observations above, OSHA believes that the training required for employees will be less extensive than was suggested by the Agency's preliminary training cost estimates.

For this final analysis, OSHA estimates that the costs associated with training entrants and attendants would primarily involve supervisor and employee time necessary for the supervisor to conduct the training. For this FEA, OSHA estimated that employers will spend four hours of supervisor time plus an hour of clerical time developing or revising the training programs for entrants, attendants, and supervisors. OSHA estimates 15 minutes of training for entrants and attendants (1 supervisor and 1 clerical worker are modeled to provide training to a class of 10 entrants). OSHA also includes 1 hour of supervisor training, and 6 minutes of supervisor time to provide the training, per project (again, assuming a class size of 10). As a reminder, most supervisors are already familiar with the general industry rule and, therefore, with many provisions of this final rule. Based on these underlying unit costs, OSHA estimates that the annualized training-related costs under the final standard will be $11.3 million.

Other Compliance Costs

Other compliance costs associated with the final standard include providing disposable coveralls when necessary, emergency lights, traffic barriers, and communication equipment. OSHA identified these costs in the PEA and received no specific comments on the compliance costs for these requirements. Therefore, the Agency used the same methodology in this FEA to estimate these costs.

OSHA modeled the clothing costs based on workers wearing disposable coveralls. The Agency multiplied the number of worker entries requiring disposable coveralls for each project type (by activity and size) by the number of projects in that category that are not currently in compliance and by the unit-cost for disposable coveralls of $8.94 per set. The number of entries requiring this clothing is a subset of the entire number of entries. The estimated annual cost for disposable overalls comes to $2.7 million.

To calculate the costs of emergency lights, OSHA estimated the number of simultaneous entries for each project type. OSHA then multiplied that number by the unit cost of a lantern, $19.04, and annualized it over a useful life of 3 years. Finally, OSHA multiplied the cost per project by the number of projects not in compliance for each category, and summed across categories. The resulting cost is about $193,000 a year.

To calculate the costs of traffic barriers, OSHA added costs for traffic barricades and barricade tape. The Agency estimated that 50 percent of all projects require these controls. OSHA then annualized the unit cost of $165.64 for a traffic barricade over 3 years, and the unit cost of barricade tape at $2.12. The total annualized cost of these barriers comes to $2.9 million.

To calculate the costs of communication equipment, OSHA assumes that employers use two-way radios. OSHA estimated using this equipment for each simultaneous entry. The useful life of this equipment is typically three years. OSHA multiplied annualized costs by the number of simultaneous entries per project and by the number of projects not in compliance per category, and summed the results across categories. The total annual communication costs come to about $55,000.

The total annualized costs for these other requirements come to $6.5 million.

Respiratory Protection

In this FEA, OSHA did not include costs for respiratory protection for two reasons. First, OSHA designed the final rule to prevent an employee's exposure to confined-space hazards whenever possible, thereby obviating the need for respirators and other PPE in those cases; the provisions of the final rules designed to prevent such exposure include training, information exchanges, and a program that ensures appropriate testing and evaluation, monitoring, planning, and control of the space to prevent unauthorized entry (including unauthorized rescues). This approach is fundamental to OSHA's regulatory policy, which recognizes a hierarchy of controls consisting of engineering controls when possible, then work-practice controls when engineering controls are not possible, and finally personal protective equipment only when the other controls are not feasible.[55] Second, consistent with the design of the final rule, none of the safety benefits estimated in this FEA were attributable to respiratory protection. The Agency believes that it would be inconsistent to attribute costs, but not benefits, to respiratory protection (unless, of course, the respiratory protection requirement generates costs but not benefits).

This treatment of respiratory protection in the FEA is fundamentally different from OSHA's earlier treatment of respiratory protection in the PEA. In the PEA, OSHA included costs for employers to provide respiratory protection. These costs included the purchase of the appropriate type of respirator (*e.g.*, self-contained breathing apparatus, powered air purifying respirators, dust masks), time and materials for cleaning respirators, and other necessary equipment such as a

[55] The following excerpt from the preamble to OSHA's Cadmium standard at 57 FR 42101, 42340 (Sept. 14, 1992) provides a typical summary of OSHA's concerns about reliance on PPE and the importance of the hierarchy of controls:

Engineering controls are preferred by OSHA for a number of reasons. Engineering controls are reliable, provide consistent levels of protection to large numbers of workers, can be monitored continually and inexpensively, allow for predictable performance levels, and can remove toxic substances from the workplace. Once removed, the toxic substances no longer pose a threat to the employee. Moreover, the effectiveness of engineering controls does not depend to any marked degree on human behavior, and . . . the operation of equipment is not as vulnerable to human error as is the use of personal protective equipment . . .

Respirators are another, important method of compliance. However, to be used effectively, respirators must be individually selected; fitted and periodically refitted; conscientiously and properly worn; regularly maintained; and replaced as necessary. In many workplaces, these preconditions for effective respirator use are difficult to achieve with sufficient consistency to provide adequate protection. The absence of any of these preconditions can reduce or eliminate the protection the respirator provides to the employee.

Because there are so many ways that respirators can be rendered ineffective and so many potential problems associated with their use, OSHA has traditionally relied less on respirators than on engineering and work-practice controls in the hierarchy of controls. For example, where work is strenuous, the increased breathing resistance of certain types of respirators may contribute to an employee's health problems and may reduce the acceptability of wearing a respirator to employees. Although experience in industry shows that most healthy workers do not have physiological problems wearing properly chosen and fitted respirators, common health problems can cause difficulty in breathing while an employee is wearing a respirator.

compressor or air supply, depending on the type of confined space and the type of work performed in the space.

Furthermore, the Agency used a relatively low rate of current respirator compliance in the PEA, resulting in significant estimated costs (approximately $11.6 million in 2009 dollars) for respirator protection.

The revised treatment of respirator-protection costs in this FEA remedies several issues retrospectively identified in the PEA. First, OSHA designed the final rule to avoid respirator use by relying instead on training, information exchanges, and a program that ensures appropriate testing and evaluation, monitoring, planning, and control of the space to prevent unauthorized entry (including unauthorized rescues). The costs estimated for respirator protection in the PEA failed to fully appreciate the underlying logic of the proposed rule to avoid respirator use whenever possible. Second, OSHA did not attribute any benefits to respirator protection in the PEA. Removing the respirator-protection costs in the FEA resolves the inconsistent treatment of respirator costs and respirator benefits in the PEA.

The third issue concerns the relatively low rate of respirator compliance used to estimate the costs of respirator protection in the PEA. These rates reflected the findings of the 1994 CONSAD report. As noted earlier in this FEA, some commenters questioned the continued relevance of the CONSAD report produced in 1994 (ID–222, p. 20). In light of these comments, OSHA reexamined the CONSAD report and concluded that, generally, while it is the best available data source for this rulemaking, the Agency had to make adjustments in particular areas to reflect updated information. One of these areas involves CONSAD's outdated assumptions and data regarding respirator use. Based on surveys conducted in 1993, the CONSAD report assumed a high rate of non-compliance with the Respiratory Protection standard that existed at the time, and the PEA included significant respirator costs under the assumption that the new confined-spaces standard for construction would have a significant impact on respirator use. However, the CONSAD assumption did not account for the publication of OSHA's significantly revised Respiratory Protection standard in 1998 (63 FR 1152 (Jan. 8, 1998)). In that 1998 rulemaking, OSHA reviewed its enforcement data for the years 1990–1996, acknowledged that many of the respiratory-protection programs were deficient, and designed the new standard to improve employer's selection, maintenance, fit testing, and training for proper respirator use, and "to provide employers with the tools needed to implement an effective respiratory protection program" (63 FR 1160). The rulemaking increased monitoring requirements and awareness and understanding of the respirator requirements. In light of these revisions to the Respirator Protection standard subsequent to the CONSAD report, OSHA concluded that the new standard would significantly enhanced employer compliance with the respiratory-protection requirements by reducing misinterpretations and inconsistencies (63 FR 1158). Enhanced compliance increased the respiratory protection provided to workers, making it unnecessary to rely on the provisions of this final confined-space rulemaking to protect workers from respiratory hazards.

The new confined-spaces standard does not require any additional respirator use beyond that already required by the existing Respiratory Protection standard. OSHA believes that the much-reduced need for respirator protection in confined spaces in the future (as a result of this final rule) will not increase, and could arguably decrease, future respirator use in confined spaces in construction relative to current respirator use.

Annualized Costs by NAICS Industry

Based on the cost estimates for the individual provisions contained in this final standard, Table IV–15 shows, by affected industry engaged in construction activity, annualized compliance costs for all establishments, annualized compliance costs for all small entities (as defined by the Small Business Act and the Small Business Administration's (SBA's) implementing regulations; see 15 U.S.C. 632 and 13 CFR 121.201), and annualized compliance costs for all very small entities (those with fewer than 20 employees). OSHA annualized the costs presented in Table IV–15 using the discount rate of 7 percent, which is, along with a discount rate of 3 percent, recommended by OMB in Circular A–4.

TABLE IV–15—ANNUALIZED COSTS, BY INDUSTRY, FOR ALL CONSTRUCTION ENTITIES AFFECTED BY THE FINAL CONFINED-SPACE STANDARD FOR ALL ESTABLISHMENTS, SMALL ENTITIES, AND VERY SMALL ENTITIES

NAICS	Industry	All establishments	Small entities (SBA-defined)	Very small entities <20 employees)
221310	Water Supply and Irrigation Systems	$51,635	$14,299	$8,738
236115	New Single-Family Housing Construction (except Operative Builders).	813,505	578,128	351,852
236116	New Multifamily Housing Construction (except Operative Builders).	955,662	533,573	174,635
236118	Residential Remodelers	8,277,207	7,853,017	4,342,753
236210	Industrial Building Construction	2,331,853	527,967	175,989
236220	Commercial and Institutional Building Construction	11,862,610	5,868,843	1,747,634
237110	Water and Sewer Line and Related Structures Construction	8,687,099	4,956,577	1,400,582
237130	Power and Communication Line and Related Structures Construction.	2,125,111	697,984	105,944
237310	Highway, Street, and Bridge Construction	15,614,845	4,915,948	1,061,237
237990	Other Heavy and Civil Engineering Construction	1,405,363	513,278	145,898
238190	Other Foundation, Structure, and Building Exterior Contractors	1,627,010	1,069,906	428,448
238210	Electrical Contractors and Other Wiring Installation Contractors	1,627,010	877,857	330,259
238220	Plumbing, Heating, and Air-Conditioning Contractors	2,471,532	1,450,572	551,757
238310	Drywall and Insulation Projects	1,627,010	686,015	203,983
38910	Site Preparation Contractors	844,522	559,703	211,959
	Total	60,321,976	31,103,667	11,241,667

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

Time Distribution of Compliance Costs

Table VI–4 provides the estimated stream of unannualized compliance costs for 10 years following the effective date of the final standard.

TABLE VI–4—DISTRIBUTION OF COMPLIANCE COSTS BY YEARS

Year 1	$ 93,068,644
Year 2	50,514,323
Year 3	50,950,150
Year 4	55,365,256
Year 5	50,950,150
Year 6	76,163,971
Year 7	55,801,082
Year 8	50,514,323
Year 9	50,950,150
Year 10	55,365,256

Source: Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

7. Economic Feasibility Analysis and Regulatory Flexibility Determination

Introduction

In this chapter, OSHA investigates the economic impacts of its final standard on confined spaces in construction. This impact investigation has two overriding objectives: (1) To determine whether the final rule is economically feasible for all affected industries, and (2) to establish if the Agency can certify that the final standard will not have a significant economic impact on a substantial number of small entities.

Economic Feasibility

Section 6(b)(5) of the OSH Act states: "The Secretary . . . shall set the standard which most adequately assures, *to the extent feasible*, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity. . . .[56] [Emphasis added.] OSHA interpreted the phrase "to the extent feasible" to encompass economic feasibility. The U.S. Court of Appeals for the D.C. Circuit supported this interpretation in a 1974 decision.[57] The court noted that "Congress does not appear to have intended to protect employees by putting their employers out of business . . .," [58] and then proceeded to define the concept of "economic feasibility" and to indicate its boundaries:

> Standards may be economically feasible even though, from the standpoint of employers, they are financially burdensome and affect profit margins adversely. Nor does the concept of economic feasibility necessarily guarantee the continued existence of individual employers. It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers. As the effect becomes more widespread within an industry, the problem of economic feasibility becomes more pressing.[59]

Thus, according to the court, OSHA standards would satisfy the economic-feasibility criterion even if they impose significant costs on regulated industries and force some marginal firms out of business, so long as they did not cause massive economic dislocations within a particular industry or imperil the existence of the industry.[60] The implication for analysis of economic impacts is that OSHA must determine whether its standards will eliminate or alter the competitive structure of an industry, not to determine whether any individual plants may close.

In practice, the economic burden of an OSHA standard on an industry—and whether the standard is economically feasible for that industry—depends on the magnitude of compliance costs incurred by establishments in that industry and the extent to which they are able to pass those costs on to their customers. To determine whether a rule is economically feasible for an industry, OSHA begins with two screening tests to consider minimum threshold effects of the rule under two extreme cases: (1) All costs are passed through to customers in the form of higher prices, and (2) firms absorb all costs in the form of reduced profits. In the former case, the immediate impact of the rule would appear as increased industry revenues. In the absence of evidence to the contrary, OSHA generally considers a standard to be economically feasible for an industry when the annualized costs of compliance are less than a threshold level of one percent of annual revenues. Retrospective studies of previous OSHA regulations show that potential impacts of such a small magnitude are unlikely to eliminate an industry or significantly alter its competitive structure.[61]

In the second case, the immediate impact of the rule would appear as reduced industry profits. Again, in the absence of evidence to the contrary, OSHA generally considers a standard to be economically feasible for an industry when the annualized costs of compliance are less than a threshold level of 10 percent of annual profits. OSHA's choice of a threshold level of 10 percent of annual profits is low enough that even if the industry incurred all compliance costs upfront, the costs could still be met from profits without needing to resort to the credit market. Assuming a 7 percent discount rate and a 10-year annualization period, the compliance costs would equal about 70 percent of first-year profits; the industry could absorb these costs from profits without resorting to credit markets. The industry analysis refers to an average firm and its threshold level of profits. Some firms in any industry are below-average, and under-capitalized, poorly run, saddled with lawsuits, or operating in a shrinking market. OSHA cannot guarantee that not a single firm in any industry will become unprofitable in the first year because of this rule, but rather that the vast majority of firms will have their profits impacted by 10 percent or less.

To implement the economic feasibility screening tests described above, OSHA first compared, for each affected industry, annualized compliance costs to annual revenues and profits per (average) affected establishment. The results for all affected establishments in affected industries are in Table IV–14. Shown in the table for each affected industry are the total number of affected firms (entities) and establishments, the percentage of firms affected, annualized costs per affected establishment, annual revenues per establishment, annual profits per establishment, annualized compliance costs as a percentage of annual revenues, and annualized compliance costs as a percentage of annual profits.

To estimate costs for different NAICS construction industries, OSHA developed "crosswalks" from project types used in the CONSAD report to the appropriate NAICS. The Agency then used data from the *2007 Statistics of U.S. Businesses* to obtain information on the number of establishments and receipts (revenues), and data from the *Internal Revenue Service Corporation Source Book* to obtain the average of 2003–2007 profit rates for these sectors. Subsequently, OSHA allocated confined-space projects to sectors and size classes on the assumption that smaller establishments are less likely to work in such spaces than larger ones, and on an allocation rule whereby the Agency assigned each establishment a project before assigning any establishment a second project (for analytical tractability). Finally, OSHA

[56] 29 U.S.C. 655(b)(5).

[57] *Indus Union Dep't* v. *Hodgson*, 499 F.2d 467 (D.C. Cir. 1974).

[58] *Id.* at 478.

[59] *Id.*

[60] *Id.; see also Am. Iron and Steel Inst.* v. *OSHA*, 939 F.2d 975, 980 (D.C. Cir. 1991); *United Steelworkers of Am., AFL–CIO–CLC* v. *Marshall*, 647 F.2d 1189, 1265 (D.C. Cir. 1980).

[61] See OSHA's Web page, *http://www.osha.gov/dea/lookback.html#Completed*, for a link to all completed OSHA lookback reviews.

aggregated compliance costs by industry, divided by the number of affected establishments in the industry to derive average compliance costs per affected establishment by industry, and compared the quotient to average annual establishment revenues and profits by industry.

Note that, in any industry sector in construction, the final standard will affect directly only a small percentage of firms and establishments in any given year. Many business entities in affected industries do not regularly work with confined spaces. As demonstrated in Tables IV–16 and IV–3, respectively, the final standard will affect only about 6.3 percent of firms and 7.2 percent of establishments in the affected industries. OSHA estimates that the average cost of complying with the final standard, per affected establishment, will be less than $2,000 annually (compared with average revenues of about $2.6 million). The estimated costs of compliance represent about 0.08 percent of revenues and 1.6 percent of profits, on average, across all affected entities.

As previously noted, OSHA established a minimum threshold level of annualized costs, equal to 1 percent of annual revenues or 10 percent of annual profits, below which the Agency concluded that costs are unlikely to threaten the economic viability of an affected industry. The key result from Table IV–16, for purposes of determining economic feasibility, is that annualized compliance costs do not represent more than 0.48 percent of revenues for affected firms in any industry. Furthermore, there is only one industry, NAICS 236210 (Industrial Building Construction), in which annualized compliance costs for affected firms exceed 10 percent of annual profits. For that industry, annualized compliance costs are equal to 10.56 of annual profits. However, the Agency believes that the final standard would still be clearly feasible for this industry because, first, the final standard affects only 1.84 percent of all firms in that industry each year (see Table IV–4). Second, OSHA believes that firms engaged in confined-spaces work are larger and more profitable than average, so profit losses to them are likely to be less than modeled. Third, OSHA does not believe that industries will absorb all or most of the costs of the final standard in lost profits. The price elasticity of demand in construction is sufficiently inelastic to enable affected firms to substantially offset variable compliance costs through minor price increases—here, less than 0.5 percent—without experiencing any significant reduction in total revenues or in net profits. Consequently, the Agency concludes that the final standard for confined spaces in construction is economically feasible for all affected industries.[62]

TABLE IV–16—POTENTIAL ECONOMIC IMPACTS FOR ENTITIES AFFECTED BY THE FINAL STANDARD FOR CONFINED SPACES IN CONSTRUCTION

[2009 dollars]

NAICS industry code	Industry name	Affected		Affected firms as a percentage of total (percent)	Annualized compliance costs per affected firm	Average revenues per firm ($ thousands)	Average profits per firm ($ thousands)	Annualized costs as a percentage of affected firm revenues (percent)	Annualized costs as a percentage of affected firm profits (percent)
		Firms	Establishments						
221310 ...	Water Supply and Irrigation Systems.	22	65	0.61	$2,347	$2,235	$132	0.11	1.78
236115 ...	New Single-Family Housing Construction (except Operative Builders).	1,075	1,321	1.75	757	1,691	77	0.04	0.99
236116 ...	New Multifamily Housing Construction (except Operative Builders).	830	883	19.22	1,151	5,774	262	0.02	0.44
236118 ...	Residential Remodelers	9,405	9,602	9.44	880	757	34	0.12	2.57
236210 ...	Industrial Building Construction ..	71	106	1.84	32,843	6,865	311	0.48	10.56
236220 ...	Commercial and Institutional Building.	5,401	6,408	13.08	2,196	9,519	431	0.02	0.51
237110 ...	Water and Sewer Line and Related Structures Construction.	2,579	2,765	18.85	3,368	3,787	227	0.09	1.49
237130 ...	Power and Communication Line and Related Structures Construction.	127	341	2.49	16,733	6,968	417	0.24	4.01
237310 ...	Highway, Street, and Bridge Construction.	3,486	4,275	31.83	4,479	10,230	612	0.04	0.73
237990 ...	Other Heavy and Civil Engineering Construction.	778	965	14.96	1,806	4,633	277	0.04	0.65
238190 ...	Other Foundation, Structure, and Building Exterior Contractors.	1,163	1,182	20.40	1,399	1,243	57	0.11	2.46
238210 ...	Electrical Contractors	2,046	2,680	2.59	795	1,635	74	0.05	1.07
238220 ...	Plumbing, Heating, and Air-Conditioning Contractors.	2,264	2,934	2.28	1,092	1,688	65	0.06	1.68
238310 ...	Drywall and Insulation Projects ..	1,640	2,284	7.53	992	1,941	89	0.05	1.12
238910 ...	Site Preparation Contractors	225	255	0.55	3,753	1,647	79	0.23	4.77

[62] In Chapter 6 of this FEA, OSHA explained why it was not including costs for respiratory protection as part of the estimated costs of the final standard. The Agency notes that this feasibility determination would not change with respect to any affected industry even if OSHA attributed to the final standard the respiratory-protection costs included in the PEA. Using the PEA assumptions, and updating unit-cost information for half masks and HEPA filters (based on currently available online price quotes), OSHA finds that none of the annualized costs for any NAICS code exceed the Agency's threshold of presumptive feasibility of one percent of revenues. The annualized costs for only one NAICS code, 236210 (Industrial Building Construction), exceed the threshold of presumptive feasibility of 10 percent of annual profits. The overall annualized costs for this NAICS code would total roughly $2.8 million after including the costs for respiratory protection; this figure represents 0.57 percent of annual revenue and 12.6 percent of annual profit for this industry. However, for the reasons stated above, the Agency believes that the final standard would be feasible for this industry even after including the respiratory-protection costs.

TABLE IV–16—POTENTIAL ECONOMIC IMPACTS FOR ENTITIES AFFECTED BY THE FINAL STANDARD FOR CONFINED SPACES IN CONSTRUCTION—Continued

[2009 dollars]

NAICS industry code	Industry name	Affected		Affected firms as a percentage of total (percent)	Annualized compliance costs per affected firm	Average revenues per firm ($ thousands)	Average profits per firm ($ thousands)	Annualized costs as a percentage of affected firm revenues (percent)	Annualized costs as a percentage of affected firm profits (percent)
		Firms	Establishments						
	Total	31,112	36,066	6.27	1,939	2,559	121	0.08	1.60

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

Regulatory Flexibility Screening Analysis

To determine if the Assistant Secretary of Labor for Occupational Safety and Health can certify that the final standard for confined spaces in construction will not have a significant economic impact on a substantial number of small entities, the Agency applied long-standing screening tests to consider minimum threshold effects of the final standard on small entities. The minimum threshold effects for this purpose are annualized costs equal to one percent of annual revenues, or annualized costs equal to five percent of annual profits, applied to each affected industry. OSHA applied these screening tests both to small entities and to very small entities. For purposes of certification, affected small entities or very small entities in any affected industry cannot exceed the minimum threshold effects.

Table IV–17 shows that the annualized costs of the standard do not exceed one percent of annual revenues for small entities in any affected construction industry, but they do exceed five percent of annual profits for small entities in two construction industries—NAICS 236210 (Industrial Building Construction) and NAICS 238910 (Site Preparation Contractors). Table IV–18 shows that the annualized costs of the standard exceed one percent of revenues and five percent of annual profits for very small entities in NAICS 236210 (Industrial Building Construction), and exceed five percent of annual profits for very small entities in two other construction industries—NAICS 237130 (Power and Communication Line and Related Structures) and NAICS 238910 (Site Preparation Contractors). OSHA is, therefore, unable to certify that the final standard will not have a significant economic impact on a substantial number of small entities in construction, and must prepare a Final Regulatory Flexibility Analysis (FRFA) (see Chapter 8 below).

TABLE IV–17—POTENTIAL ECONOMIC IMPACTS FOR SMALL ENTITIES AFFECTED BY THE FINAL STANDARD FOR CONFINED SPACES

[2009 dollars]

NAICS industry code	Industry name	Affected firms	Average compliance costs per affected firm ($)	Average revenues per firm ($ thousand)	Average profits per firm ($ thousand)	Costs as a percentage of affected firm revenues	Costs as a percentage of affected firm profits	Cost as a percentage of overall category firm revenues	Costs as a percentage of overall category firm profits
221310	Water Supply and Irrigation Systems.	16	894	713	42	0.13	2.13	0.00	0.01
236115	New Single-Family Housing Construction (except Operative Builders).	942	614	1,255	57	0.05	1.08	0.00	0.02
236116	New Multifamily Housing Construction (except Operative Builders).	719	742	3,600	163	0.02	0.46	0.00	0.08
236118	Residential Remodelers	9,384	837	736	33	0.11	2.51	0.01	0.24
236210	Industrial Building Construction.	24	21,999	2,827	128	0.78	17.18	0.01	0.11
236220	Commercial and Institutional Building.	4,398	1,334	4,950	224	0.03	0.60	0.00	0.06
237110	Water and Sewer Line and Related Structures Construction.	2,248	2,203	2,462	147	0.09	1.50	0.02	0.25
237130	Power and Communication Line and Related Structures Construction.	95	7,347	3,012	180	0.24	4.08	0.00	0.08
237310	Highway, Street, and Bridge Construction.	2,738	1,795	4,304	258	0.04	0.70	0.01	0.19
237990	Other Heavy and Civil Engineering Construction.	579	884	2,085	125	0.04	0.71	0.00	0.08
238190	Other Foundation, Structure, and Building Exterior Contractors.	1,100	973	936	43	0.10	2.27	0.02	0.44
238210	Electrical Contractors	1,424	616	1,037	47	0.06	1.31	0.00	0.02
238220	Plumbing, Heating, and Air-Conditioning Contractors.	1,700	853	1,130	44	0.08	1.96	0.00	0.03
238310	Drywall and Insulation Projects.	1,119	613	1,127	52	0.05	1.19	0.00	0.06

TABLE IV–17—POTENTIAL ECONOMIC IMPACTS FOR SMALL ENTITIES AFFECTED BY THE FINAL STANDARD FOR CONFINED SPACES—Continued

[2009 dollars]

NAICS industry code	Industry name	Affected firms	Average compliance costs per affected firm ($)	Average revenues per firm ($ thousand)	Average profits per firm ($ thousand)	Costs as a percentage of affected firm revenues	Costs as a percentage of affected firm profits	Cost as a percentage of overall category firm revenues	Costs as a percentage of overall category firm profits
238910 ...	Site Preparation Contractors.	167	3,352	1,223	58	0.27	5.74	0.00	0.02
	Total	26,653	1,167	1,533	71	0.08	1.64	0.00	0.09

*Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis—Safety.

TABLE IV–18—POTENTIAL ECONOMIC IMPACTS FOR VERY SMALL ENTITIES (FEWER THAN 20 EMPLOYEES) AFFECTED BY THE FINAL STANDARD FOR CONFINED SPACES

[2009 dollars]

NAICS industry code	Industry name	Annual number of affected firms	Average compliance costs per affected firm ($)	Average revenues per affected firm ($ thousand)	Average profits per affected firm ($ thousand)	Costs as a percentage of affected firm revenues	Costs as a percentage of affected firm profits	Cost as a percentage of overall category firm revenues	Costs as a percentage of overall category firm profits
221310	Water Supply and Irrigation Systems.	11	794	532	31	0.15	2.54	0.00	0.01
236115	New Single-Family Housing Construction (except Operative Builders).	580	607	977	44	0.06	1.37	0.00	0.01
236116	New Multifamily Housing Construction (except Operative Builders).	271	644	1,650	75	0.04	0.86	0.00	0.06
236118	Residential Remodelers.	7,104	611	545	25	0.11	2.47	0.01	0.18
236210	Industrial Building Construction.	8	21,999	1,471	67	1.45	31.92	0.00	0.08
236220	Commercial and Institutional Building.	1,327	1,317	2,273	103	0.06	1.28	0.00	0.05
237110	Water and Sewer Line and Related Structures Construction.	642	2,182	1,105	66	0.20	3.30	0.01	0.19
237130	Power and Communication Line and Related Structures Construction.	17	6,232	945	57	0.66	11.02	0.00	0.05
237310	Highway, Street, and Bridge Construction.	601	1,766	1,814	109	0.10	1.63	0.01	0.12
237990	Other Heavy and Civil Engineering Construction.	166	879	1,007	60	0.09	1.46	0.00	0.06
238190	Other Foundation, Structure, and Building Exterior Contractors.	706	607	552	25	0.11	2.40	0.01	0.32
238210	Electrical Contractors	544	607	575	26	0.11	2.33	0.00	0.02
238220	Plumbing, Heating, and Air-Conditioning Contractors.	655	842	622	24	0.14	3.51	0.00	0.03
238310	Drywall and Installation Projects.	336	607	599	27	0.10	2.21	0.00	0.04
238910	Site Preparation Contractors.	64	3,312	681	33	0.49	10.18	0.00	0.02
	Total	13,032	863	827	38	0.10	2.27	0.00	0.07

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis—Safety.

8. Final Regulatory Flexibility Analysis

The Regulatory Flexibility Act, as amended in 1996 and 2010, requires that an agency prepare a final regulatory flexibility analysis for any rule expected to have a significant economic impact on a substantial number of small entities (5 U.S.C. 601–612). Under the provisions of the law, such an analysis must contain:

1. A description of the impact of the rule on small entities;

2. A statement of the need for, and objectives of, the rule;

3. The response of the agency to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the

proposed rule, and a detailed statement of any change made to the proposed rule in the final rule as a result of the comments;

4. A statement of the significant issues raised by public comments in response to the initial regulatory flexibility analysis, a statement of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments;

5. A description, and estimate, of the number of small entities to which the rule will apply, or an explanation of why no such estimate is available;

6. A description of the projected reporting, recordkeeping, and other compliance requirements of the rule, including an estimate of the classes of small entities that will be subject to the requirements, and the type of professional skills necessary for preparation of the report or record; and

7. A description of the steps the agency took to minimize the significant economic impact on small entities consistent with the stated objectives of the applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule, and why the agency rejected each of the other significant alternatives to the rule considered by the agency which affect the impact on small entities.

1. A Description of the Impact of the Final Rule on Small Entities

As shown in Table IV–19, the estimated total annualized cost of the final standard for all affected small entities in construction (as defined by SBA) is $31.1 million. Also shown in that table are annualized costs per affected small entity by industry. These costs per affected small entity range from $613 for NAICS 238310 (Drywall and Insulation Projects) to $21,999 for NAICS 236210 (Industrial Building Construction). The average yearly cost per affected small entity is $1,167.

To assess the potential economic impact of the final rule on affected small entities, OSHA calculated the ratios of these annualized compliance costs to yearly profits and to yearly revenues. These percentages for each construction industry are in Table IV–17 (see Chapter 7 of this FEA). As shown, among small entities potentially affected by the final rule, the annualized cost of the rule is equal to approximately 0.07 percent of annual revenues. In no construction industry does the annualized cost of the rule for affected small entities exceed 0.7 percent of annual revenues. Accordingly, on average, prices for affected small entities in construction would have to increase by about 0.08 percent to completely offset the cost of the final rule. For affected small entities in the most impacted industry, NAICS 236210 (Industrial Building Construction), prices would have to increase by about 0.8 percent to completely offset the cost of the final rule.

Only to the extent that such price increases are not possible would there be any effect on the average profits of affected small entities. Even in the unlikely event that entities could not pass the costs of the final rule through in the form of higher prices, the entities could absorb the costs completely through a reduction in profits of 1.64 percent, on average, for affected small entities (as shown in Table IV–17). In all but two of the affected industries, the affected small entities could absorb the compliance costs completely through an average reduction in profits of less than 5 percent; the reduction in profits would not exceed 17.2 percent for affected small entities in any of the construction industries, again assuming these entities could not pass through the costs.

To further ensure that OSHA fully analyzed and considered the potential impacts on small entities, the Agency separately examined the potential impacts of the final standard on very small entities, defined as those entities with fewer than 20 employees. As shown in Table IV–20, OSHA estimated the total annualized cost of the final standard for all affected very small entities in construction to be $11.2 million. Also shown in that table are annualized costs per affected small entity by industry. These costs per affected small entity range from $607 for several construction industries to $21,999 for NAICS 236210 (Industrial Building Construction). The average yearly cost per affected small entity is $862.

To assess the potential economic impact of the final standard on very small entities, OSHA calculated the ratios of the annualized costs of the final rule to yearly profits and to yearly revenues. These percentages for each affected construction industry are in Table IV–18. As shown, among very small entities potentially affected by the final rule, the annualized cost of the rule is equal to approximately 0.10 percent of annual revenues. In no construction industry does the annualized cost of the rule for affected very small entities exceed 1.45 percent of annual revenues. Accordingly, on average, prices for affected very small entities in construction would have to increase by about 0.10 percent to completely offset the cost of the final rule. For affected very small entities in the most impacted industry, NAICS 236210 (Industrial Building Construction), prices would have to increase by about 1.45 percent to completely offset the cost of the final rule.

TABLE IV–19—ANNUALIZED COMPLIANCE COSTS ASSOCIATED WITH THE FINAL CONFINED-SPACES STANDARD FOR SMALL ENTITIES, BY NAICS INDUSTRY

[2009 dollars]

NAICS industry code	Industry name	Affected firms	Affected establishments	Affected firms as a percentage of total (percent)	Annualized compliance costs	Cost per firm
221310	Water Supply and Irrigation Systems	16	18	0.5	$14,299	$894
236115	New Single-Family Housing Construction.	942	953	1.5	578,128	614
236116	New Multifamily Housing Construction.	719	728	17.1	533,573	742
236118	Residential Remodelers	9,384	9,468	9.4	7,853,017	837
236210	Industrial Building Construction	24	24	0.7	527,967	21,999
236220	Commercial and Institutional Building	4,398	4,463	10.9	5,868,843	1,334
237110	Water and Sewer Line and Related Structures Construction.	2,248	2,272	16.8	4,956,577	2,205

TABLE IV–19—ANNUALIZED COMPLIANCE COSTS ASSOCIATED WITH THE FINAL CONFINED-SPACES STANDARD FOR SMALL ENTITIES, BY NAICS INDUSTRY—Continued

[2009 dollars]

NAICS industry code	Industry name	Affected firms	Affected establishments	Affected firms as a percentage of total (percent)	Annualized compliance costs	Cost per firm
237130	Power and Communication Line and Related Structures Construction.	95	112	1.9	697,984	7,347
237310	Highway, Street, and Bridge Construction.	2,738	2,784	26.8	4,915,948	1,795
237990	Other Heavy and Civil Engineering Const..	579	584	11.6	513,278	886
238190	Other Foundation, Structure, and Building Exterior Contractors.	1,100	1,112	19.5	1,069,906	973
238210	Electrical Contractors	1,424	1,446	1.8	877,857	616
238220	Plumbing, Heating, and Air-Conditioning Contractors.	1,700	1,722	1.7	1,450,572	853
238310	Drywall and Insulation Projects	1,119	1,130	5.3	686,015	613
238910	Site Preparation Contractors	167	169	0.4	559,703	3,352
	Total	26,653	26,985	5.4	31,103,667	1,167

Source: U.S. Department of Labor, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis-Safety.

TABLE IV–20—ANNUALIZED COMPLIANCE COSTS ASSOCIATED WITH THE FINAL CONFINED-SPACES STANDARD FOR VERY SMALL ENTITIES, BY NAICS INDUSTRY

[2009 dollars]

NAICS industry code	Industry name	Affected firms	Affected establishments	Affected firms as a percentage of total	Annualized compliance costs ($)	Cost per firm ($)
221310	Water Supply and Irrigation Systems	11	11	0.3	8,738	794
236115	New Single-Family Housing Construction.	580	580	1.0	351,851	607
236116	New Multifamily Housing Construction.	271	271	7.2	174,635	644
236118	Residential Remodelers	7,104	7,105	7.3	4,342,753	611
236210	Industrial Building Construction	8	8	0.2	175,989	21,999
236220	Commercial and Institutional Building	1,327	1,329	3.9	1,747,634	1,317
237110	Water and Sewer Line and Related Structures Construction.	642	642	5.7	1,400,582	2,182
237130	Power and Communication Line and Related Structures Construction.	17	17	0.4	105,944	6,232
237310	Highway, Street, and Bridge Construction.	601	601	7.5	1,061,237	1,766
237990	Other Heavy and Civil Engineering Const.	166	166	3.8	145,898	879
238190	Other Foundation, Structure, and Building Exterior Contractors.	706	706	13.5	428,448	607
238210	Electrical Contractors	544	544	0.8	330,259	607
238220	Plumbing, Heating, and Air-Conditioning Contractors.	655	655	0.7	551,757	842
238310	Drywall and Insulation Projects	336	336	1.8	203,983	607
238910	Site Preparation Contractors	64	64	0.2	211,959	3,312
	Total	13,032	13,035	2.9	11,241,667	863

Only to the extent that such price increases are not possible would there be any effect on the average profits of affected very small entities. Even in the unlikely event that the entities could not pass through the costs of the final rule in the form of higher prices, small affected entities could absorb the costs completely through an average reduction in profits of 2.27 percent (as shown in Table IV–18). In all but three of the affected industries, the affected small entities could absorb the compliance costs completely through an average reduction in profits of less than 5 percent; the reduction in profits would not exceed 32 percent for affected small entities in any of the construction industries, again assuming that no costs could be passed through.

In practice, given the small incremental increases in prices potentially resulting from compliance with the final standard and the lack of readily available substitutes (including foreign competition) for the products and services provided by the covered construction industry sectors, OSHA believes demand to be sufficiently inelastic in each affected industry to enable small and very small entities to substantially offset variable compliance costs through minor price increases

without experiencing any significant reduction in total revenues or in net profits.

Further, it is important to note that st assignment to entities by size is approximate, and in some instances larger firms may bear the burden, so the impacts on individual small entities is suggestive only, not definitive. Indeed, the limitations of available economic data and the Dodge report data make it impossible to assign small projects to small firms in a way that represents economic reality. Because OSHA did not assign fractions of projects to firms, it is likely that the Agency overestimated the costs of the final rule on small and very small entities. Accordingly, OSHA believes that it overstated its estimates of impacts on small entities.

With this important caveat, the Agency notes that there are industries in which impacts are above the conventional thresholds of 1 percent of revenue and 5 percent of profit for some small and very small entities. However, only a few firms account for the impacts as shown from the fact that the costs are negligible when expressed as a percentage of overall revenues and profits for the industry-size class (see the last two columns of Table IV–17 and Table IV–18).

A Statement of the Need for, and Objectives of, the Rule

The primary objective of the final rule is to provide an increased degree of occupational safety for employees performing construction work in confined spaces. Another objective of the final rule, in support of the primary objective, is to provide updated, clear, and comprehensive safety standards regarding construction work in confined spaces to the relevant employers, employees, and interested members of the public. The estimated 5.2 fatalities and 780 injuries annually that the final rule would prevent (assuming full compliance) demonstrate the need for the final rule.

The legal basis for the rule is the responsibility given the Department of Labor through the Occupational Safety and Health (OSH) Act of 1970. The OSH Act authorizes and obligates the Secretary of Labor to promulgate mandatory occupational safety and health standards as necessary "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 S.C. 651(b). Additional legal authority for this final rule includes 29 U.S.C. 653, 655(b), and 657; and 40 U.S.C. 3701.

3. The Response of the Agency to Any Comments Filed by the Chief Counsel for Advocacy of the Small Business Administration in Response to the Proposed Rule, and a Detailed Statement of Any Change Made to the Proposed Rule in the Final Rule as a Result of the Comments

In addition to the issues raised by the SBREFA panel, SBA's Office of Advocacy provided recommendations for OSHA to consider (OSHA–2007–0026–0119.1). The Agency provides the following responses to these recommendations (quoted verbatim):

SBA Recommendation 1: While the proposed rule is much improved from the draft version of the rule reviewed during the SBREFA process, it is still very complicated and difficult to understand. Advocacy recommends that OSHA try to further streamline the rule and harmonize it as much as possible with the existing general industry standard (or consider adopting a single rule for both industries). Advocacy notes that many employers operate on work sites that include both general industry and construction confined spaces and employees may encounter both types of confined spaces in close proximity. As many of the SERs pointed out to the SBAR Panel, having two separate standards could double the cost of their safety and training programs (especially if they contract out these services) and cause unnecessary confusion on the job site. Further, the distinction between "maintenance" and "construction" work in various facilities is often unclear. Having two different standards increases the complexity of compliance and could ultimately increase risk. This was, and remains, a key concern of the SERs.

OSHA's Response: When possible, OSHA adapted requirements in the general industry confined spaces standard to construction using parallel language. For example, § 1926.1205, Permitting process, in the final standard contains provisions virtually identical to those in § 1910.146(e), Permit system, in the general industry standard, rather than retaining the distinct classification system that OSHA proposed. However, the final standard for confined spaces in construction bears important distinctions from the general industry standard due to:

- Advances in safety systems (for example, monitoring procedures that detect increases in atmospheric hazards, as required in § 1926.1204(c)(5));
- Unique conditions associated with construction, such as greater emphasis on assessing hazards at sewer worksites and the need for information exchange in a complex multi-employer environment;
- Requests from stakeholders and commenters to allow greater flexibility for employers, such as permitting employers to enter a confined space under the alternative procedures specified by final § 1926.1203(e) if they isolate physical hazards within a space, or permitting employers to suspend a permit (rather than cancelling it) in response to certain temporary changes in conditions;
- Improvements in language for clarity and enforcement considerations.

SBA Recommendation 2: Advocacy is concerned about the host-employer and controlling-contractor provisions of the proposed rule and remains apprehensive about OSHA's imposition of legal obligations on employers for employees who are not their own. This policy seems to emanate from OSHA's *Multi-Employer Citation Policy,* which has never been promulgated as a rule and whose legal status has been called into question in the recent *Secretary of Labor* v. *Summit Contractors, Inc.* decision. Advocacy filed a similar comment about the host-contractor provisions in OSHA's proposed Electric Power Transmission rule. Some of the key concerns of small businesses are that host employers may not even be engaged in construction work (and therefore have no expertise on confined spaces), and that contractors may be working in remote locations with no interaction or oversight. Advocacy appreciates that OSHA has tried to limit the scope of this provision by only requiring host-employers or controlling contractors to provide information they actually possess (as opposed to having to obtain information they do not already have); however, these provisions are highly controversial and are opposed by many small businesses. Advocacy recommends that OSHA eliminate these requirements from the rule.

OSHA's Response: The U.S. Court of Appeals for the Eighth Circuit vacated the cited *Summit* decision in *Solis* v. *Summit Contractors, Inc.,* 558 F.3d 815 (8th Cir. 2009), and the Commission subsequently reiterated its support for OSHA's multi-employer citation policy and OSHA's authority to hold employers responsible for actions of employees who are not their own. *Solis* v. *Summit Contractors, Inc.,* 23 BNA OSHC 1196, 1202–03 (No. 05–0839, 2010). OSHA continues to believe, as stated in the NPRM:

> On multi-employer worksites, an employer's actions can affect the health and safety of another employer's employees. It is critical for the safety of all employees on a

worksite that contractors and subcontractors communicate with each other. Requiring communication between employers is an efficient way to ensure that each employer learns important information about the confined space hazards present so that all employees are adequately protected. (72 FR 67358.)

In this final rule, OSHA made every effort to minimize the impact of the information-exchange requirements on host employers and controlling contractors. OSHA believes that the affected parties conduct such multi-employer communication currently with minimal disruption to business operations, and that the obligations specified by the final standard will become routine and easy to fulfill for employers who must initiate a system for regular communication. OSHA provided a detailed explanation of its decision to retain these requirements, along with its authority for these requirements, in its discussion of final § 1926.1203(h) and (i).

SBA Recommendation 3: Advocacy notes that there are no single-family residential builders included in the economic analysis or the Initial Regulatory Flexibility Analysis (IRFA); however, it appears that there are confined spaces on these construction sites. If OSHA is assuming that no single-family residential builders will incur costs or be affected by the rule (possibly because OSHA is assuming that all of this work is subcontracted out and these subcontractors are already included), then OSHA should state this clearly in the rule. If not, these costs should be included in the economic analysis and IRFA [sic FRFA] (including the costs for the host-employer and controlling-contractor provisions and the paperwork and recordkeeping requirements associated with them). Advocacy notes that because the net benefits of this rule (*i.e.,* benefits minus costs) are only $8.2 million, the additional costs for single-family residential builders could mean that the costs of this proposed rule outweigh its benefits.

OSHA's Response: In this FEA, OSHA analyzed the costs and impacts to residential single-family builders for confined spaces in single-family dwellings that are subject to the final standard (see Chapters VI and VII of this FEA). OSHA determined that, even with these costs included, the benefits of the final standard significantly exceed the costs.

SBA Recommendation 4: In the Regulatory Flexibility Act section, it would be helpful if OSHA clarified in the first paragraph that "an RFA analysis is required for any proposed rule that is expected to have a significant economic impact on a substantial number of small entities" (rather than saying "for certain proposed rules"). Further, OSHA should affirmatively declare in the IRFA [sic FRFA] that OSHA expects this proposed [sic final] rule will have a significant economic impact on a substantial number of small entities.

OSHA's Response: In the opening paragraph of this FRFA, OSHA made the following clarifying statement: "The Regulatory Flexibility Act, as amended in 1996, requires that an agency prepare a final regulatory flexibility analysis for any rule expected to have a significant economic impact on a substantial number of small entities . . ." However, the overall thrust of SBA's recommendation is inconsistent with the RFA, as well as with OSHA's official procedures.[63] According to both the RFA and OSHA's official procedures, the Agency *must* prepare an FRFA only if it is unable to certify that the final standard will not have a significant economic impact on a substantial number of small entities. In Chapter 7 of this FEA, the Agency explained that it was unable to certify that the final standard will not have a significant economic impact on a substantial number of small entities and that, therefore, it must prepare an FRFA.

Note that OSHA may prepare an FRFA even when it has no requirement to do so. In fact, OSHA may, and has, voluntarily prepared FRFAs for purposes of transparency even when the Agency is able to certify that the final standard will not have a significant economic impact on a substantial number of small entities.

SBA Recommendation 5: Also, in Item 7 of the IRFA (Alternatives), OSHA should have summarized the significant alternatives it considered and invited public comment on them (OSHA simply mentions that some were considered). Advocacy notes that a "significant" alternative is defined as one that: (1) Reduces the burden on small entities; (2) is feasible; and (3) meets the agency's underlying objectives. Since it appears that none of the alternatives OSHA considered meets these criteria, OSHA should have stated that fact and invited public comment on its determination. This is a significant issue because many of the SERs recommended that OSHA either adopt the general industry standard or harmonize the two sets of rules as much as possible.

OSHA's Response: OSHA did discuss, and request comment on, several regulatory alternatives, including the major alternative supported by the SBA of aligning the new rule more closely with the general industry rule (see discussion at 72 FR 67396, which incorporates discussions of regulatory alternatives in Table 6 on page 67397, and PEA Chapter 3 at OSHA–2007–0026–0002). The Agency considered these alternatives in terms of (1) reducing the burden on small entities; (2) feasibility; and (3) satisfying the Agency's statutory obligations and objectives. Furthermore, in referring the public, in Item 7 of the IRFA, to more extensive discussions of the alternatives elsewhere, OSHA attempted to comply with both the spirit and the letter of § 605(a) of the RFA to avoid duplicative analyses.

OSHA believes that it addressed the recommendation to a large extent by extensively reworking the proposed standard to this final format, which closely reflects the general industry standard, and thereby reduces the burden on small entities. In this FEA, OSHA evaluated the impacts of more stringent and less stringent regulatory alternatives. The final standard in large part reflects the general industry standard, tailored to address the unique characteristics of the construction industry. A more stringent regulatory alternative to the final standard would require that employers identify and distinguish the type of confined space according to the classification system specified in the proposed rule. OSHA estimates that the more complex classification system, present in the proposed rule but not in this final standard, would increase compliance costs by $1.7 million, not including any costs required for additional training.

One less stringent alternative would relieve employers of the requirement to have a written program for each permit-required entry, and would instead require making a copy of the standard available to employees. OSHA estimates that the requirement for a written program imposes compliance costs of about $1.3 million. OSHA believes that having a written program onsite maintains consistency with the general industry standard and provides specific guidance about how employees are to address hazards in the confined spaces; entry supervisors and employees may need to refer to the program quickly during the entry. The proposed rule allowed employers to simply keep a copy of the standard at the worksite instead of a written program because the proposed standard provided specific and detailed requirements for each potential type of confined space; however, commenters criticized this

[63] Available online at: *http://www.dol.gov/dol/regs/appendix.htm.*

approach as overly complex. The final standard is not conducive to replacing a written program with a copy of the standard because it takes a more generic approach to confined-space requirements than the proposal; this approach is similar to the general industry standard, which also requires employers to maintain a written program on site.

SBA Recommendation 6: Advocacy recommends that OSHA include a list of examples of confined spaces for each of the proposed categories to make the proposed standard easier to understand. For example, the only example cited for the Continuous System-Permit-Required Confined Space category is a "sewer." It would be helpful if OSHA provided additional examples. Similarly, since the SERs and many small businesses have said they find the existing categories to be too complex and confusing, Advocacy recommends that OSHA consider providing a table with four columns listing: (1) The category of confined space; (2) examples of confined spaces under that category; (3) a sequential list of the steps an employer must take to comply with the requirements for that particular category; and (4) a cross-reference to the regulatory citation. OSHA should include this table as an Appendix to the rule as it has done for Entry Permits, which is very helpful.

OSHA's Response: As noted earlier in this chapter, for the final standard OSHA simplified the classification system for confined spaces, making the recommended supplemental lists, tables, and examples unnecessary. OSHA also plans to issue additional guidance documents to help employers comply with this simpler standard.

SBA Recommendation 7: Finally, OSHA should clarify the definition of a "confined space" itself, which is currently unclear. For example, it is unclear what is meant by "not designed for continuous employee occupancy." It would be helpful if OSHA provided some examples for clarification. Also, OSHA should specifically state whether foundations, attics, and crawl spaces in single-family residential homes are considered confined spaces. Finally, OSHA should clarify whether there is any legal distinction between "enclosed" and "confined" spaces, as the term "enclosed" spaces is also used in the preamble.

OSHA's Response: In the Summary and Explanation section of the preamble to the final standard, OSHA clarifies its definition of a "confined space," and § 1926.1201(a) of the standard includes a note with a non-exhaustive list of potential confined spaces that commonly occur on a construction worksite. This list provides examples for employers who may be unfamiliar with confined spaces in construction. The same section of the preamble addresses the scope of the standard with respect to affected spaces in single-family residential construction. In the final rule, OSHA does not distinguish between an "enclosed space" and a "confined space" because the final rule does not include requirements for enclosed spaces. OSHA amended the "enclosed spaces" provision of subpart V, § 1926.953, as part of this rulemaking, and defined that term for purposes of subpart V. OSHA does not use the term in the preamble of the NPRM or the final rule other than in response to SBREFA comments, the removal of § 1926.21(b), and the ACCSH recommendation to address enclosed spaces, which OSHA did not adopt.

4. A Statement of the Significant Issues Raised by the Public Comments in Response to the Initial Regulatory Flexibility Analysis, a Summary of the Assessment of the Agency of Such Issues, and a Statement of Any Changes Made in the Proposed Rule as a Result of Such Comments

On September 26, 2003, OSHA convened a Small Business Advocacy Review Panel (the Panel) for this rulemaking in accordance with the provisions of the Small Business Regulatory Enforcement Fairness Act of 1996 (Pub. L. 104–121), as codified at 5 U.S.C. 601 *et seq.* The Panel consisted of representatives of OSHA, the Office of Information and Regulatory Affairs in the Office of Management and Budget, and the Office of Advocacy within the U.S. Small Business Administration. The Panel received oral and written comments on a draft proposal and a draft economic analysis from small entities (businesses) potentially affected by the rule. The Panel, in turn, prepared a written report which it delivered to the Assistant Secretary for Occupational Safety and Health (and is available in the docket on Regulations.gov as OSHA–2007–0026–0037). The report summarized the comments received from the small-entity representatives (SERs), and included recommendations from the Panel to OSHA regarding the proposal and the associated analysis of compliance costs. OSHA sought comment in the NPRM on a variety of issues of particular interest to small businesses as a result of the recommendations of the Panel. Table IV–21 below provides the Panel recommendations and a summary of OSHA's response to each of these recommendations in light of comments made on the record.

TABLE IV–21—OSHA RESPONSE TO RECOMMENDATIONS BY THE SMALL BUSINESS ADVOCACY REVIEW PANEL FOR THE PROPOSED STANDARD ON CONFINED SPACES IN CONSTRUCTION

Panel recommendation	OSHA's response
1. The SERs generally believed that OSHA had underestimated the costs of the draft proposed standard. The Panel recommended that OSHA revise its economic and regulatory flexibility analysis as appropriate to reflect the SERs' comments on underestimation of costs, and that the Agency compare OSHA's revised estimates to alternative estimates provided by the SERs. For those SER estimates that OSHA did not adopt, OSHA should explain its reasons for preferring an alternative estimate, and solicit comment on the issue.	The Agency relied, in part, on the comments and alternative cost estimates from the SERs to help ensure that the estimated costs of compliance with the final standard would reflect the actual costs that businesses might incur when complying with the requirements specified by the standard. OSHA reduced or eliminated some requirements altogether (such as those addressing hazardous-enclosed spaces) in light of the information provided and issues raised by the SERs. The Agency revised or clarified other requirements (such as those involving communications to/from controlling employers and the classification of spaces) to avoid the potential for misinterpretations regarding the applicability of the requirements and the specific actions necessary to ensure compliance. OSHA discusses the revisions in further detail below in the responses to specific Panel recommendations separately addressing each of these issues.

TABLE IV–21—OSHA RESPONSE TO RECOMMENDATIONS BY THE SMALL BUSINESS ADVOCACY REVIEW PANEL FOR THE PROPOSED STANDARD ON CONFINED SPACES IN CONSTRUCTION—Continued

Panel recommendation	OSHA's response
2. Many SERs observed that OSHA had underestimated the cost of training. They were concerned particularly about the length of time required for training, training the trainers, renewal training, and multilingual training. The SERs also noted that much retraining could be avoided if OSHA adopted the general industry rule because most firms already have trained their employees on that rule. Some SERs also noted that they still need to train employees on the general industry standard because some of their work would come under the general industry standard. In these situations, they would need to continue training on the general industry standard while adding training on the construction standard, and on how employees should determine which standard applies. Because OSHA's economic analysis examined training on a project basis, it is difficult to compare OSHA's cost estimates to the estimates provided by the SERs. The Panel recommends that OSHA carefully analyze the SERs' comments on training costs by developing methods for comparing these cost estimates to those estimates provided in OSHA's economic analysis. OSHA then should compare these costs to its present cost estimates, and revise its training costs as necessary based on all of the available information.	The Agency reviewed its estimates of the costs of complying with the training requirements in the proposed standard in light of the additional information provided by the SERs. OSHA understands that many businesses would have to comply with both the general industry and the construction industry versions of the OSHA confined-spaces standards, depending on the circumstances. Under the final standard, OSHA decided not to allow compliance with the general industry standard in lieu of compliance with this final standard for construction projects because there are situations where the general industry standard would not adequately protect construction employees because of the unique characteristics of construction work (see section II.B. ("History") of this document for a discussion of this issue). However, to simplify the process for employers in confined spaces where both general industry and construction work is ongoing, OSHA provided a statement of enforcement policy which has the effect of allowing all employers in that space to comply with a single set of rules: The construction standard. That policy, along with the changes that bring the construction rule closer in line with the general industry rule and address much of the information provided by the SERs, should reduce the training costs.
3. Many SERs stated that OSHA had neglected some elements of monitoring costs, such as the need for a competent person to conduct the monitoring, the need for the entire crew to wait while a supervisor performs the monitoring, the short life span in the field of monitoring equipment, and costs associated with calibrating the equipment. Those SERs affected by the hazardous-enclosed spaces portion of the draft proposed rule were concerned particularly about increased monitoring costs. The Panel notes that if the SERs' views about the life of equipment and the need for the entire crew to suspend work during monitoring are correct, and no other assumptions are changed, the costs of monitoring would be three to five times higher than OSHA estimated, adding $6 to $12 million to the cost of the draft proposed standard. The Panel recommends that OSHA consider these factors and revise its monitoring cost estimates accordingly, and that monitoring costs reflect the total actual costs associated with conducting monitoring, including the cost of transporting and maintaining equipment, and the costs associated with crew members waiting for the completion of monitoring activities.	The Agency reviewed its estimates of the costs of complying with the atmospheric-monitoring requirements in the proposed standard in light of the additional information provided by the SERs. The Agency decided not to revise the use of a five-year useful life of monitoring equipment absent additional evidence demonstrating that a shorter span was more appropriate. In any case, the effect on total costs of minor variances in the life of equipment would be small. OSHA increased the costs associated with setting up monitoring equipment to 20 minutes (instead of 10 minutes) to reflect the possibility of additional losses of productive work time by other employees. OSHA also doubled the costs associated with periodic calibration of the equipment to reflect possible additional time, costs associated with the transportation of equipment, and other incidental expenses.
4. Many SERs were concerned that the hazardous enclosed spaces provisions of the draft proposed rule would result in extensive costs with few benefits. Some SERs thought the provisions required little recordkeeping beyond what they currently do. Also, some SERs noted that OSHA had underestimated the costs associated with recordkeeping. The Panel is concerned that the hazardous enclosed spaces provision would require major atmospheric testing and monitoring burdens not identified in the cost analysis. The Panel recommends that OSHA carefully examine the benefits and costs of this portion of the rule and compare these requirements carefully to what is required under other existing regulations, and to existing construction industry practice.	As recommended by the Panel, OSHA carefully examined the hazardous-enclosed space portion of the draft proposed standard. OSHA also reexamined applicable existing requirements, the extent of occupational risks involved, and the potential for risk reduction with the promulgation of additional regulatory requirements for hazardous-enclosed spaces. Based on this reexamination, the Agency decided not to promulgate any new or additional requirements for hazardous-enclosed spaces. OSHA believes that other existing standards adequately cover potential hazards associated with these spaces (for example, 29 CFR 1926.55). Therefore, OSHA eliminated all requirements involving hazardous-enclosed spaces, and no such requirements appear in the final standard.
5. Most SERs were concerned that the treatment of controlling employers in the draft proposed standard would result in additional costs for controlling employers in the form of increased monitoring and supervision of subcontractor activities. SERs also were concerned with the costs and time required to meet the coordination and communication requirements of the draft proposed standard. The Panel recommends that, if OSHA does not clarify these provisions, then it should examine further the possible costs of the controlling-employer provisions in the draft proposed rule. Also, OSHA should be certain that it has accounted for all of the burdens associated with this provision.	The Agency clarified the duties of the controlling employer in § 1926.1203 of the final standard (General requirements). In its explanation of paragraph (h) of this section, OSHA provided additional information about the type of information that the controlling employer must share with its subcontractors, and OSHA further clarified in a note to this paragraph that the controlling or host employer do not have to enter a confined space to collect the specified information for its subcontractors. Therefore, the Agency believes that compliance with final § 1926.1203 would not result in a significant added cost to controlling employers. Its purpose is to aid them in their duties to safely coordinate the activities of their subcontractors within the space.
6. Many SERs were concerned that the increased complexity of the classification system would add not only to the training costs but also to the costs associated with classifying confined spaces. The Panel recommends that, if the classification process is not simplified, OSHA should further analyze the costs associated with classifying confined spaces.	The Agency revised the classification system in the final standard to clarify and simplify the classification of confined spaces. The Agency believes this system reflects current practice under the general industry standard when employers apply it to construction work, thereby reducing the compliance burden for employers.

TABLE IV–21—OSHA RESPONSE TO RECOMMENDATIONS BY THE SMALL BUSINESS ADVOCACY REVIEW PANEL FOR THE PROPOSED STANDARD ON CONFINED SPACES IN CONSTRUCTION—Continued

Panel recommendation	OSHA's response
7. OSHA estimated that the draft proposed standard potentially affects small entities performing construction work in confined and enclosed spaces. Small entities in eight specific construction industry classifications were identified as being potentially affected by the draft proposed standard. These classifications include Residential Housing (SIC 1522); Industrial Buildings (SIC 1541); Other Nonresidential Buildings (SIC 1542); Highway and Street Construction (SIC 1611); Bridge and Tunnel Construction (SIC 1622); Water, Sewer, and Pipeline Construction (SIC 1623); Other Heavy Construction (SIC 1629); and Structural Steel Erection (SIC 1791). For each of these industry classifications, Table 3 in the Panel report shows estimates of the total number of small firms in the industry, the number of establishments operated by these firms, the number of employees of these firms, and the total sales of these firms. These figures represent the best available estimates for the numbers of potentially affected small entities meeting the definition of a small entity established by the Small Business Administration for these particular industry sectors. In summary, an estimated 86,012 small entities are potentially affected by the draft proposed standard. These firms operate an estimated 86,158 establishments, employ an estimated 921,831 employees, and generate total sales estimated at $192 billion. In addition to the small entities identified above.	As noted in the response to item 4 above, OSHA did not include the requirements addressing hazardous-enclosed spaces that the Panel believed may impose a burden on the industrial sector for General Contractors for Single Family Homes in the final standard.
8. Almost all of the SERs found the draft proposed standard difficult to follow. The SERs stated that they currently were using the general industry standard and were familiar with it. A few SERs saw some advantages to the differences between the draft proposed standard and the general industry standard, but even these SERs did not believe that these advantages were sufficient to justify the amount of training the draft proposed standard would require. The Panel recommends that OSHA either make the standard easier to follow, consider a standard closer to the general industry standard, or develop a standard in which the classification provisions that provide greater flexibility to employers are optional rather than required.	In the final standard, OSHA addressed the concerns of the SERs about the difficulty in following the text of the proposed standard. OSHA reorganized the regulatory text to follow more closely the general industry structure preferred by the SERs. The final standard specifies the general duties, the standards pertaining to permit-required confined spaces, the permitting process, entry permits, training, rescue services, and specific duties assigned to entrants, attendants, and supervisors. OSHA recognized and addressed problematic situations common to construction sites not clearly addressed by the general industry standard (e.g., sites where there is no host, the kind of information that entities need to exchange, conducting the initial hazard assessment of a previously unclassified space). OSHA adopted many of the general industry provisions, and adjusted them for use on a construction worksite.
9. Most SERs were confused by the distinctions between types of confined spaces. One SER referred to the distinctions as "metaphysical." The Panel recommends that if these distinctions are retained, they should be made clearer, or OSHA should consider making such classifications optional.	In the final standard, OSHA greatly simplified the system for classifying confined spaces (relative to that in the proposed standard) by removing the series of classifications in the proposed rule and simply requiring that employers identify all confined spaces where their employees may work, and designate them as either permit-required confined spaces (*i.e.,* permit spaces) or non-permit spaces. Within the subcategory of permit spaces, employers must identify and address the hazards, such as through hazard isolation or atmosphere control; the final rule addresses these responsibilities using performance language in §§ 1926.1203 (General requirements) and 1926.1204 (Permit-Required Confined Space Program) and does not require the additional classifications required by the proposed rule.
10. Many SERs noted that the hazardous-enclosed spaces requirements would result in a major recordkeeping burden. Some SERs believed that these requirements represented major new requirements for many contractors. OSHA notes that a few of the SERs seemed unacquainted with some of the requirements of existing regulations. The Panel notes that the requirement to evaluate each potentially hazardous space, implicit in § 1926.1225(a)(3), could radically alter the compliance requirements and the costs of the rule in ways not reflected in OSHA's Preliminary Initial Regulatory Flexibility Analysis. The Panel recommends that OSHA more carefully explain the relation of these requirements to existing requirements and practice, and explain the need for different requirements.	See the Agency's response to item 4 above.

TABLE IV–21—OSHA RESPONSE TO RECOMMENDATIONS BY THE SMALL BUSINESS ADVOCACY REVIEW PANEL FOR THE PROPOSED STANDARD ON CONFINED SPACES IN CONSTRUCTION—Continued

Panel recommendation	OSHA's response
11. SERs were concerned that the provisions addressing controlling employers would require general contractors to develop confined-space expertise and provide confined-space supervision. OSHA's intent with these provisions was not to change existing relations between general contractors and their subcontractors, but rather to assure that general contractors provide subcontractors with the information they possess relevant to confined spaces. Some SERs agreed that additional information could be useful. The Panel recommends that OSHA clarify this requirement to indicate that the role of the controlling employer is only to provide any information they possess concerning confined spaces.	As stated above, OSHA clarified the responsibilities of controlling employers in final § 1926.1203. In addition to sharing specific information that it may have about the space with its affected subcontractors, the note to that section clearly states that employers do not have to enter a confined space to gather such information for its subcontractors. The purpose of this section is not to change existing relations between general contractors and their subcontractors, but rather to assure that general contractors provide subcontractors with information relevant to the safety of their subcontractors' employees working within a confined space. The proposed standard did not require controlling employers to develop confined-space expertise to fulfill their duties, and neither does the final standard.
12. OSHA's Hazard Communication standard also provides guidance to employers on the use of certain chemicals in the workplace. However, OSHA does not see any conflict between this standard and the draft proposed standard. The Hazard Communication standard provides general precautionary information regarding the use of certain chemicals and products; the draft proposed standard provides more explicit requirements for conditions specific to confined and enclosed spaces. Also, many construction contractors still will need to follow the general industry standard [for confined spaces] in some types of work, and thus need to train their workers in using two different standards, and when to apply each standard. The SERs identified other federal standards that they believe address the hazards associated with confined and enclosed spaces, including OSHA standards for Ventilation (§ 1926.57) and for Gases, Vapors, Fumes, Dusts, and Mists (§ 1926.55), and EPA and HUD rules on abatement work. Accordingly, the Panel recommends that OSHA clarify the exact relation between the draft proposed standard and other standards affecting work by construction employers in confined or enclosed spaces, including the Hazard Communication standard, the general industry standard, the Permissible Exposure Limit standards, the Ventilation standard, the Gases, Vapors, Fumes, Dusts, and Mists standard, and applicable EPA and HUD standards.	OSHA recognized that the confined spaces standard may overlap with provisions in other part 1926 standards. In the preamble discussion of this final rule, OSHA clarified the relationship between this standard and other pre-existing construction standards which may be applicable in a confined space. In § 1926.1201(c) of the final standard, OSHA explains how overlapping standards would interact with each other, and the obligations of an employer in such situations. OSHA also explains in the preamble of the final rule how employers would evaluate practical situations under the requirements of the final standard when it overlaps with another OSHA requirement. In its explanation of the scope of the final rule, OSHA also provided additional guidance about the potential overlap with part 1926, subparts J, P, S, and Y. In addition, OSHA made a minor modification to 29 CFR part 1926, subpart V, to ensure that it provides clear guidance to employers about the interaction of that standard with the confined spaces in construction standard. OSHA is currently unaware of any other Federal agency standards that overlap or conflict with the final OSHA standard.
13. Alternatives to adopting the draft proposed standard developed by OSHA include adopting the draft proposed standard developed by the Advisory Committee for Construction Safety and Health, the industry consensus standard developed by the American National Standards Institute, or the existing OSHA general industry standard [for confined spaces]. Additional alternatives include modifying the OSHA draft proposed standard by removing provisions addressing hazardous-enclosed spaces, removing the requirement to classify spaces in the least hazardous category, revising requirements for atmospheric monitoring to allow periodic monitoring instead of continuous monitoring, and/or reducing or eliminating recordkeeping requirements. The Panel recommends that OSHA continue to consider these alternatives, and discuss and solicit comment on them in the proposed rule.	OSHA considered alternatives to drafting its own confined space standard for construction. The Agency considered the general industry standard for confined spaces, but found it to be unsuitable for the construction industry. OSHA believes that the general industry standard does not adequately address some problematic situations common on construction sites. These concerns include multiple subcontractors working within one space, and hazards created by a confined space built around employees. OSHA drafted the final standard to be similar to the general industry standard in terms of organization and most of the requirements. ANSI is presently considering whether it is feasible to begin drafting a confined-spaces standard for application specifically to construction. OSHA addressed major concerns of the SERs regarding the hazardous-enclosed space requirements in the draft proposed standard by removing that section completely from the proposal and final standard. As previously stated above, OSHA also simplified classification as either permit-required or non-permit required. Finally, OSHA reduced employers' recordkeeping requirements by minimizing the time necessary for employers to maintain documentation. For example, in § 1926.1205 of the final standard, an employer will only have to maintain entry permits for one year.

TABLE IV–21—OSHA RESPONSE TO RECOMMENDATIONS BY THE SMALL BUSINESS ADVOCACY REVIEW PANEL FOR THE PROPOSED STANDARD ON CONFINED SPACES IN CONSTRUCTION—Continued

Panel recommendation	OSHA's response
14. Most SERs indicated a preference for using the general industry standard for construction work, as opposed to the draft proposed standard. OSHA is concerned that not all construction employers are as familiar with the general industry standard as the SERs are, and that some employers might benefit from a standard designed to provide greater compliance flexibility. The Panel recommends that OSHA consider the alternative of adopting the general industry standard and, if this alternative is not adopted, discuss and solicit comment on this alternative in the proposed rule. If OSHA does not adopt a standard closer to the general industry standard, the Panel recommends that OSHA revise its comparative cost analysis of the general industry rule and the draft proposed standard to take account of SERs' concerns about the increased training, communication, and classification costs associated with the draft proposed standard. The Panel also recommends that OSHA solicit comment on how an alternative standard similar to the general industry standard could be adapted to the construction sector. In addition, the Panel recommends that OSHA analyze and solicit comment on the non-regulatory alternative of not issuing a final standard, relying instead on existing standards and improved outreach.	As stated before, the draft proposed confined-spaces standard for construction addresses some concerns that are unique to the construction industry. OSHA believes that the reorganization of the proposed standard and the elimination of the section on hazardous-enclosed spaces will make the final standard easier to read than the general industry standard for confined spaces, thereby expediting employer compliance. OSHA requested that the public submit comments regarding the degree of flexibility granted to employers in classifying confined spaces, as well as other alternatives to the proposed rule in general. In the final standard, OSHA adopted a classification system based on identifying permit-required spaces (*i.e.,* permit spaces). This system reflects the classification system used widely under the general industry standard. OSHA rejected the alternative of not issuing a final standard because the record demonstrates that the existing standards, even with improved outreach, would be inadequate to prevent the fatalities and injuries identified earlier in this analysis. The earlier discussion in this FEA under "Need For Regulation" includes additional information on the need for this new standard.
15. The SERs were confused by the variety of distinctions among confined spaces, and generally believed that the training required by these provisions negated any advantages that might arise from the flexibility of different types of confined spaces. The Panel recommends that OSHA examine and solicit comment on alternatives that reduce the number of types of confined spaces, and that OSHA consider alternatives that would allow employers the choice of using or ignoring these provisions.	In the proposed rule, the Agency reduced the number of classifications by removing the classification for hazardous-enclosed spaces. In the proposed rule, OSHA further clarified the four remaining categories by reorganizing the text of the proposed standard to ensure that all requirements for each classification type were available in one section. OSHA requested that the public submit comments regarding other alternatives to the proposed rule. In the final standard, OSHA further reduced the number of confined-space classifications by adopting the approach used in the general industry standard to designate permit-required spaces. The Agency believes that, because the final standard closely mirrors the general industry standard, there will be minimal additional costs for employers to train their employees on the final construction standard.
16. Many SERs viewed the requirements for hazardous-enclosed spaces as highly burdensome. The Panel recommends that OSHA remove this provision unless OSHA can (1) clarify exactly how the requirements of this provision are different from other existing requirements and practices; (2) develop a detailed cost analysis of this provision; (3) quantify the hazards associated with hazardous-enclosed spaces; and (4) explain how the hazardous-enclosed space provisions can serve to reduce these hazards. If OSHA retains this requirement or one like it, OSHA also should solicit comment on the need for the recordkeeping requirements in the provision. In addition, OSHA should solicit comment on removing this provision entirely.	As recommended by the Panel, OSHA removed the provisions for hazardous-enclosed spaces.
17. Most SERs were concerned that the provisions for controlling contractors would alter the existing relationship between contractors and subcontractors with little gain in reduced risk to employees. OSHA notes that the purpose of this provision was only to ensure that contractors share available information at multi-employer worksites. Some SERs agreed that information sharing would be helpful, but were concerned that the OSHA draft went far beyond this purpose. The Panel recommends that OSHA consider removing this provision or clarifying the purpose of this provision, and solicit comment in the proposal on the need for this provision.	As stated previously, § 1926.1203(h), and the note to that section, clarify the duties of the controlling contractor and explain that a controlling contractor will not have to enter a confined space to gather the specified information for the subcontractor.

OSHA received no significant comments in response to the Initial Regulatory Flexibility Analysis for the proposed rule, but it did receive two comments on whether elements of the proposed standard were feasible for small entities. First, the National Association of Home Builders (NAHB) claimed the proposed rule required controlling contractors to supervise all entries into permit spaces, and argued that it was not economically feasible for small home builders to do so (ID–219.2). In addition, NAHB claimed the information coordination duties of the proposed rule were not economically feasible for small home builders.

OSHA finds these arguments misguided. First, neither the proposal nor the final rule required controlling employers to supervise the entries of other employers. Nor did NAHB provide convincing evidence that the coordination duties placed on contractors were infeasible.

Among the evidence cited in the published study NAHB used to support this economic infeasibility conclusion is a profit rate (profit as a percentage of revenue) of 7.7 percent for NAHB builder members in 2006, which is significantly higher than the more conservative rate OSHA used in its calculations: 4.53 percent. If the actual profit rate is higher than OSHA's

estimate, OSHA's impact estimates may *overstate* the effect of this rule on revenues and profits in the homebuilding industry. As previously demonstrated in Chapter 7 of this FEA, these potentially inflated estimates of revenue and profit impacts for the new single-family housing-construction industry (NAICS 236115; all affected firms) are well below the threshold of economic infeasibility at 0.04 percent and 0.99 percent, respectively (0.05 percent and 1.08 percent, respectively, for small entities).

As noted in Chapter 6 of this FEA, OSHA assigned typical unit-time estimates for the multi-employer (information-exchange) provisions of the final standard and demonstrated there, and in this chapter, that the costs incurred by home builders would not be excessive or unreasonable. Despite assertions by NAHB that the demands of coordinating subcontractors would be economically infeasible as prescribed by the multi-employer provisions of the rule, there is evidence (ID–211, Tr. pp. 123–127) to suggest that home builders often find that they must coordinate and communicate efficiently with subcontractors across construction sites of varied size and complexity. Therefore, OSHA believes that, based on the evidence in the record as a whole, the multi-employer information-exchange requirements of the final standard would not impose an unreasonable burden on home builders, and would not threaten the competitive stability of the industry or otherwise create conditions of economic infeasibility.

Another commenter asserted that the impact of the proposed rule on small businesses would be "staggering" and would drive some contractors out of business, arguing that several of the costs of the proposed standard were disproportionate to its benefits (ID–112). This commenter suggested that OSHA withdraw the proposed standard or that compliance with the general industry standard constitute compliance with the construction standard. OSHA revised the final rule by harmonizing it with the general industry standard to a substantial degree. Therefore, the final standard in large part reflects the general industry standard, tailored to address the unique characteristics of the construction industry. In revising several provisions of the final rule to reflect the general industry standard, OSHA sought to minimize the impact on small entities by minimizing the costs involved in distinguishing between the two rules and complying with both standards, as well as the costs involved in retraining employees on new procedures.

5. A Description, and an Estimate, of the Number of Small Entities to Which the Rule Will Apply, or an Explanation of Why no such Estimate is Available

OSHA completed an analysis of the economic impacts associated with this final rule, including an analysis of the type and number of small entities to which it would apply, as described previously in this section (See Tables IV–19 and IV–20). To determine the number of small entities potentially affected by this rulemaking, OSHA used the definitions of small entities developed by the Small Business Administration (SBA) for each industry.

For the construction industry generally, SBA defines small businesses using revenue-based criteria. For most of the affected construction industries, including those industries that mostly consist of general contractors, OSHA classified firms with annual revenues of less than $33.5 million as small businesses. For specialty contractors, such as structural-steel erection contractors, the Agency considered firms with annual revenues of less than $14 million to be small businesses. Based on the definitions of small entities developed by SBA for each industry, the final rule would potentially affect a total of 490,000 small entities, as shown in Table IV–4. Included in this number are an estimated 451,000 entities with fewer than 20 employees, as shown in Table IV–5.

6. A Description of the Projected Reporting, Recordkeeping, and Other Compliance Requirements of the Rule, Including an Estimate of the Classes of Small Entities That Will Be Subject to the Requirement, and the Type of Professional Skills Necessary for Preparation of the Report or Record

OSHA is issuing a standard that addresses the work practices employers must use and other requirements they must follow when performing construction work in confined spaces. Table IV–14 of this FEA shows the unit costs for these requirements.

Employers must keep records associated with work in confined spaces as specified by the final standard. Records include entry permits and verification documents. The final standard does not require regular reporting; however, employers must demonstrate compliance with the recordkeeping requirements as part of OSHA compliance inspections.

Other compliance requirements of the final standard include evaluating and classifying confined spaces, eliminating or isolating hazards, providing sufficient ventilation, conducting atmospheric monitoring, providing an attendant, providing respiratory protection, preventing unauthorized entry, planning and providing rescue capability, and providing training.

The preamble to the final standard provides a comprehensive description of, and further detail regarding, the provisions of the final rule. The preceding chapters of this FEA provide a description of the types of entities subject to the new and revised requirements, and the types of professional skills necessary for compliance with the requirements.

7. A Description of the Steps the Agency Took To Minimize any Significant Economic Impact on Small Entities Consistent With the Stated Objectives of the Applicable Statutes, Including a Statement of the Factual, Policy, and Legal Reasons for Selecting the Alternative Adopted in the Final Rule, and Why the Agency Rejected Each One of the Other Significant Alternatives to the Rule Considered by the Agency Which Affect the Impact on Small Entities

OSHA took a number of steps to minimize economic burdens on small entities. In response to the SERs' suggestion that the Agency harmonize the construction standard with the general industry standard to the greatest extent possible, the final standard in large part reflects the general industry standard, tailored to address the unique characteristics of the construction industry. In revising several provisions of the final rule to reflect the general industry standard, OSHA sought to minimize the impact on small entities by reducing the need to comply with different confined-space requirements for construction and general industry, and to train employees on new procedures. The vast majority of commenters believed that the classification system in the proposed rule would not contribute to worker safety, and would result in confusion among employers. Therefore, OSHA decided to adopt the system reflected in the general industry standard for classifying confined spaces as permit-required confined spaces.

In addition, OSHA did not include a proposed provision in the final rule that required an employer to summon an entry-rescue service whenever the employer initiated a non-entry rescue. OSHA also allows employers to use the alternative ventilation-only procedures under final § 1926.1203(e) if an employer is able to isolate all physical

hazards in the space, which provides more flexibility to an employer than the general industry standard. Furthermore, OSHA allows employers to suspend a permit in certain circumstances, rather than cancelling and developing a new permit. Each of these options has the potential to significantly reduce the economic impact on employers, including small entities. The preamble for §§ 1926.1203(e) and 1926.1205(e) includes an in-depth explanation of the specific steps taken to minimize employer burden.

Another less stringent alternative would relieve employers of the requirements specified in the final standard for information exchange between host employers, controlling contractors, and entry employers on worksites; these requirements are absent from the general industry standard. While OSHA notes that host employers must share this information under the general industry standard, and believes that this exchange of information occurs as a matter of usual and customary practice on general industry and construction worksites alike, the general industry standard does not explicitly impose information-sharing requirements on controlling contractors. OSHA estimates that compliance with the information-exchange requirements of the final rule will result in compliance costs of about $9.3 million, and that the less-stringent alternative, reflected in the general industry standard, would reduce compliance costs by about $5.9 million. However, OSHA believes that, given the unique characteristics of the construction industry that include continually changing projects and multiple employers onsite, the specific information-exchange requirements contained in the final rule will contribute to an effective exchange of information about confined-space hazards and will, therefore, increase worker safety on construction sites. Another, less stringent, alternative would relieve employers of the requirement in the final standard to develop a written program for each permit-required entry, and would instead require that a copy of the standard be made available at the worksite. OSHA estimates that the requirement for a written program will result in compliance costs of about $1.3 million. OSHA believes that having a written program onsite maintains consistency with the general industry standard and provides site-specific information about the confined spaces. The proposed rule allowed employers to simply keep a copy of the standard at the worksite instead of a written program because the proposed standard provided specific and detailed requirements for each potential type of confined space. The final standard is not conducive to replacing a written program with a copy of the standard because it takes a more generic approach to confined-space requirements than the proposal; this approach is similar to the general industry standard, which also requires employers to maintain a written program on site.

9. Sensitivity Analysis

In this chapter, OSHA presents the results of two different types of sensitivity analysis to demonstrate how robust the estimates of net benefits are to changes in selected cost and benefit parameters. In the first set of sensitivity tests, OSHA makes a series of isolated changes to individual cost- and benefit-input parameters to determine their effects on the Agency's estimates of annualized costs, benefits, and net benefits. In the second set of tests—a so-called "break-even analysis"—OSHA also investigates isolated changes to individual cost- and benefit-input parameters, but with the objective of determining the magnitude of the changes needed for annualized costs to equal annualized benefits. The Agency conducted these calculations for informational purposes only, and is not relying on these calculations to justify this final rule.

Effects of Isolated Changes to Specific Input Parameters

OSHA provides below a sensitivity analysis of several assumptions underlying the Agency's estimates of the annualized costs and benefits of the final rule. The calculations underlying the estimation of compliance costs, benefits, and economic impacts associated with this rulemaking are generally linear and additive. Accordingly, the changes in the costs or benefits will generally be proportional to variations in the relevant input parameters. For example, if the estimated time for supervisors to evaluate and classify confined spaces increased by 50 percent, the corresponding labor costs would also increase 50 percent.

OSHA evaluated a series of such changes in input parameters to test the extent to which the general conclusions of the economic analysis remained stable. On the whole, OSHA finds these conclusions to be robust, as even sizeable changes in the values of several input parameters did not greatly alter the estimates of the costs, benefits, or net benefits. Furthermore, this final rule produces significant positive net benefits regardless of the individual revisions to costs, benefits, or discount rate. Table IV–22 below summarizes the results of the individual sensitivity tests. In all the sensitivity tests, the parameters remained unchanged except for the one tested.

In the first sensitivity test on costs, when OSHA increased by 100 percent the estimated time for supervisors to evaluate and classify confined spaces, the estimated total costs of compliance increased by $0.7 million annually, or by 1 percent. In a second sensitivity test, OSHA increased by 100 percent the time estimated for information exchange on a multi-employer project. This test led to an increase in the estimated annualized compliance costs of $9.3 million, or of about 17 percent. In a third sensitivity test, OSHA increased by 100 percent its estimate of the time needed to issue entry permits and verify the safety of entries into confined spaces, which resulted in an increase in the estimated annualized compliance costs of $2.3 million, or of about 4 percent. Finally, in a fourth sensitivity test, when OSHA increased by 100 percent the estimate of the time devoted to training entrants and attendants, the estimated compliance costs rose by $1.5 million, or by about 3 percent.

In addition, OSHA examined the effect of a change in the discount rate on annualized costs and benefits. Changing the discount rate from 7 percent, used in the base case, to 3 percent lowered the estimated costs of the final rule from $60.3 million to $59.2 million per year (while leaving estimated annual benefits unaffected), thereby increasing the estimate of net benefits by $1 million.

OSHA also performed a sensitivity test on an input parameter used to estimate the benefits of the final rule. In particular, OSHA assumed that there were 100 injuries for every fatality instead of 150 injuries per fatality, the value used in the main analysis. As a result, the estimated benefits of the final rule fell by $15.6 million, or by about 17 percent.

In conclusion, these sensitivity tests demonstrate that even with relatively large variations in the input parameters, there are no large changes in the estimates of compliance costs or benefits.

TABLE IV–22—SENSITIVITY TESTS

Variable	OSHA's Best estimate	Change in variable	Change in annualized costs	Percentage change in annualized costs	Annualized costs	Net benefit
Cost Parameters						
OSHA's Best Estimate of Total Annualized Costs					$60.3 million	$33.3 million.
Supervisor Time to Evaluate and Classify Confined Spaces.	Average of 12 minutes per confined space.	Increase by 100 percent.	$0.7 million	1	$61 million	$32.6 million.
Time for Information Exchange on a Multi-employer Project.	Per project: 8 minutes of supervisor time for exchange information between host employer and controlling contractor, 20 minutes of supervisor time each for the controlling contractor, employee representative, and every entry employer, 5 minutes of supervisor time each for the controlling contractor and 10 percent of other (non-entry) employers on the work site, and 10 minutes of supervisor time each for the controlling contractor and two other employers on the work site for coordinated entries.	Increase by 100 percent.	$9.3 million	17	$69.6 million	$24 million.
Time to Issue Entry Permits and Verify Safety of Entries.	Per permit issued: 10 minutes of supervisor time and 5 minutes of clerical time. Per entry not requiring a permit: 5 minutes of supervisor time and 5 minutes of clerical time.	Increase by 100 percent.	$2.3 million	4	$62.6 million	$31 million.
Employee Training	Per project: 15 minutes of worker time and 1.5 minutes each of supervisor and clerical employee time for each entrant, 15 minutes of attendant time and 1.5 minutes each of supervisor and clerical employee time for each attendant.	Increase by 100 percent.	$1.5 million	3	$61.8 million	$31.8 million.
Discount Rate	7 percent	Change to 3 percent.	−$1 million	−2	$59.2 million	$34.3 million.
Benefit Parameter						
OSHA's Best Estimate of Total Annualized Benefits					$93.6 million	$33.3 million.
Number of injuries per fatality.	150	100	−$15.6 million	−17	$78 million	$17.7 million.

Break-Even Analysis

OSHA also performed sensitivity tests on two other parameters used to estimate the net costs and benefits of the proposed rule. However, for these tests, the Agency performed a break-even analysis that asked the extent to which the various cost and benefits inputs would have to vary for the costs to equal benefits.

In the first break-even test addressing cost estimates, OSHA examined how much costs would have to increase for costs to equal benefits. This point would occur when costs increased by $33.3 million, or 55 percent.

In a second break-even test, on benefits, OSHA examined the reduction needed in the rule's estimated aggregate benefits (in terms of avoided fatalities and injuries) for the costs to equal the benefits. The point would occur when OSHA's estimates of the number of avoided fatalities and injuries fell by 59 percent. The break-even point would, thus, require reducing the estimated benefits of the final rule by 2.18 fatalities and 326 injuries prevented annually (relative to OSHA's estimate of 5.2 fatalities and 780 injuries prevented annually).

In summary, according to these two break-even tests, there would have to be a fairly significant increase in costs or reduction in benefits for the rule to no longer produce positive net benefits. Further, OSHA notes that some of the other benefits of the rule are non-quantifiable, such as those benefits associated with making the general industry and construction provisions as compatible as possible. These benefits would increase the overall net benefits of the final rule.

10. References

ACCSH Confined Spaces Work Group (ACCSH, 1994). "Work Group Report: Confined Spaces," submitted to the Advisory Committee on Construction Safety and Health, May 17, 1994. Available at: *https://www.osha.gov/doc/reference_documents.html.*

Ahluwalia, G. (Ahluwalia, 2003). "Subcontracting and Channels of Distribution," *Housing Economics,* May 2003. (Attached to OSHA–2007–0026–0117.)

Ashford, N. A., 2006. "Workers' Compensation," in *Environmental and Occupational Medicine,* Fourth Edition, W.N. Rom and S. Markowitz (Eds.), Lippincott-Raven Publishers, Philadelphia: pp. 1712–1719.

CONSAD Research Corporation (CONSAD, 2005). "Rulemaking Support for the Proposed OSHA Confined Space Standard for Construction," prepared for the U.S. Department of Labor, Occupational Safety and Health Administration, Office of Regulatory Analysis, June 8, 2005. (OSHA–2007–0026–003.)

Dong, X., *et al.* (Dong, et al., 2011). "Lifetime Risk of Occupational Injuries and Illnesses among Construction Workers," American Public Health Association, Washington, DC, October 31, 2011.

Hintermann, B., A. Alberini, and A. Markandya (Hinterman, Alberini, and Markandya, 2010). "Estimating the Value of Safety with Labour Market Data: Are the Results Trustworthy?," *Applied Economics,* 42 (9): pp. 1085–1100, 2010.

IRS (Internal Revenue Service), 2012. Publication 525, "Taxable and Nontaxable Income." Available at: *http://www.irs.gov/uac/Publication-525,-Taxable-and-Nontaxable-Income--1.*

IRS (Internal Revenue Service), 2013. Topic 751, "Social Security and Medicare Withholding Rates." Available at: *http://www.irs.gov/taxtopics/tc751.html.*

Leigh, J. P., and J. P. Marcin, 2012. "Workers' Compensation Benefits and Shifting Costs for Occupational Injury and Illness," *Journal of Occupational and Environmental Medicine,* April, 54(4): pp. 445–50.

NASI (National Academy of Social Insurance), 2012. "Workers' Compensation: Benefits, Coverage, and Costs, 2010," August. Available at *http://www.nasi.org/research/2012/report-workers-compensation-benefits-coverage-costs-2010.*

NCCI (National Council on Compensation Insurance), 2013. "ABCs of Experience Rating." Available at *https://www.ncci.com/NCCIMain/Education/ExperienceRating/Pages/default.aspx.*

Neuhauser, F.W., S.S. Seabury, and J. Mendeloff, 2013. "The Impact of Experience Rating on Small Employers: Would Lowering the Threshold for Experience Rating Improve Safety?," Rand Working Papers WR–955. Newsletter discussion available at: *http://www.rand.org/jie/centers/workplace-health-safety/projects/experience-rating.html.* Full paper at: *http://www.rand.org/pubs/working_papers/WR955.html.*

Ruser, J.W. (Ruser, 2008). "Examining Evidence on Whether BLS Undercounts Workplace Injuries and Illnesses," *Monthly Labor Review,* 131 (8): pp. 20–32, August 2008.

Small Business Advocacy Review Panel for the OSHA Confined Spaces in Construction Draft Standard (SBREFA Panel, 2003). "Report of the Small Business Advocacy Review Panel on the Draft OSHA Standard for Confined Spaces in Construction," submitted to Mr. John Henshaw, Assistant Secretary for Occupational Safety and Health, U.S. Department of Labor, Occupational Safety and Health Administration, November 24, 2003. (Exhibit 2–1 in OSHA docket S107A.)

Seong, S.K., and J. Mendeloff, 2004. "Assessing the Accuracy of OSHA's Projections of the Benefits of New Safety Standards," *American Journal of Industrial Medicine,* 45, 4: 2004.

Sunstein, C., 2004. "Valuing Life: A Plea for Disaggregation," *Duke Law Journal,* 54: pp. 385–445.

Thaler, R., and S. Rosen, 1976. "The Value of Saving a Life: Evidence from the Labor Market," in *Household Production and Consumption,* N E. Terleckyj (ed.), New York: Columbia University Press, 1976: pp. 265–298.

U.S. Bureau of Labor Statistics (BLS 2009A). Table A–1, "Fatal Occupational Injuries by Industry, Event and Exposure, 2009." Available at: *http://www.bls.gov/iif/oshwc/cfoi/cftb0241.pdf.*

U.S. Bureau of Labor Statistics (BLS 2009B). Table 2, "Number of Nonfatal Occupational Injuries and Illnesses by Case Type and Ownership for Selected Industries, 2009," News Release USDL 10–1451. Available at: *http://bls.gov/news.release/archives/osh2_11092010.pdf.*

U.S. Commerce Department, Bureau of Economic Analysis. "GDP Price Deflator 2002 to 2009." Available at: *http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&903=13,* downloaded on 11/9/2010.

U.S. Census Bureau. "Annual Value of Construction Put in Place 2002–2009." Available at: *http://www.census.gov/construction/c30/c30index.html.*

U.S. Environmental Protection Agency (EPA, 2000). "Guidelines for Preparing Economic Analyses," *EPA 240–R–00–003:* September 2000. Available at: *http://yosemite1.epa.gov/ee/epa/eed.nsf/Webpages/Guidelines.html;* also available in OSHA Docket No. H–0054a, Exhibit 35–334.

U.S. Internal Revenue Service (IRS, 2013), 2010. "Corporation Source Book," *Publication 1053.* Available at: < *http://www.irs.gov/uac/SOI-Tax-Stats-Corporation-Source-Book:-U.S.-Total-and-Sectors-Listing*> Accessed by OSHA on 4/19/2013.

U.S. Office of Management and Budget (OMB, 2003). "To the Heads of Executive Agencies and Establishments; Subject: Regulatory Analysis," *Circular A–4:* September 17, 2003. Available at: *http://www.whitehouse.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf.*

Urban Institute/Brookings, 2012. "Historical Average Federal Tax Rates for All Households," Tax Policy Center, October. Available at: *http://www.taxpolicycenter.org/taxfacts/displayafact.cfm?Docid=456.*

Viscusi, K., and J. Aldy (Viscusi and Aldy, 2003). "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World," *The Journal of Risk and Uncertainty,* 27 (1): pp. 5–76, August 2003.

Viscusi, W. Kip, Wesley A. Magat, and Anne Forrest. "Altruistic and Private Valuation of Risk Reduction." *Journal of Policy Analysis and Management* 7(2): pp. 227–245, 1988.

Workers Compensation Research Institute (WCRI, 1987). *Workplace Injuries—Economic and Noneconomic Consequences for Workers,* 3 (7): Cambridge, MA, July 1987.

C. Office of Management and Budget Review Under the Paperwork Reduction Act of 1995

The final Confined Spaces in Construction Standard contains collection of information requirements (paperwork) that are subject to review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (PRA–95) (44 U.S.C. 3501 *et seq.*) In accordance with 44 U.S.C. 3506(c)(2) of the PRA–95, OSHA solicited public comments on the *Confined Spaces in Construction (29 CFR 1926, subpart AA)* Information Collection Request (ICR) (paperwork burden hour and cost analysis) for the proposed rule. The Department also submitted this ICR to OMB for review in accordance with 44 U.S.C. 3507(d) on November 28, 2007. On February 15, 2008, OMB authorized the Department of Labor to use OMB Control Number 1218–0258 in future paperwork submissions involving this rulemaking. OMB commented, "This OMB action is not an approval to conduct or sponsor an information collection under the Paperwork Reduction Act of 1995." OMB also stated that "OMB will review

the associated collection requirements in parallel with the final regulation prior to approval."

OSHA received no public comments on the proposed ICR. However, a number of comments received in response to the Notice of Proposed Rulemaking (NPRM), described earlier in this preamble, contained information relevant to the burden-hour and cost analysis that OSHA considered when it developed the revised ICR associated with this final rule.

In accordance with 44 U.S.C. 3507 of the PRA–95, OSHA requested OMB approval of the collection of information requirement described below. A copy of the ICR is available at *http://www.reginfo.gov*. OMB is preapproving the collection of information requirements under OMB Control Number 1218–0258 and they will take effect on the same date as other parts of this rule.

The Department of Labor notes that, under the PRA–95, a Federal agency cannot conduct or sponsor a collection of information unless OMB approves it and the collection of information 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 collection of information requirements in this final rule impose duties on employers to communicate, produce and maintain records, and take other measures to protect employees from confined-space hazards in construction. These provisions are necessary to protect the health and safety of employees who are engaged in construction work in confined spaces. Accordingly, each employer engaged in construction who has employees who enter a permit-required confined space (PRCS) must have, as applicable, the following information posted in accordance with the standard or on file and available at the job site: Danger signs and other means of notification of PRCSs; a written PRCS program; entry permits that document procedures necessary for safe permit-entry operations and that include atmospheric-testing and monitoring information and results; signed certifications and supporting documentation for entry under alternate procedures, including documentation of the hazard determinations and the methods used to protect employees from these hazards; written approval from a professional engineer for use of job-made hoisting systems when entering spaces under alternate procedures, certifications documenting reclassification of the space; a Safety Data Sheet or similar written information to provide to medical facilities treating exposed employees; and training records for employees. Entry employers must retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program and maintain employee training records for the period of time the employee is employed by that employer. Employers must make all information required to be developed under the standard available for review by the affected employees and their authorized representatives, and provide access to documents required to be retained by the standard to OSHA for compliance purposes. Additionally, controlling contractors have responsibilities to obtain and disseminate information about the permit space, host employers have a duty to disclose known information about permit spaces, and each employer engaged in construction who has an employee enter a PRCS must share information with the controlling contractor and must ensure that its attendants, authorized entrants, supervisors and rescue teams or services communicate as required by the standard. An employer's failure to generate and disclose the information required in this standard will affect significantly the Agency's effort to control and reduce injuries and fatalities related to confined spaces in construction.

Table IV–23 below identifies and describes the collection of information requirements contained in the final rule. As discussed in Section II.B. of the preamble, OSHA is finalizing a Confined Spaces in Construction standard that more closely resembles the general industry standard than did the NPRM. OSHA's rationale for the need to collect information is set forth in the general discussion in the Background section of the preamble, and in the discussion of each of these specific provisions in Section III of the preamble. As noted in the preamble discussions of the specific sections of the standard, the new information collection requirements not contained in the NPRM include requirements for written PRCS programs, written approval for job-made hoisting systems used when entering spaces under alternate procedures, and consultation with affected employees and their authorized representatives in the development and implementation of the PRCS program. In addition, while the proposed rule required host employers to communicate directly with entry employers, OSHA assigned the controlling contractor that function in the final rule. Table IV–23 identifies the collection of information requirements contained in the final rule as follows:

TABLE IV–23—COLLECTION OF INFORMATION REQUIREMENTS OF THE FINAL STANDARD

29 CFR 1926.1203(b)(1) and (b)(2)	If the workplace contains a PRCS, employers must inform employees by posting a danger sign, and inform the employees' authorized representatives and controlling contractor in a manner other than posting, of the existence and location of, and the danger posed by, the PRCS.
29 CFR 1926.1203(d), 29 CFR 1926.1204, 29 CFR 1926.1211(a)(5), and 29 CFR 1926.1212(a).	If an employer decides that employees it directs will enter a PRCS, the employer must have and implement a written permit-space program at the construction site that complies with § 1926.1204 of this standard. The employer must make the written program available prior to, and during, entry operations for inspection by employees and their authorized representatives. Entry employers must document a number of necessary procedures, including: Safe PRCS entry operations; summoning rescue and emergency services (including the development of a rescue plan for employers who have in-house rescue teams), rescuing entrants from PRCSs, providing necessary emergency services to rescued employees, and preventing unauthorized personnel from attempting a rescue; coordinating entry operations; and for concluding entry. Employers must consult with affected employees and their authorized representatives on all aspects of the PRCS program.
29 CFR 1926.1203(e)(1)(v), (e)(2)(viii) and (e)(2)(ix).	Before entry under alternate procedures, employers must document the determinations and supporting data required by paragraphs § 1910.1204(e)(1)(i)–(e)(1)(iii) of this standard. The employer must make the documented determinations and supporting data available to each employee entering the space or to that employee's authorized representative. A job-made hoisting system is permissible if it is approved for personnel hoisting by a registered professional engineer, in writing, prior to use.

TABLE IV–23—COLLECTION OF INFORMATION REQUIREMENTS OF THE FINAL STANDARD—Continued

29 CFR 1926.1203(g)(3)	Entry employer(s) must document and certify the basis for determining the elimination or isolation of all hazards in a PRCS when reclassifying the space. The certification must be made available to each employee entering the space or to that employee's authorized representative.
29 CFR 1926.1203(h)(1)(i)–(h)(1)(iii), (h)(2)(i), (h)(5)(iii), and (i).	The host employer and controlling contractor must exchange PRCS information before and after entry operations.
29 CFR 1926.1203(h)(2)(ii), and (i)	The controlling contractor must provide PRCS information to non-entry employers before entry operations begin.
29 CFR 1926.1203(h)(2)(ii), (h)(3)(i)–(h)(3)(ii), (h)(5)(i)–(h)(5)(ii), and (i).	The controlling contractor and the entry employer(s) must exchange PRCS information before and after entry operations.
29 CFR 1926.1203(h)(4)(i), (h)(4)(ii), and (i).	The controlling contractor and entry employer(s) must each coordinate entry operations: When more than one entity performs PRCS entry at the same time; or when performing permit-space entry while at the same time any activities are performed that could foreseeably result in a hazard in the PRCS.
29 CFR 1926.1204(e)(6)	Employers must provide results of any testing conducted under § 1926.1204 to employees or employees' authorized representative.
29 CFR 1926.1204(m) and (n)	Entry employers must review entry operations when the measures taken under the permit-space program may not protect employees, and revise the program to correct deficiencies found to exist before subsequent entries are authorized. Entry employers must review the permit-space program, using the canceled permits retained under § 1926.1205(f) of this standard, within 1 year after each entry, and revise the program as necessary to protect employees participating in entry operations from permit-space hazards. Employers may perform a single annual review covering all entries performed during a 12-month period.
29 CFR 1926.1205(a) and (c), and 29 CFR 1926.1206.	Each entry employer must document the completion of measures required by § 1926.1204(c) of this standard by preparing an entry permit and making it available by posting or other equally effective means to authorized entrants or their authorized representatives before entry is authorized. Employers must identify on the permit specific information such as: The purpose of the entry, date and authorized duration of the permit, authorized entrants, means of detecting atmospheric hazards, attendants, entry supervisors, hazards of the PRCS, measures used to isolate the PRCS and to control permit-space hazards before entry, acceptable entry conditions, results of tests and monitoring performed under § 1926.1204(e) of this standard and the names or initials of the testers and an indication of when the tests were performed, rescue and emergency services (such as the equipment to use and the numbers to call) and the means to summon those services, communication procedures, equipment, any additional permits issued previously to authorize work in the permit space, and any other information necessary, given the circumstances of the particular confined space to ensure employee safety.
29 CFR 1926.1205(b) and 29 CFR 1926.1210(b).	Before entry begins, the entry supervisor identified on the permit must sign the entry permit, and verify, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
29 CFR 1926.1205(f)	Entry employers must retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program required by § 1926.1204(n) of this standard. The employer must note on the permit any problems encountered during an entry operation and make appropriate revisions to the permit-space program.
29 CFR 1926.1207(d)	Employers must maintain training records containing each employee's name, the name of the trainers, and the dates of training to show completion of the training required by § 1926.1207(a) through (c) of this standard. The documentation must be available for inspection by employees and their authorized representatives for the period of time the employee is employed by that employer.
29 CFR 1926.1208(c) and (d)	Entry employers must ensure that authorized entrants: Communicate with the attendant as necessary to enable the attendant to assess entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by § 1926.1209(f) of this standard, and to alert the attendant whenever there is any warning sign or symptom of exposure to a dangerous situation, or the entrant detects a prohibited condition.
29 CFR 1926.1209(e), (f), (g), and (h)(1)–(h)(3).	Entry employers must ensure that attendants: Communicate with authorized entrants and order them to evacuate the permit space under specified conditions; summon PRCS rescue services as soon as necessary; warn unauthorized persons to stay away from, or to exit, PRCSs; and informs authorized entrants and entry supervisors of any unauthorized PRCS entry.
29 CFR 1926.1210(d) and 29 CFR 1926.1211(c).	Entry employers must ensure that each entry supervisor verifies that rescue services are available, the means for summoning them are operable, and the employer will be notified as soon as the services become unavailable. If the employer uses non-entry rescue, the employer must confirm, prior to entry, that emergency assistance will be available in the event that non-entry rescue fails.
29 CFR 1926.1211(a)(1) and (a)(2)	Employers who designate rescue and emergency services must evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified, and evaluate a prospective rescue service's ability to function proficiently with rescue-related tasks and equipment while rescuing entrants from the particular PRCS identified.
29 CFR 1926.1211(a)(4)	Employers who designate rescue and emergency services must inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site.
29 CFR 1926.1211(d)	If an injured entrant is exposed to a substance for which the employer must keep a Safety Data Sheet or other similar written information at the worksite, the employer must make that SDS or written information available to the medical facility treating the exposed entrant.
29 CFR 1926.1212(b)	Employers must make available to each affected employee and his/her authorized representatives all information they must develop under this standard.
29 CFR 1926.1213	Employers must disclose to the Secretary of Labor or the Secretary's designee all documents this standard requires them to retain.

The final rule imposes a program adjustment of 654,514 new burden hours to 30,066 construction-employment establishments after the effective date of the final standard.

Title of Collection: Confined Spaces in Construction (29 CFR 1926 subpart AA).

OMB Control Number: 1218–0258.

Affected Public: Businesses or other for-profits.

Total Estimated Number of Respondents: 30,066.

Total Estimated Number of Responses: 4,093,825.

Total Estimated Annual Time Burden: 54,514 hours.

Total Estimated Annual Other Costs Burden: $1,017,859.

D. Federalism

OSHA reviewed this final rule in accordance with the most recent Executive Order (E.O.) on Federalism (E.O. 13132, 64 FR 43255 (Aug. 10, 1999)). This E.O. requires that Federal agencies, to the extent possible, refrain from limiting State policy options, consult with States prior to taking any actions that would restrict State policy options, and take such actions only when clear constitutional authority exists and the problem is national in scope. E.O. 13132 provides for preemption of State law only with the expressed consent of Congress. Federal agencies must limit any such preemption to the extent possible.

Under Section 18 of the OSH Act, Congress expressly provides that States may adopt, with Federal approval, a plan for the development and enforcement of occupational safety and health standards; States that obtain Federal approval for such a plan are referred to as "State-Plan States" (29 U.S.C. 667). Occupational safety and health standards developed by State-Plan States must be at least as effective in providing safe and healthful employment and places of employment as the Federal standards. While OSHA promulgated this final rule to protect employees in every State, Section 18(c)(2) of the Act permits State-Plan States and Territories to develop and enforce their own standards for confined spaces work provided that those requirements are at least as effective in providing safe and healthful employment and places of employment as the requirements in this final rule.

In summary, this final rule complies with E.O. 13132. In States without OSHA-approved State Plans, this final rule limits State policy options in the same manner as every standard promulgated by OSHA. In States with OSHA-approved State Plans, this rulemaking does not significantly limit State policy options.

E. State-Plan States

When Federal OSHA promulgates a new standard or more stringent amendment to an existing standard, the 27 states and U.S. Territories with their own OSHA-approved occupational safety and health plans must amend their standards to reflect the new standard or amendment, or show OSHA why such action is unnecessary, for example, because an existing state standard covering this area is "at least as effective" as the new Federal standard or amendment (29 CFR 1953.5(a)). The state standard must be at least as effective as the final Federal rule and must be completed within 6 months of the promulgation date of the final Federal rule. When OSHA promulgates a new standard or amendment that does not impose additional or more stringent requirements than an existing standard, State-Plan States do not have to amend their standards, although the Agency may encourage them to do so.

The 21 states and 1 U.S. Territory with OSHA-approved occupational safety and health plans covering private employers and state and local government employees are: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, and Wyoming. In addition, four states and one U.S. Territory have OSHA-approved State Plans that apply to state and local government employees only: Connecticut, Illinois, New Jersey, New York, and the Virgin Islands.

The requirements in this final rule are more stringent than all or most State plans for the work they cover. However, as discussed previously in this preamble, OSHA believes that State-Plan States that have standards applicable to construction work in confined spaces that are similar to 29 CFR 1910.146, the general industry standard for confined spaces, will not have to make major changes to their existing rules to ensure that these rules are at least as effective as this final rule. OSHA believes that the record warrants these changes so as to provide construction employees with the same level of protection afforded to them by this final rule. Therefore, states and territories with OSHA-approved State Plans must adopt comparable amendments to their standards within 6 months of the promulgation date of this 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. Each State Plan State's existing requirements will continue to be in effect until that State adopts the required revisions.

F. Unfunded Mandates Reform Act

OSHA reviewed this final rule according to the Unfunded Mandates Reform Act of 1995 (UMRA) (2 U.S.C. 1501 *et seq.*) and E.O. 13132 (64 FR 43255 (Aug. 10, 1999)). As discussed in the Final Economic and Regulatory Flexibility Analysis for this rulemaking, OSHA estimates that compliance with the rule will require expenditures of less than $100 million per year by all affected employers. Therefore, this rule is not a significant regulatory action within the meaning of Section 202 of UMRA (2 U.S.C. 1532).

OSHA standards do not apply to state or local governments except in states that elect voluntarily to adopt a State Plan approved by the Agency. Consequently, this final rule does not meet the definition of a "Federal intergovernmental mandate" (2 U.S.C. 658(5)).

Therefore, for the purposes of UMRA, the Agency certifies that this final rule does not mandate that state, local, or Tribal governments adopt new, unfunded regulatory obligations or increase expenditures by the private sector of more than $100 million in any year.

G. Consultation and Coordination With Indian Tribal Governments

OSHA reviewed this final rule in accordance with Executive Order 13175, (65 FR 67249 (Nov. 9, 2000)) and determined that it does not have "tribal implications" as defined in that order. The final rule does not have substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes.

H. Applicability of Existing Consensus Standards

Section 6(b)(8) of the Occupational Safety and Health Act of 1970 (29 U.S.C. 655(b(8)) requires OSHA to explain why the rule adopted will better effectuate the purposes of the Act than relevant national consensus standards. The American National Standards Institute (ANSI) Z117.1 consensus standard ("Safety Requirements for Confined Spaces") contains provisions addressing safety in confined spaces. The Agency consulted this standard in developing its proposed rule for confined spaces in construction, as well as in developing its general industry confined spaces standard. The Summary and Explanation section of this rule discusses OSHA's consideration of the requirements contained in ANSI Z–117.1 and other ANSI standards.

The Agency did not adopt the ANSI standard as the OSHA confined spaces in construction standard for several reasons. First, the Agency believes that the ANSI standard concentrates on confined spaces with oxygen-deficient

atmospheres, or with potential overexposures to air contaminants, without adequately addressing the full range of hazards that can occur in a confined space. In this regard, OSHA concurs with the findings it published in the preamble to the general industry confined spaces standard (58 FR 4464). After reviewing relevant publications by the National Institute for Occupational Safety and Health, the ANSI Z117.1 standards (both the 1989 and the 1977 editions), and the relevant guidelines developed by other organizations, the Agency decided to diverge from the approach used by those standards-development organizations because their documents do not provide sufficient guidance for employers to distinguish among the several types of confined space hazards they may encounter. Second, OSHA concludes that the structure and organization of the ANSI standard is not sufficiently user-friendly for small businesses, especially those that rarely deal with confined spaces. Third, OSHA finds that the ANSI standard does not adequately address construction-specific hazards, particularly where multiple employers are working in or around permit spaces. Fourth, OSHA notes that, in most instances, the wording of the provisions in these ANSI standards needed revision to improve enforceability, clarity, and ease of use. For example, much of the information in the consensus standard is presented as suggestions or non-mandatory guidance rather than enforceable imperative commands. Finally, most commenters expressed a preference for a rule that was similar to the general industry confined spaces standard. Agency incorporation of consensus standards can often facilitate rulemaking by avoiding duplicative Agency efforts and preventing potential confusion in the affected industries, but the widespread use of OSHA's general industry confined spaces standard suggests that, in this area, the Agency will be better able to facilitate worker safety and health by basing the new construction standard on the general industry standard rather than incorporating the ANSI standard.

List of Subjects in 29 CFR Part 1926

Confined space, Construction industry, Occupational safety and health, Permit space, Safety.

Authority and Signature

David Michaels, Ph.D., MPH, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Ave. NW., Washington, DC 20210, authorized the preparation of this document. OSHA is issuing this final rule under the following authorities: 29 U.S.C. 653, 655, 657; 40 U.S.C. 3701 *et seq.;* 5 U.S.C. 553; Secretary of Labor's Order No. 1–2012 (77 FR 3912, Jan. 25, 2012); and 29 CFR part 1911.

Signed at Washington, DC, on April 8, 2015.

David Michaels,

Assistant Secretary of Labor for Occupational Safety and Health.

Amendments to Standards

For the reasons stated in the preamble of this rule, the Agency is amending 29 CFR part 1926 as follows:

PART 1926—[AMENDED]

Subpart C—General Safety and Health Provisions

■ 1. The authority citation for subpart C of 29 CFR part 1926 is revised to read as follows:

Authority: 40 U.S.C. 3701 *et seq.;* 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), 6–96 (62 FR 111), 5–2007 (72 FR 31160), or 1–2012 (77 FR 3912) as applicable; and 29 CFR part 1911.

§ 1926.21 [Amended]

■ 2. In § 1926.21, paragraph (b)(6) is removed.

Subpart V—Electric Power Transmission and Distribution

■ 3. The authority citation for subpart V of part 1926 continues to read as follows:

Authority: 40 U.S.C. 3701 *et seq.;* 29 U.S.C. 653, 655, 657; Secretary of Labor's Order No. 1–2012 (77 FR 3912); and 29 CFR part 1911.

■ 4. Amend § 1926.953 by revising paragraphs (a) and (g) and the note at the end of the section to read as follows:

§ 1926.953 Enclosed spaces.

(a) *General.* This section covers enclosed spaces that may be entered by employees. It does not apply to vented vaults if the employer makes a determination that the ventilation system is operating to protect employees before they enter the space. This section applies to routine entry into enclosed spaces. If, after the employer takes the precautions given in this section and in § 1926.965, the hazards remaining in the enclosed space endanger the life of an entrant or could interfere with an entrant's escape from the space, then entry into the enclosed space must meet the permit space entry requirements of subpart AA of this part. For routine entries where the hazards remaining in the enclosed space do not endanger the life of an entrant or interfere with an entrant's escape from the space, this section applies in lieu of the permit-space entry requirements contained in §§ 1926.1204 through 926.1211.

* * * * *

(g) *Hazardous atmosphere.* Employees may not enter any enclosed space while it contains a hazardous atmosphere, unless the entry conforms to the confined spaces in construction standard in subpart AA of this part.

* * * * *

Note to § 1926.953.: Entries into enclosed spaces conducted in accordance with the permit space entry requirements of subpart AA of this part are considered as complying with this section.

■ 5. Amend § 1926.968 by adding a note to the definition for "Enclosed spaces" to read as follows:

§ 1926.968 Definitions.

* * * * *

Enclosed space. * * *

Note to the definition of "Enclosed space". The Occupational Safety and Health Administration does not consider spaces that are enclosed but not designed for employee entry under normal operating conditions to be enclosed spaces for the purposes of this subpart. Similarly, the Occupational Safety and Health Administration does not consider spaces that are enclosed and that are expected to contain a hazardous atmosphere to be enclosed spaces for the purposes of this subpart. Such spaces meet the definition of permit spaces in subpart AA of this part, and entry into them must conform to that standard.

* * * * *

■ 6. Subpart AA is added to read as follows:

Subpart AA—Confined Spaces in Construction

Sec.

1926.1200 [Reserved]
1926.1201 Scope.
1926.1202 Definitions.
1926.1203 General requirements.
1926.1204 Permit-required confined space program.
1926.1205 Permitting process.
1926.1206 Entry permit.
1926.1207 Training.
1926.1208 Duties of authorized entrants.
1926.1209 Duties of attendants.
1926.1210 Duties of entry supervisors.
1926.1211 Rescue and emergency services.
1926.1212 Employee participation.
1926.1213 Provision of documents to Secretary.

Authority: 40 U.S.C. 3701 *et seq.;* 29 U.S.C. 653, 655, 657; Secretary of Labor's Order No. 1–2012 (77 FR 3912); and 29 CFR part 1911.

§ 1926.1200 [Reserved]

§ 1926.1201 Scope.

(a) This standard sets forth requirements for practices and procedures to protect employees engaged in construction activities at a worksite with one or more confined spaces, subject to the exceptions in paragraph (b) of this section.

Note to paragraph (a). Examples of locations where confined spaces may occur include, but are not limited to, the following: Bins; boilers; pits (such as elevator, escalator, pump, valve or other equipment); manholes (such as sewer, storm drain, electrical, communication, or other utility); tanks (such as fuel, chemical, water, or other liquid, solid or gas); incinerators; scrubbers; concrete pier columns; sewers; transformer vaults; heating, ventilation, and air-conditioning (HVAC) ducts; storm drains; water mains; precast concrete and other pre-formed manhole units; drilled shafts; enclosed beams; vessels; digesters; lift stations; cesspools; silos; air receivers; sludge gates; air preheaters; step up transformers; turbines; chillers; bag houses; and/or mixers/reactors.

(b) *Exceptions.* This standard does not apply to:

(1) Construction work regulated by subpart P of this part (Excavations).

(2) Construction work regulated by subpart S of this part (Underground Construction, Caissons, Cofferdams and Compressed Air).

(3) Construction work regulated by subpart Y of this part (Diving).

(c) Where this standard applies and there is a provision that addresses a confined space hazard in another applicable OSHA standard, the employer must comply with both that requirement and the applicable provisions of this standard.

§ 1926.1202 Definitions.

The following terms are defined for the purposes of this subpart only:

Acceptable entry conditions means the conditions that must exist in a permit space, before an employee may enter that space, to ensure that employees can safely enter into, and safely work within, the space.

Attendant means an individual stationed outside one or more permit spaces who assesses the status of authorized entrants and who must perform the duties specified in § 1926.1209.

Authorized entrant means an employee who is authorized by the entry supervisor to enter a permit space.

Barrier means a physical obstruction that blocks or limits access.

Blanking or *blinding* means the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

Confined space means a space that:

(1) Is large enough and so configured that an employee can bodily enter it;

(2) Has limited or restricted means for entry and exit; and

(3) Is not designed for continuous employee occupancy.

Control means the action taken to reduce the level of any hazard inside a confined space using engineering methods (for example, by ventilation), and then using these methods to maintain the reduced hazard level. Control also refers to the engineering methods used for this purpose. Personal protective equipment is not a control.

Controlling Contractor is the employer that has overall responsibility for construction at the worksite.

Note to the definition of "Controlling Contractor". If the controlling contractor owns or manages the property, then it is both a controlling employer and a host employer.

Double block and bleed means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Early-warning system means the method used to alert authorized entrants and attendants that an engulfment hazard may be developing. Examples of early-warning systems include, but are not limited to: Alarms activated by remote sensors; and lookouts with equipment for immediately communicating with the authorized entrants and attendants.

Emergency means any occurrence (including any failure of power, hazard control or monitoring equipment) or event, internal or external, to the permit space that could endanger entrants.

Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, crushing, or suffocation.

Entry means the action by which any part of a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space, whether or not such action is intentional or any work activities are actually performed in the space.

Entry Employer means any employer who decides that an employee it directs will enter a permit space.

Note to the definition of "Entry Employer". An employer cannot avoid the duties of the standard merely by refusing to decide whether its employees will enter a permit space, and OSHA will consider the failure to so decide to be an implicit decision to allow employees to enter those spaces if they are working in the proximity of the space.

Entry permit (permit) means the written or printed document that is provided by the employer who designated the space a permit space to allow and control entry into a permit space and that contains the information specified in § 1926.1206.

Entry rescue occurs when a rescue service enters a permit space to rescue one or more employees.

Entry supervisor means the qualified person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this standard.

Note to the definition of "Entry supervisor". An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this standard for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

Hazard means a physical hazard or hazardous atmosphere. See definitions below.

Hazardous atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

(2) Airborne combustible dust at a concentration that meets or exceeds its LFL;

Note to paragraph (2) of the definition of "Hazardous atmosphere". This concentration may be approximated as a condition in which the combustible dust obscures vision at a distance of 5 feet (1.52 meters) or less.

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in subpart D of this part (Occupational Health and Environmental Control), or in subpart Z of this part (Toxic and Hazardous Substances), and which could result in employee exposure in excess of its dose or permissible exposure limit;

Note to paragraph (4) of the definition of "Hazardous atmosphere". An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this definition.

(5) Any other atmospheric condition that is immediately dangerous to life or health.

Note to paragraph (5) of the definition of "Hazardous atmosphere". For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Safety Data Sheets that comply with the Hazard Communication Standard, § 1926.59, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Host employer means the employer that owns or manages the property where the construction work is taking place.

Note to the definition of "Host employer". If the owner of the property on which the construction activity occurs has contracted with an entity for the general management of that property, and has transferred to that entity the information specified in § 1926.1203(h)(1), OSHA will treat the contracted management entity as the host employer for as long as that entity manages the property. Otherwise, OSHA will treat the owner of the property as the host employer. In no case will there be more than one host employer.

Hot work means operations capable of providing a source of ignition (for example, riveting, welding, cutting, burning, and heating).

Immediately dangerous to life or health (IDLH) means any condition that would interfere with an individual's ability to escape unaided from a permit space and that poses a threat to life or that would cause irreversible adverse health effects.

Note to the definition of "Immediately dangerous to life or health". Some materials—hydrogen fluoride gas and cadmium vapor, for example—may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12–72 hours after exposure. The victim "feels normal" after recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

Inerting means displacing the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Note to the definition of "Intering". This procedure produces an IDLH oxygen-deficient atmosphere.

Isolate or isolation means the process by which employees in a confined space are completely protected against the release of energy and material into the space, and contact with a physical hazard, by such means as: Blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; blocking or disconnecting all mechanical linkages; or placement of barriers to eliminate the potential for employee contact with a physical hazard.

Limited or restricted means for entry or exit means a condition that has a potential to impede an employee's movement into or out of a confined space. Such conditions include, but are not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces and ladders.

Line breaking means the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Lockout means the placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lower flammable limit or lower explosive limit means the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion.

Monitor or *monitoring* means the process used to identify and evaluate the hazards after an authorized entrant enters the space. This is a process of checking for changes that is performed in a periodic or continuous manner after the completion of the initial testing or evaluation of that space.

Non-entry rescue occurs when a rescue service, usually the attendant, retrieves employees in a permit space without entering the permit space.

Non-permit confined space means a confined space that meets the definition of a confined space but does not meet the requirements for a permit-required confined space, as defined in this subpart.

Oxygen deficient atmosphere means an atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere means an atmosphere containing more than 23.5 percent oxygen by volume.

Permit-required confined space (permit space) means a confined space that has one or more of the following characteristics:

(1) Contains or has a potential to contain a hazardous atmosphere;

(2) Contains a material that has the potential for engulfing an entrant;

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

(4) Contains any other recognized serious safety or health hazard.

Permit-required confined space program (permit space program) means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

Physical hazard means an existing or potential hazard that can cause death or serious physical damage. Examples include, but are not limited to: Explosives (as defined by paragraph (n) of § 1926.914, definition of "explosive"); mechanical, electrical, hydraulic and pneumatic energy; radiation; temperature extremes; engulfment; noise; and inwardly converging surfaces. Physical hazard also includes chemicals that can cause death or serious physical damage through skin or eye contact (rather than through inhalation).

Prohibited condition means any condition in a permit space that is not allowed by the permit during the period when entry is authorized. A hazardous atmosphere is a prohibited condition unless the employer can demonstrate that personal protective equipment (PPE) will provide effective protection for each employee in the permit space and provides the appropriate PPE to each employee.

Qualified person means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

Representative permit space means a mock-up of a confined space that has

entrance openings that are similar to, and is of similar size, configuration, and accessibility to, the permit space that authorized entrants enter.

Rescue means retrieving, and providing medical assistance to, one or more employees who are in a permit space.

Rescue service means the personnel designated to rescue employees from permit spaces.

Retrieval system means the equipment (including a retrieval line, chest or full body harness, wristlets or anklets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Serious physical damage means an impairment or illness in which a body part is made functionally useless or is substantially reduced in efficiency. Such impairment or illness may be permanent or temporary and includes, but is not limited to, loss of consciousness, disorientation, or other immediate and substantial reduction in mental efficiency. Injuries involving such impairment would usually require treatment by a physician or other licensed health-care professional.

Tagout means:

(1) Placement of a tagout device on a circuit or equipment that has been deenergized, in accordance with an established procedure, to indicate that the circuit or equipment being controlled may not be operated until the tagout device is removed; and

(2) The employer ensures that:

(i) Tagout provides equivalent protection to lockout; or

(ii) That lockout is infeasible and the employer has relieved, disconnected, restrained and otherwise rendered safe stored (residual) energy.

Test or testing means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

Note to the definition of "Test or testing". Testing enables employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

Ventilate or *ventilation* means controlling a hazardous atmosphere using continuous forced-air mechanical systems that meet the requirements of § 1926.57 (Ventilation).

§ 1926.1203 General requirements.

(a) Before it begins work at a worksite, each employer must ensure that a competent person identifies all confined spaces in which one or more of the employees it directs may work, and identifies each space that is a permit space, through consideration and evaluation of the elements of that space, including testing as necessary.

(b) If the workplace contains one or more permit spaces, the employer who identifies, or who receives notice of, a permit space must:

(1) Inform exposed employees by posting danger signs or by any other equally effective means, of the existence and location of, and the danger posed by, each permit space; and

Note to paragraph (b)(1). A sign reading "DANGER—PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or using other similar language would satisfy the requirement for a sign.

(2) Inform, in a timely manner and in a manner other than posting, its employees' authorized representatives and the controlling contractor of the existence and location of, and the danger posed by, each permit space.

(c) Each employer who identifies, or receives notice of, a permit space and has not authorized employees it directs to work in that space must take effective measures to prevent those employees from entering that permit space, in addition to complying with all other applicable requirements of this standard.

(d) If any employer decides that employees it directs will enter a permit space, that employer must have a written permit space program that complies with § 1926.1204 implemented at the construction site. The written program must be made available prior to and during entry operations for inspection by employees and their authorized representatives.

(e) An employer may use the alternate procedures specified in paragraph (e)(2) of this section for entering a permit space only under the conditions set forth in paragraph (e)(1) of this section.

(1) An employer whose employees enter a permit space need not comply with §§ 1926.1204 through 1206 and §§ 1926.1208 through 1211, provided that all of the following conditions are met:

(i) The employer can demonstrate that all physical hazards in the space are eliminated or isolated through engineering controls so that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;

(ii) The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry, and that, in the event the ventilation system stops working, entrants can exit the space safely;

(iii) The employer develops monitoring and inspection data that supports the demonstrations required by paragraphs (e)(1)(i) and (ii) of this section;

(iv) If an initial entry of the permit space is necessary to obtain the data required by paragraph (e)(1)(iii) of this section, the entry is performed in compliance with §§ 1926.1204 through 1926.1211;

(v) The determinations and supporting data required by paragraphs (e)(1)(i), (ii), and (iii) of this section are documented by the employer and are made available to each employee who enters the permit space under the terms of paragraph (e) of this section or to that employee's authorized representative; and

(vi) Entry into the permit space under the terms of paragraph (e)(1) of this section is performed in accordance with the requirements of paragraph (e)(2) of this section.

Note to paragraph (e)(1). See paragraph (g) of this section for reclassification of a permit space after all hazards within the space have been eliminated.

(2) The following requirements apply to entry into permit spaces that meet the conditions set forth in paragraph (e)(1) of this section:

(i) Any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed.

(ii) When entrance covers are removed, the opening must be immediately guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.

(iii) Before an employee enters the space, the internal atmosphere must be tested, with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Any employee who enters the space, or that employee's authorized representative, must be provided an opportunity to observe the pre-entry testing required by this paragraph.

(iv) No hazardous atmosphere is permitted within the space whenever any employee is inside the space.

(v) Continuous forced air ventilation must be used, as follows:

(A) An employee must not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;

(B) The forced air ventilation must be so directed as to ventilate the immediate areas where an employee is or will be present within the space and must

continue until all employees have left the space;

(C) The air supply for the forced air ventilation must be from a clean source and must not increase the hazards in the space.

(vi) The atmosphere within the space must be continuously monitored unless the entry employer can demonstrate that equipment for continuous monitoring is not commercially available or periodic monitoring is sufficient. If continuous monitoring is used, the employer must ensure that the monitoring equipment has an alarm that will notify all entrants if a specified atmospheric threshold is achieved, or that an employee will check the monitor with sufficient frequency to ensure that entrants have adequate time to escape. If continuous monitoring is not used, periodic monitoring is required. All monitoring must ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Any employee who enters the space, or that employee's authorized representative, must be provided with an opportunity to observe the testing required by this paragraph (e)(2)(vi).

(vii) If a hazard is detected during entry:

(A) Each employee must leave the space immediately;

(B) The space must be evaluated to determine how the hazard developed; and

(C) The employer must implement measures to protect employees from the hazard before any subsequent entry takes place.

(viii) The employer must ensure a safe method of entering and exiting the space. If a hoisting system is used, it must be designed and manufactured for personnel hoisting; however, a job-made hoisting system is permissible if it is approved for personnel hoisting by a registered professional engineer, in writing, prior to use.

(ix) The employer must verify that the space is safe for entry and that the pre-entry measures required by paragraph (e)(2) of this section have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification must be made before entry and must be made available to each employee entering the space or to that employee's authorized representative.

(f) When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, or some indication that the initial evaluation of the space may not have been adequate, each entry employer must have a competent person reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

(g) A space classified by an employer as a permit-required confined space may only be reclassified as a non-permit confined space when a competent person determines that all of the applicable requirements in paragraphs (g)(1) through (4) of this section have been met:

(1) If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated or isolated without entry into the space (unless the employer can demonstrate that doing so without entry is infeasible), the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated or isolated;

(2) The entry employer must eliminate or isolate the hazards without entering the space, unless it can demonstrate that this is infeasible. If it is necessary to enter the permit space to eliminate or isolate hazards, such entry must be performed under §§ 1926.1204 through 1926.1211. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated or isolated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated or isolated;

Note to paragraph (g)(2). Control of atmospheric hazards through forced air ventilation does not constitute elimination or isolation of the hazards. Paragraph (e) of this section covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.

(3) The entry employer must document the basis for determining that all hazards in a permit space have been eliminated or isolated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification must be made available to each employee entering the space or to that employee's authorized representative; and

(4) If hazards arise within a permit space that has been reclassified as a non-permit space under paragraph (g) of this section, each employee in the space must exit the space. The entry employer must then reevaluate the space and reclassify it as a permit space as appropriate in accordance with all other applicable provisions of this standard.

(h) *Permit space entry communication and coordination.* (1) Before entry operations begin, the host employer must provide the following information, if it has it, to the controlling contractor:

(i) The location of each known permit space;

(ii) The hazards or potential hazards in each space or the reason it is a permit space; and

(iii) Any precautions that the host employer or any previous controlling contractor or entry employer implemented for the protection of employees in the permit space.

(2) Before entry operations begin, the controlling contractor must:

(i) Obtain the host employer's information about the permit space hazards and previous entry operations; and

(ii) Provide the following information to each entity entering a permit space and any other entity at the worksite whose activities could foreseeably result in a hazard in the permit space:

(A) The information received from the host employer;

(B) Any additional information the controlling contractor has about the subjects listed in paragraph (h)(1) of this section; and

(C) The precautions that the host employer, controlling contractor, or other entry employers implemented for the protection of employees in the permit spaces.

(3) Before entry operations begin, each entry employer must:

(i) Obtain all of the controlling contractor's information regarding permit space hazards and entry operations; and

(ii) Inform the controlling contractor of the permit space program that the entry employer will follow, including any hazards likely to be confronted or created in each permit space.

(4) The controlling contractor and entry employer(s) must coordinate entry operations when:

(i) More than one entity performs permit space entry at the same time; or

(ii) Permit space entry is performed at the same time that any activities that could foreseeably result in a hazard in the permit space are performed.

(5) After entry operations:

(i) The controlling contractor must debrief each entity that entered a permit space regarding the permit space program followed and any hazards confronted or created in the permit space(s) during entry operations;

(ii) The entry employer must inform the controlling contractor in a timely manner of the permit space program followed and of any hazards confronted or created in the permit space(s) during entry operations; and

(iii) The controlling contractor must apprise the host employer of the information exchanged with the entry entities pursuant to this subparagraph.

Note to paragraph (h). Unless a host employer or controlling contractor has or will have employees in a confined space, it is not required to enter any confined space to collect the information specified in this paragraph (h).

(i) If there is no controlling contractor present at the worksite, the requirements for, and role of, controlling contactors in this section must be fulfilled by the host employer or other employer who arranges to have employees of another employer perform work that involves permit space entry.

§ 1926.1204 Permit-required confined space program.

Each entry employer must:

(a) Implement the measures necessary to prevent unauthorized entry;

(b) Identify and evaluate the hazards of permit spaces before employees enter them;

(c) Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following:

(1) Specifying acceptable entry conditions;

(2) Providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces;

(3) Isolating the permit space and physical hazard(s) within the space;

(4) Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;

Note to paragraph (c)(4). When an employer is unable to reduce the atmosphere below 10 percent LFL, the employer may only enter if the employer inerts the space so as to render the entire atmosphere in the space non-combustible, and the employees use PPE to address any other atmospheric hazards (such as oxygen deficiency), and the employer eliminates or isolates all physical hazards in the space.

(5) Determining that, in the event the ventilation system stops working, the monitoring procedures will detect an increase in atmospheric hazard levels in sufficient time for the entrants to safely exit the permit space;

(6) Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards;

(7) Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry, and ensuring that employees are not allowed to enter into, or remain in, a permit space with a hazardous atmosphere unless the employer can demonstrate that personal protective equipment (PPE) will provide effective protection for each employee in the permit space and provides the appropriate PPE to each employee; and

(8) Eliminating any conditions (for example, high pressure) that could make it unsafe to remove an entrance cover.

(d) Provide the following equipment (specified in paragraphs (d)(1) through (9) of this section) at no cost to each employee, maintain that equipment properly, and ensure that each employee uses that equipment properly:

(1) Testing and monitoring equipment needed to comply with paragraph (e) of this section;

(2) Ventilating equipment needed to obtain acceptable entry conditions;

(3) Communications equipment necessary for compliance with §§ 1926.1208(c) and 1926.1209(e), including any necessary electronic communication equipment for attendants assessing entrants' status in multiple spaces;

(4) Personal protective equipment insofar as feasible engineering and work-practice controls do not adequately protect employees;

Note to paragraph (d)(4). The requirements of subpart E of this part and other PPE requirements continue to apply to the use of PPE in a permit space. For example, if employees use respirators, then the respirator requirements in § 1926.103 (Respiratory protection) must be met.

(5) Lighting equipment that meets the minimum illumination requirements in § 1926.56, that is approved for the ignitable or combustible properties of the specific gas, vapor, dust, or fiber that will be present, and that is sufficient to enable employees to see well enough to work safely and to exit the space quickly in an emergency;

(6) Barriers and shields as required by paragraph (c)(4) of this section;

(7) Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;

(8) Rescue and emergency equipment needed to comply with paragraph (i) of this section, except to the extent that the equipment is provided by rescue services; and

(9) Any other equipment necessary for safe entry into, safe exit from, and rescue from, permit spaces.

(e) Evaluate permit space conditions in accordance with the following paragraphs (e)(1) through (6) of this section when entry operations are conducted:

(1) Test conditions in the permit space to determine if acceptable entry conditions exist before changes to the space's natural ventilation are made, and before entry is authorized to begin, except that, if an employer demonstrates that isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), the employer must:

(i) Perform pre-entry testing to the extent feasible before entry is authorized; and,

(ii) If entry is authorized, continuously monitor entry conditions in the areas where authorized entrants are working, except that employers may use periodic monitoring in accordance with paragraph (e)(2) of this section for monitoring an atmospheric hazard if they can demonstrate that equipment for continuously monitoring that hazard is not commercially available;

(iii) Provide an early-warning system that continuously monitors for non-isolated engulfment hazards. The system must alert authorized entrants and attendants in sufficient time for the authorized entrants to safely exit the space.

(2) Continuously monitor atmospheric hazards unless the employer can demonstrate that the equipment for continuously monitoring a hazard is not commercially available or that periodic monitoring is of sufficient frequency to ensure that the atmospheric hazard is being controlled at safe levels. If continuous monitoring is not used, periodic monitoring is required with sufficient frequency to ensure that acceptable entry conditions are being maintained during the course of entry operations;

(3) When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors;

(4) Provide each authorized entrant or that employee's authorized representative an opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces;

(5) Reevaluate the permit space in the presence of any authorized entrant or that employee's authorized representative who requests that the employer conduct such reevaluation because there is some indication that the evaluation of that space may not have been adequate; and

(6) Immediately provide each authorized entrant or that employee's authorized representative with the results of any testing conducted in accordance with this section.

(f) Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations:

(1) Attendants may be assigned to more than one permit space provided the duties described in § 1926.1209 can be effectively performed for each permit space.

(2) Attendants may be stationed at any location outside the permit space as long as the duties described in § 1926.1209 can be effectively performed for each permit space to which the attendant is assigned.

(g) If multiple spaces are to be assigned to a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of those permit spaces without distraction from the attendant's responsibilities under § 1926.1209;

(h) Designate each person who is to have an active role (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each such employee, and provide each such employee with the training required by § 1926.1207;

(i) Develop and implement procedures for summoning rescue and emergency services (including procedures for summoning emergency assistance in the event of a failed non-entry rescue), for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting rescue;

(j) Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this standard, including the safe termination of entry operations under both planned and emergency conditions;

(k) Develop and implement procedures to coordinate entry operations, in consultation with the controlling contractor, when employees of more than one employer are working simultaneously in a permit space or elsewhere on the worksite where their activities could, either alone or in conjunction with the activities within a permit space, foreseeably result in a hazard within the confined space, so that employees of one employer do not endanger the employees of any other employer;

(l) Develop and implement procedures (such as closing off a permit space and canceling the permit) necessary for concluding the entry after entry operations have been completed;

(m) Review entry operations when the measures taken under the permit space program may not protect employees and revise the program to correct deficiencies found to exist before subsequent entries are authorized; and

Note to paragraph (m). Examples of circumstances requiring the review of the permit space program include, but are not limited to: Any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.

(n) Review the permit space program, using the canceled permits retained under § 1926.1205(f), within 1 year after each entry and revise the program as necessary to ensure that employees participating in entry operations are protected from permit space hazards.

Note to paragraph (n). Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.

§ 1926.1205 Permitting process.

(a) Before entry is authorized, each entry employer must document the completion of measures required by § 1926.1204(c) by preparing an entry permit.

(b) Before entry begins, the entry supervisor identified on the permit must sign the entry permit to authorize entry.

(c) The completed permit must be made available at the time of entry to all authorized entrants or their authorized representatives, by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed.

(d) The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit in accordance with § 1926.1206(b).

(e) The entry supervisor must terminate entry and take the following action when any of the following apply:

(1) Cancel the entry permit when the entry operations covered by the entry permit have been completed; or

(2) Suspend or cancel the entry permit and fully reassess the space before allowing reentry when a condition that is not allowed under the entry permit arises in or near the permit space and that condition is temporary in nature and does not change the configuration of the space or create any new hazards within it; and

(3) Cancel the entry permit when a condition that is not allowed under the entry permit arises in or near the permit space and that condition is not covered by paragraph (e)(2) of this section.

(f) The entry employer must retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program required by § 1926.1204(n). Any problems encountered during an entry operation must be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

§ 1926.1206 Entry permit.

The entry permit that documents compliance with this section and authorizes entry to a permit space must identify:

(a) The permit space to be entered;

(b) The purpose of the entry;

(c) The date and the authorized duration of the entry permit;

(d) The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space;

Note to paragraph (d). This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.

(e) Means of detecting an increase in atmospheric hazard levels in the event the ventilation system stops working;

(f) Each person, by name, currently serving as an attendant;

(g) The individual, by name, currently serving as entry supervisor, and the signature or initials of each entry supervisor who authorizes entry;

(h) The hazards of the permit space to be entered;

(i) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

Note to paragraph (i). Those measures can include, but are not limited to, the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

(j) The acceptable entry conditions;

(k) The results of tests and monitoring performed under § 1926.1204(e), accompanied by the names or initials of the testers and by an indication of when the tests were performed;

(l) The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;

(m) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;

(n) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to

be provided for compliance with this standard;

(o) Any other information necessary, given the circumstances of the particular confined space, to ensure employee safety; and

(p) Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

§ 1926.1207 Training.

(a) The employer must provide training to each employee whose work is regulated by this standard, at no cost to the employee, and ensure that the employee possesses the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this standard. This training must result in an understanding of the hazards in the permit space and the methods used to isolate, control or in other ways protect employees from these hazards, and for those employees not authorized to perform entry rescues, in the dangers of attempting such rescues.

(b) Training required by this section must be provided to each affected employee:

(1) In both a language and vocabulary that the employee can understand;

(2) Before the employee is first assigned duties under this standard;

(3) Before there is a change in assigned duties;

(4) Whenever there is a change in permit space entry operations that presents a hazard about which an employee has not previously been trained; and

(5) Whenever there is any evidence of a deviation from the permit space entry procedures required by § 1926.1204(c) or there are inadequacies in the employee's knowledge or use of these procedures.

(c) The training must establish employee proficiency in the duties required by this standard and must introduce new or revised procedures, as necessary, for compliance with this standard.

(d) The employer must maintain training records to show that the training required by paragraphs (a) through (c) of this section has been accomplished. The training records must contain each employee's name, the name of the trainers, and the dates of training. The documentation must be available for inspection by employees and their authorized representatives, for the period of time the employee is employed by that employer.

§ 1926.1208 Duties of authorized entrants.

The entry employer must ensure that all authorized entrants:

(a) Are familiar with and understand the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(b) Properly use equipment as required by § 1926.1204(d);

(c) Communicate with the attendant as necessary to enable the attendant to assess entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by § 1926.1209(f);

(d) Alert the attendant whenever:

(1) There is any warning sign or symptom of exposure to a dangerous situation; or

(2) The entrant detects a prohibited condition; and

(e) Exit from the permit space as quickly as possible whenever:

(1) An order to evacuate is given by the attendant or the entry supervisor;

(2) There is any warning sign or symptom of exposure to a dangerous situation;

(3) The entrant detects a prohibited condition; or

(4) An evacuation alarm is activated.

§ 1926.1209 Duties of attendants.

The entry employer must ensure that each attendant:

(a) Is familiar with and understands the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(b) Is aware of possible behavioral effects of hazard exposure in authorized entrants;

(c) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under § 1926.1206(d) accurately identifies who is in the permit space;

(d) Remains outside the permit space during entry operations until relieved by another attendant;

Note to paragraph (d). Once an attendant has been relieved by another attendant, the relieved attendant may enter a permit space to attempt a rescue when the employer's permit space program allows attendant entry for rescue and the attendant has been trained and equipped for rescue operations as required by § 1926.1211(a).

(e) Communicates with authorized entrants as necessary to assess entrant status and to alert entrants of the need to evacuate the space under § 1926.1208(e);

(f) Assesses activities and conditions inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:

(1) If there is a prohibited condition;

(2) If the behavioral effects of hazard exposure are apparent in an authorized entrant;

(3) If there is a situation outside the space that could endanger the authorized entrants; or

(4) If the attendant cannot effectively and safely perform all the duties required under this section;

(g) Summons rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

(h) Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

(1) Warns the unauthorized persons that they must stay away from the permit space;

(2) Advises the unauthorized persons that they must exit immediately if they have entered the permit space; and

(3) Informs the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

(i) Performs non-entry rescues as specified by the employer's rescue procedure; and

(j) Performs no duties that might interfere with the attendant's primary duty to assess and protect the authorized entrants.

§ 1926.1210 Duties of entry supervisors.

The entry employer must ensure that each entry supervisor:

(a) Is familiar with and understands the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(b) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

(c) Terminates the entry and cancels or suspends the permit as required by § 1926.1205(e);

(d) Verifies that rescue services are available and that the means for summoning them are operable, and that the employer will be notified as soon as the services become unavailable;

(e) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

(f) Determines, whenever responsibility for a permit space entry operation is transferred, and at intervals dictated by the hazards and operations performed within the space, that entry

operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

§ 1926.1211 Rescue and emergency services.

(a) An employer who designates rescue and emergency services, pursuant to § 1926.1204(i), must:

(1) Evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified;

Note to paragraph (a)(1). What will be considered timely will vary according to the specific hazards involved in each entry. For example, § 1926.103 (Respiratory protection) requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.

(2) Evaluate a prospective rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular permit space or types of permit spaces identified;

(3) Select a rescue team or service from those evaluated that:

(i) Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;

(ii) Is equipped for, and proficient in, performing the needed rescue services;

(iii) Agrees to notify the employer immediately in the event that the rescue service becomes unavailable;

(4) Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and

(5) Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue team or service can develop appropriate rescue plans and practice rescue operations.

(b) An employer whose employees have been designated to provide permit space rescue and/or emergency services must take the following measures and provide all equipment and training at no cost to those employees:

(1) Provide each affected employee with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train each affected employee so the employee is proficient in the use of that PPE;

(2) Train each affected employee to perform assigned rescue duties. The employer must ensure that such employees successfully complete the training required and establish proficiency as authorized entrants, as provided by §§ 1926.1207 and 1926.1208;

(3) Train each affected employee in basic first aid and cardiopulmonary resuscitation (CPR). The employer must ensure that at least one member of the rescue team or service holding a current certification in basic first aid and CPR is available; and

(4) Ensure that affected employees practice making permit space rescues before attempting an actual rescue, and at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces, except practice rescue is not required where the affected employees properly performed a rescue operation during the last 12 months in the same permit space the authorized entrant will enter, or in a similar permit space. Representative permit spaces must, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

(c) Non-entry rescue is required unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. The employer must designate an entry rescue service whenever non-entry rescue is not selected. Whenever non-entry rescue is selected, the entry employer must ensure that retrieval systems or methods are used whenever an authorized entrant enters a permit space, and must confirm, prior to entry, that emergency assistance would be available in the event that non-entry rescue fails. Retrieval systems must meet the following requirements:

(1) Each authorized entrant must use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point which the employer can establish presents a profile small enough for the successful removal of the entrant. Wristlets or anklets may be used in lieu of the chest or full body harness if the employer can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets or anklets is the safest and most effective alternative.

(2) The other end of the retrieval line must be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device must be available to retrieve personnel from vertical type permit spaces more than 5 feet (1.52 meters) deep.

(3) Equipment that is unsuitable for retrieval must not be used, including, but not limited to, retrieval lines that have a reasonable probability of becoming entangled with the retrieval lines used by other authorized entrants, or retrieval lines that will not work due to the internal configuration of the permit space.

(d) If an injured entrant is exposed to a substance for which a Safety Data Sheet (SDS) or other similar written information is required to be kept at the worksite, that SDS or written information must be made available to the medical facility treating the exposed entrant.

§ 1926.1212 Employee participation.

(a) Employers must consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program required by § 1926.1203.

(b) Employers must make available to each affected employee and his/her authorized representatives all information required to be developed by this standard.

§ 1926.1213 Provision of documents to Secretary.

For each document required to be retained in this standard, the retaining employer must make the document available on request to the Secretary of Labor or the Secretary's designee.

[FR Doc. 2015–08843 Filed 5–1–15; 8:45 am]

BILLING CODE 4510–26–P