

**Preamble to Final Rule  
Permit-Required Confined Spaces  
29 CFR 1910.146**

**I. Background**

Many workplaces contain spaces which are considered "confined" because their configurations hinder the activities of any employees who must enter, work in, and exit them. For example, employees who work in process vessels generally must squeeze in and out through narrow openings and perform their tasks while cramped or contorted. For the purposes of this rulemaking, OSHA is using the term "confined space" to describe such spaces. In addition, there are many instances where employees who work in confined spaces face increased risk of exposure to serious hazards. In some cases, confinement itself poses entrapment hazards. In other cases, confined space work keeps employees closer to hazards, such as asphyxiating atmospheres or the moving parts of a mixer, than they would be otherwise. For the purposes of this rulemaking, OSHA is using the term "permit-required confined space" (permit space) to describe those spaces which both meet the definition of "confined space" and pose health or safety hazards.

In its June 5, 1989 NPRM (54 FR 24080), OSHA determined, based on its review of accident data, that asphyxiation is the leading cause of death in confined spaces. The asphyxiations that have occurred in permit spaces have generally resulted from oxygen deficiency or from exposure to toxic atmospheres. In addition, there have been cases where employees who were working in water towers and bulk material hoppers slipped or fell into narrow, tapering, discharge pipes and died of asphyxiation due to compression of the torso. Also, employees working in silos have been asphyxiated as the result of engulfment in finely divided particulate matter (such as sawdust) that blocks the breathing passages.

The Agency has, in addition, documented confined space incidents in which victims were burned, ground-up by auger type conveyors, or crushed or battered by rotating or moving parts inside mixers. Failure to deenergize equipment inside the space prior to employee entry was a factor in many of those accidents. OSHA notes that the NPRM (54 FR 24080-24085) discussed the hazards which confront employees who enter permit spaces and the inadequacy of existing regulation in greater detail. Additionally, Section II of this preamble, Hazards, presents a detailed discussion of the hazards to which permit-space entrants have been exposed, demonstrating that this final rule is reasonably necessary to protect affected employees from significant risks.

OSHA has determined, based on its review of the rulemaking record, including investigation reports covering "permit space" fatalities (Exhibits (Ex.) 10 through 13 and 16), that many employers have not appreciated the degree to which the conditions of permit space work can compound the risks of exposure to atmospheric or other serious hazards. Further, the elements of confinement, limited access, and restricted air flow, can result in hazardous conditions which would not arise in an open workplace. For example, vapors which might otherwise be released into the open air can generate a highly toxic or otherwise harmful atmosphere within a confined space. Unfortunately, in many cases, employees have died because employers improvised or

followed "traditional methods" rather than following existing OSHA standards, recognized safe industry practice, or common sense. The Agency notes that, as documented in the NPRM, many of the employees who died in permit space incidents were would-be rescuers who were not properly trained or equipped.

In addition, OSHA believes that, as noted in the NPRM (54 FR 24098), the failure to take proper precautions for permit space entry operations has resulted in fatalities, as opposed to injuries, more frequently than would be predicted using the applicable Bureau of Labor Statistics models. The Agency notes that, by their very nature and configuration, many permit spaces contain atmospheres which, unless adequate precautions are taken, are immediately dangerous to life and health (IDLH). For example, many confined spaces are poorly ventilated - a condition that is favorable to the creation of an oxygen deficient atmosphere and to the accumulation of toxic gases. Furthermore, by definition, a confined space is not designed for continuous employee occupancy; hence little consideration has been given to the preservation of human life within the confined space when employees need to enter it.

Accordingly, the Agency has determined that it is necessary to promulgate a comprehensive standard to require employers to take appropriate measures for the protection of any employee assigned to enter a permit space. OSHA believes this new standard will help eliminate confusion and misunderstanding by clearly stating employer responsibilities.

The record and determinations that are discussed in this final rule culminate a series of efforts by OSHA, the National Institute for Occupational Safety and Health (NIOSH), the American National Standards Institute (ANSI) Z117 Committee, and others to address permit space hazards. The chronology of those efforts is set forth in the following paragraphs.

On July 24, 1975, OSHA issued an Advance Notice of Proposed Rulemaking (ANPR), "Standard for Work in Confined Spaces," for the purpose of obtaining data and information to be used in developing a confined spaces standard (40 FR 30980). This ANPR sought comments on 14 issues, including problems with existing regulations, factors involved in confined space injuries and deaths, and the steps necessary for the control of hazards in confined spaces.

On August 26, 1977, ANSI adopted ANSI Z117.1-1977, "Safety Requirements for Working in Tanks and Other Confined Spaces" (Ex. 13-5). That standard set "minimum requirements for safe entry, continued work in, and exit from tanks and other confined spaces at normal atmospheric pressure." The ANSI standard defined confined spaces as enclosures with limited means of access and egress, such as storage tanks, open-topped spaces more than four feet in depth with poor natural ventilation, and sewers. Explanatory information accompanying the standard stated that the standard addressed atmospheric hazards, physical hazards, the possibility of liquids, gases, or solids entering a space (e.g., drowning or engulfment hazard) and isolation of entrants in case of need (e.g., hazard of entrapment due to configuration). The ANSI standard set: (1) general precautions (such as testing, evaluation, ventilation and lockout) to be followed before entry, (2) procedures to be followed when confronting particular environmental hazards (such as oxygen-deficient, flammable and toxic atmospheres, noise, and radiation exposure), (3) entry procedures (including the use of permit to authorize entry and illumination of the space),

and (4) special procedures for hot work (e.g., welding) or removal or application of preservative coatings or linings performed in confined spaces.

Citing both "the complexity of the issues and the period of time since the previous Advance Notice," OSHA issued another ANPR, "Entry and Work in Confined Spaces" (44 FR 60334), on October 19, 1979. The 24 questions raised in the 1979 ANPR were similar to, but more detailed than, the 14 issues raised in the 1975 ANPR.

The 1979 ANPR again requested suggestions for a definition of "confined space," as well as information regarding the appropriate procedures for addressing confined space hazards, and the cost of those procedures. OSHA received 68 comments in response to the 1979 ANPR. These comments, while similar to those received in response to the 1975 ANPR, broadened the informational base which supported OSHA regulatory action to address confined spaces hazards.

Most commenters suggested that OSHA develop a performance-oriented standard similar to OSHA's "fire protection standard" (29 CFR Part 1910, Subparts E, H, and L), which was then being revised and which was subsequently published as a final rule on September 12, 1980 (45 FR 60704). Also, many commenters suggested that defining the hazards confronted in confined spaces was more important than defining the term "confined space."

In December 1979, NIOSH issued a criteria document, "Working in Confined Spaces" (Ex. 13-9), which recommended procedures for protecting employees from the hazards of entering, working in, or exiting confined spaces. NIOSH defined the term "confined space" to mean "a space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy." The criteria document states: "The standard is designed not only to make the confined space safe for the worker, but also to make the worker cognizant of the hazards associated with this work area and the safe work practices necessary to deal with these hazards."

The NIOSH recommended standard included provisions for permit to authorize entry, testing and monitoring, precautions (such as ventilation, purging and lockout), medical surveillance, training, labeling and posting of confined spaces, entry procedures (such as planning for entry, standby person, communications, and rescue), personal protective equipment, rescue equipment and recordkeeping. NIOSH would require employers whose confined spaces were immediately dangerous to life or health (categorized as "Class A") or dangerous (categorized as "Class B") to implement all of these measures, except that employers with Class B confined spaces would have a qualified person determine if it was necessary to conduct monitoring. Employers with confined spaces "in which the potential hazard would not require any special modification of the work procedure" (categorized as "Class C") would be required to implement a permit system, atmospheric testing, training, labeling and posting, entry procedures (except for stationing of standby person), and recordkeeping and to provide rescue equipment. Other measures would be taken if a qualified person determined that they were necessary.

On March 25, 1980, OSHA issued an ANPR (Construction ANPR) "Entry and Work in Confined Spaces" (45 FR 19266), to obtain information which could be used "to revise its

existing standards in order to effectively cover hazards connected with these (confined space) activities in construction." The Agency stated its belief that "the hazards of work in confined spaces are also significant in the construction industry." The Construction ANPR posed 31 questions, similar to those presented in the 1979 General Industry ANPR, regarding the appropriate precautions and procedures for controlling confined space hazards which construction workers may confront. The Agency received 75 comments, most of which restated general industry-related concerns that were raised in response to the 1979 ANPR.

On April 4, 1980, OSHA scheduled public meetings (45 FR 22978) where interested parties could make oral presentations regarding confined space hazards in general industry and in construction. Those meetings were held during May 1980 in Houston, Texas, in Denver, Colorado, and in Washington, D.C. There were approximately 30 participants at these meetings.

In January 1986, NIOSH published an "Alert" titled "Request for Assistance in Preventing Occupational Fatalities in Confined Spaces" (Ex. 13-16). The Alert described the circumstances under which 16 workers died (14 of them due to atmospheric hazards) in confined space incidents. NIOSH focused on problems employers have in three areas: (1) recognizing confined spaces; (2) testing, evaluating, and monitoring confined space atmospheres; and (3) developing and implementing rescue procedures. It was noted, for example, that "[m]ore than 60% of confined space fatalities occur among would-be rescuers." The Alert recommended that employers protect employees who enter confined spaces by implementing measures similar to those presented in the 1979 Criteria Document.

In July 1987, NIOSH published "A Guide to Safety in Confined Space" (Ex. 14-145). The Guide addressed identification of confined spaces, measures to take when a confined space presents atmospheric hazards, and incidents where "[l]ack of hazard awareness and unplanned rescue attempts led to [employee] deaths." NIOSH also described other potential confined space hazards (temperature extremes, engulfment, noise, slick or wet surfaces, and falling objects) and provided a checklist for employers to follow in evaluating confined spaces and in planning entry operations.

In addition, NIOSH's Fatal Accident Circumstances and Epidemiology (FACE) project focused much of its effort on confined space-related fatalities from 1984 to 1988 (Ex. 14-145). Personnel from NIOSH's Division of Safety Research evaluated numerous incidents and prepared reports which contained recommendations for improved employee protection. Those reports, which constituted the primary data base for the 1986 "Alert" and the 1987 "Guide", contributed significantly to OSHA's understanding of the broad range of hazards posed by confined spaces.

In May 1988, the ANSI Z117.1 Committee withdrew ANSI Z117.1-1977 because the committee had not completed action to renew or revise the standard within the 5-year period required by ANSI procedures for such action.

On June 5, 1989, OSHA issued a notice of proposed rulemaking (NPRM) (54 FR 24080) to set requirements for the protection of employees who work in or near permit-required confined spaces (permit spaces). In brief, the proposal required employers to identify any permit spaces in their workplaces, prevent unauthorized entry into such spaces, and protect authorized entrants

from permit space hazards through a permit space program. As proposed, the permit space program, in turn, required employers to control hazards; properly inform, train and equip affected employees; document compliance with the program and authorize any entry operations through written permits; station an attendant to monitor entry operations; take the appropriate precautions for rescuing entrants from permit spaces; and assist any contractors hired for entry operations in complying with the program requirements by informing them of the hazards identified and any procedures developed for dealing with them. In addition, the NPRM presented 18 issues regarding which OSHA solicited comments and information. Detailed discussion of the proposed rule and issues raised during the rulemaking may be found in Section III, Summary and Explanation of the Standard, later in this preamble.

The NPRM set a comment period which ended on August 4, 1989. On July 21, 1989, in response to several requests, OSHA published a notice (54 FR 30557) which extended the time in which written comments and requests for hearing could be submitted through October 4, 1989.

On September 1, 1989, (54 FR 36644) the Agency promulgated a standard for "The control of hazardous energy (lockout/tagout)", 29 CFR 1910.147, to address "the unexpected energization or start up of machines or equipment, or release of stored energy [that] could cause injury to employees." OSHA anticipates that compliance with the lockout/tagout standard, in conjunction with the permit-space standard, will effectively protect employees who work in permit spaces from mechanical and other energy hazards. (See the discussion of issue 7 under NPRM Issues, later in this preamble, for further information on the relationship between the two standards.) On October 5, 1989, the ANSI Z117 Committee approved ANSI Z117.1-1989, "Safety Requirements for Confined Spaces." The 1989 edition differs from the 1977 edition in two major respects: First, it distinguishes between confined spaces based on their potential to pose hazards. Under ANSI Z117.1-1989, employers would not need written permits to authorize work or attendants for spaces which fit the definition of permit-required confined space but have low potential to pose hazards. Second, it provides more specific guidance regarding the identification and evaluation of confined spaces, the training of personnel, and the appropriate procedures for having contractors work in confined spaces and for providing rescue and emergency services.

On October 10, 1989, OSHA issued a notice of informal public hearing (54 FR 41461), which announced that hearings would be held in Washington, D.C. and in Houston, Texas. The notice set out 15 issues regarding which the Agency solicited testimony, with supporting information. The testimony and other information received regarding those issues are discussed in Section III, Summary and Explanation of the Standard, later in this preamble. In addition, OSHA extended the written comment period through November 1, 1989.

On November 14, 1989, OSHA issued a notice of additional hearing site (54 FR 47498), which announced that the Agency would hold a hearing in Chicago, Illinois to facilitate participation by interested parties in the Chicago area.

On November 14-15, 1989, OSHA convened public hearings on the NPRM, with Administrative Law Judge Aaron Silverman presiding. Hearings were also held in Houston, Texas (December 5-6, 1989) and in Chicago, Illinois (January 30-February 2, 1990).

At the conclusion of the hearings, Judge Silverman set a post-hearing period for the submission of additional data (ending on April 18, 1990) and for the submission of additional briefs, arguments and summations (ending on May 3, 1990). On April 11, 1990, in response to requests from several parties, Judge Silverman extended the post-hearing comment periods, so that hearing participants had until May 18, 1990 to submit additional data and until June 4, 1990 to submit briefs, arguments or summations. On November 9, 1990, Judge Silverman closed and certified the hearing record for the rulemaking. The rulemaking record contains 137 exhibits and 2,279 pages of hearing transcript. OSHA received 227 comments on the proposal and 51 post-hearing comments.

In the course of drafting the final standard, OSHA has carefully reviewed the record for this rulemaking. In addition to comments and testimony at the public hearings, the Agency has also studied confined space regulations generated by states and other countries; materials generated by NIOSH; both editions of ANSI Z117.1; and the guidelines developed by other organizations (such as the American Petroleum Institute (Ex. 13-14) and the UAW-GM Human Resource Center (Ex. 64, 65, 66, 67)).

While the Agency has gained many valuable insights from the documents reviewed, OSHA believes that some standard-setting groups have not focused sufficiently on non-atmospheric hazards and have concentrated largely on air contaminants and oxygen-deficient atmospheres. For example, both the 1979 NIOSH Criteria Document and ANSI Z117.1-1989 require atmospheric testing before entry into a "confined space", even though those standards also recognize that some such spaces will pose mechanical and physical hazards rather than atmospheric hazards. Consequently, the OSHA permit-required confined space standard diverges from the approaches taken in the ANSI and NIOSH documents as necessary to indicate clearly that the OSHA standard is intended to protect employees from exposure to all permit space hazards.

Section 6(b)(8) of the Occupational Safety and Health Act of 1970 (the OSH Act) requires OSHA to explain "why a rule promulgated by the Secretary differs substantially from an existing national consensus standard," by publishing "a statement of the reasons why the rule as adopted will better effectuate the purposes of the Act than the national consensus standard." In compliance with that requirement, the Agency has reviewed the standards proposed through this rulemaking with reference to the pertinent consensus standards. OSHA discusses the relationship between individual regulatory provisions and the corresponding consensus standards in Section III, Summary and Explanation of the Standard, later in this preamble.

The materials upon which OSHA has relied in drafting this final rule are available for review and copying in the OSHA Docket Office. Those materials include, among others, transcripts of the 1989 and 1990 informal public hearings, documents received by OSHA at the hearings and during the post-hearing comment periods, public comments on the NPRM, accident reports, existing regulatory language, responses to the 1975 and 1979 ANPRs, transcripts of the 1980 public meetings and the sources listed in the "References" sections of both the NPRM and this final rule.

[58 FR 4462, Jan. 14, 1993; 59 FR 55208, Nov. 4, 1994