

## **CONFINED SPACE PROGRAM**

### **A confined space, as defined in 29 CFR 1910.146:**

Is large enough and so configured that an employee can bodily enter and perform assigned work AND

Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers vaults, and pits are spaces that may have limited means of entry) AND

Is not designed for continuous employee occupancy.

### **All confined spaces are potentially hazardous to enter. Potential hazards include, but are not limited to:**

Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit (LFL).

Airborne combustible dust at a concentration that meets or exceeds its LFL. Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.

Atmospheric oxygen concentration of less than 19.5% or above 23.5%.

Atmospheric concentration of any substance for which a dose or permissible exposure limit is published in Subpart G or Subpart Z of 1910 and which could result in employee exposure in excess of its dose or permissible exposure limit. Note: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment or ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

Any other atmospheric condition that is immediately dangerous to life or health. Note: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as MSDS that comply with the Hazard Communication Standard can provide guidance in establishing acceptable atmospheric conditions.

### **Permit-required confined space means a confined space that has one or more of the following characteristics:**

Contains or has a potential to contain a hazardous atmosphere;

Contains a material that has the potential for engulfing an entrant;  
(Rev. 5/99)

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

Contains any other recognized serious safety or health hazard.

**In addition to 29 CFR 1910.146 confined space work is addressed in the following standards:**

<b>1910.252</b>	Welding, cutting and brazing in confined spaces
<b>1910.261</b>	Special Industries, acid tanks
<b>1910.268</b>	Telecommunications; underground lines
<b>1926.21</b>	Confined space training requirements for construction
<b>1926.250</b>	Lifelines in silos, hoppers, tanks - construction
<b>1926.956</b>	Underground lines - construction

The employer must identify all confined spaces in the workplace and must distinguish between confined spaces and permit required confined spaces. The definitions given above will assist in making this distinction. Appendix A to this section has a flow chart which will facilitate

compliance. If the workplace contains permit spaces, the employer shall 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 the permit spaces. If the employer decides that its employees will not enter permit spaces, the employer shall take effective measures to prevent its employees from entering the permit spaces. If the employer decides that its employees will enter permit spaces, the employer shall develop and implement a written permit space program that complies with 1910.146.

**There were changes to the confined space regulation which became effective February 1, 1999. These included three major elements:**

Enhanced employee participation in the employer's permit program;

Authorized entrant observation of any monitoring/testing associated with entry; and

Strengthening and clarification of the criteria employers must satisfy when preparing for the timely rescue of incapacitated persons.

**A copy of 1910.146 is attached. The sections are:**

**Scope and Application**

**Definitions**

**General requirements**

**Permit-required confined space program**

**Permit system**

**Entry permit**

**Training**

**Duties of authorized entrants**

**Duties of attendants**  
**Duties of entry supervisors**  
**Rescue and emergency services**  
**Employee participation**

## OSHA Regulations (Standards - 29 CFR)

### Permit-required confined spaces - 1910.146

#### (a) Scope and application.

This section contains requirements for practices and procedures to protect employees in general industry from the hazards of entry into permit-required confined spaces. This section does not apply to agriculture, to construction, or to shipyard employment (Parts 1928, 1926, and 1915 of this chapter, respectively).

#### (b) Definitions.

“Acceptable entry conditions” means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

“Attendant” means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant’s duties assigned in the employer’s permit space program.

“Authorized entrant” means an employee who is authorized by the employer to enter a permit space.

“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.

“Confined space” means a space that:

- (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- (2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
- (3) Is not designed for continuous employee occupancy.

“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.

“Emergency” means any occurrence (including any failure of 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, or crushing.

“Entry” means the action by which 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.

“Entry permit (permit)” means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in paragraph (f) of this section.

“Entry supervisor” means the 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 section.

NOTE: 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 section 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.

“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: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) 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 G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this Part and which could result in employee exposure in excess of its dose or permissible exposure limit;

NOTE: 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 provision.

- (5) Any other atmospheric condition that is immediately dangerous to life or health.

NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, section 1910.1200 of this Part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

“Hot work permit” means the employer’s written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

“Immediately dangerous to life or health (IDLH)” means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual’s ability to escape unaided from a permit space.

NOTE: 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” from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be “immediately” dangerous to life or health.

“Inerting” means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

NOTE: This procedure produces an IDLH oxygen-deficient atmosphere.

“Isolation” means the process by which a permit space is removed from service and completely protected against the release of energy and material into the space 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; or blocking or disconnecting all mechanical linkages.

“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.

“Non-permit confined space” means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

“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 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.

“Permit system” means the employer’s written procedure for preparing and issuing permits for

entry and for returning the permit space to service following termination of entry.

“Prohibited condition” means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

“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, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

“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: 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.

### **(c) General requirements.**

**(1)** The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces. NOTE: Proper application of the decision flow chart in Appendix A to section 1910.146 would facilitate compliance with this requirement.

**(2)** If the workplace contains permit spaces, the employer shall 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 the permit spaces.

NOTE: A sign reading DANGER — PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER or using other similar language would satisfy the requirement for a sign.

**(3)** If the employer decides that its employees will not enter permit spaces, the employer shall take effective measures to prevent its employees from entering the permit spaces and shall comply with paragraphs (c)(1), (c)(2), (c)(6), and (c)(8) of this section.

**(4)** If the employer decides that its employees will enter permit spaces, the employer shall develop and implement a written permit space program that complies with this section. The written program shall be available for inspection by employees and their authorized representatives.

**(5)** An employer may use the alternate procedures specified in paragraph (c)(5)(ii) of this section for entering a permit space under the conditions set forth in paragraph (c)(5)(i) of this section.

**(i)** An employer whose employees enter a permit space need not comply with paragraphs (d) through (f) and (h) through (k) of this section, provided that:

**(A)** The employer can demonstrate that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;

**(B)** The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry;

**(C)** The employer develops monitoring and inspection data that supports the demonstrations required by paragraphs (c)(5)(i)(A) and (c)(5)(i)(B) of this section;

**(D)** If an initial entry of the permit space is necessary to obtain the data required by paragraph (c)(5)(i)(C) of this section, the entry is performed in compliance with paragraphs (d) through (k) of this section;

**(E)** The determinations and supporting data required by paragraphs (c)(5)(i)(A), (c)(5)(i)(B), and (c)(5)(i)(C) 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 (c)(5) of this section or to that employee's authorized representative; and

**(F)** Entry into the permit space under the terms of paragraph (c)(5)(i) of this section is performed in accordance with the requirements of paragraph (c)(5)(ii) of this section.

NOTE: See paragraph (c)(7) of this section for reclassification of a permit space after all hazards within the space have been eliminated.

**(ii)** The following requirements apply to entry into permit spaces that meet the conditions set forth in paragraph (c)(5)(i) of this section.

**(A)** Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.

**(B)** When entrance covers are removed, the opening shall be promptly 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.

**(C)** Before an employee enters the space, the internal atmosphere shall 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, shall be provided an opportunity to observe the pre-entry testing required by this paragraph.

- (1)** Oxygen content,
- (2)** Flammable gases and vapors, and
- (3)** Potential toxic air contaminants.

**(D)** There may be no hazardous atmosphere within the space whenever any employee is inside the space.

**(E)** Continuous forced air ventilation shall be used, as follows:

- (1)** An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;
- (2)** The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space



and shall continue until all employees have left the space;

**(3)** The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space

**(F)** The atmosphere within the space shall be periodically tested as necessary to 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, shall be provided with an opportunity to observe the periodic testing required by this paragraph.

**(G)** If a hazardous atmosphere is detected during entry:

**(1)** Each employee shall leave the space immediately;

**(2)** The space shall be evaluated to determine how the hazardous atmosphere developed; and

**(3)** Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

**(H)** The employer shall verify that the space is safe for entry and that the pre-entry measures required by paragraph (c)(5)(ii) 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 shall be made before entry and shall be made available to each employee entering the space or to that employee's authorized representative .

**(6)** When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the employer shall reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

**(7)** A space classified by the employer as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

**(i)** If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

**(ii)** If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed under paragraphs (d) through (k) of this section. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.

NOTE: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards. Paragraph (c)(5) covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.

**(iii)** The employer shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space or to that employee's authorized representative.

**(iv)** If hazards arise within a permit space that has been declassified to a non-permit space under paragraph (c)(7) of this section, each employee in the space shall exit the space. The employer shall then reevaluate the space and determine whether it must be reclassified as a permit space, in accordance with other applicable provisions of this section.

**(8)** When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall:

**(i)** Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of this section;

**(ii)** Apprise the contractor of the elements, including the hazards identified and the host employer's experience with the space, that make the space in question a permit space;

**(iii)** Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;

**(iv)** Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and

**(v)** Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

**(9)** In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall:

**(i)** Obtain any available information regarding permit space hazards and entry operations from the host employer;

**(ii)** Coordinate entry operations with the host employer, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and

**(iii)** Inform the host employer of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either through a debriefing or during the entry operation.

**(iv)** Permit-required confined space program (permit space program).

**Under the permit space program required by paragraph (c)(4) of this section, the employer shall:**

**(1)** Implement the measures necessary to prevent unauthorized entry;

**(2)** Identify and evaluate the hazards of permit spaces before employees enter them;

**(3)** Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following:

**(i)** Specifying acceptable entry conditions;

**(ii)** Providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces;

**(iii)** Isolating the permit space;

**(iv)** Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;

**(v)** Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and

**(vi)** Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry.

**(4)** Provide the following equipment (specified in paragraphs (d)(4)(i) through (d)(4)(ix) of this section) at no cost to employees, maintain that equipment properly, and ensure that employees use that equipment properly:

**(i)** Testing and monitoring equipment needed to comply with paragraph (d)(5) of this section;

**(ii)** Ventilating equipment needed to obtain acceptable entry conditions;

**(iii)** Communications equipment necessary for compliance with paragraphs (h)(3) and (i)(5) of this section;

**(iv)** Personal protective equipment insofar as feasible engineering and work practice controls do not adequately protect employees;

**(v)** Lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency;

**(vi)** Barriers and shields as required by paragraph (d)(3)(iv) of this section;

**(vii)** Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;

**(viii)** Rescue and emergency equipment needed to comply with paragraph (d)(9) of this section, except to the extent that the equipment is provided by rescue services; and

**(ix)** Any other equipment necessary for safe entry into and rescue from permit spaces.

**(5)** Evaluate permit space conditions as follows when entry

operations are conducted:

- (i)** Test conditions in the permit space to determine if acceptable entry conditions exist before entry is authorized to begin, except that, if isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), pre-entry testing shall be performed to the extent feasible before entry is authorized and, if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized entrants are working;
- (ii)** Test or monitor the permit space as necessary to determine if acceptable entry conditions are being maintained during the course of entry operations; and
- (iii)** When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors.
- (iv)** 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;
- (v)** 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 the entrant or representative has reason to believe that the evaluation of that space may not have been adequate;
- (vi)** Immediately provide each authorized entrant or that employee's authorized representative with the results of any testing conducted in accord with paragraph (d) of this section.

NOTE: Atmospheric testing conducted in accordance with Appendix B to section 1910.146 would be considered as satisfying the requirements of this paragraph. For permit space operations in sewers, atmospheric testing conducted in accordance with Appendix B, as supplemented by Appendix E to section 1910.146, would be considered as satisfying the requirements of this paragraph.

- (6)** Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations;

NOTE: Attendants may be assigned to monitor more than one permit space provided the duties described in paragraph (i) of this section can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in paragraph (i) of this section can be effectively performed for each permit space that is monitored.

- (7)** If multiple spaces are to be monitored by 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 the permit spaces being monitored without distraction from the attendant's responsibilities under paragraph (i) of this section;

- (8)** Designate the persons who are to have active roles (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 paragraph (g) of this section;

**(9)** Develop and implement procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue;

**(10)** Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this section;

**(11)** Develop and implement procedures to coordinate entry operations when employees of more than one employer are working simultaneously as authorized entrants in a permit space, so that employees of one employer do not endanger the employees of any other employer;

**(12)** 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;

**(13)** Review entry operations when the employer has reason to believe that 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: Examples of circumstances requiring the review of the permit space program are: 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.

**(14)** Review the permit space program, using the canceled permits retained under paragraph (e)(6) of this section 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: 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.

**(e) Permit system.**

**(1)** Before entry is authorized, the employer shall document the completion of measures required by paragraph (d)(3) of this section by preparing an entry permit.

NOTE: Appendix D to section 1910.146 presents examples of permits whose elements are considered to comply with the requirements of this section.

**(2)** Before entry begins, the entry supervisor identified on the permit shall sign the entry permit to authorize entry.

**(3)** The completed permit shall 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.

**(4)** 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 paragraph (f)(2) of this section.

**(5)** The entry supervisor shall terminate entry and cancel the entry permit when:

**(i)** The entry operations covered by the entry permit have been completed; or

**(ii)** A condition that is not allowed under the entry permit arises in or near the permit space.

**(6)** The employer shall retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program required by paragraph (d)(14) of this section. Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

**(f) Entry permit.**

The entry permit that documents compliance with this section and authorizes entry to a permit space shall identify:

**(1)** The permit space to be entered;

**(2)** The purpose of the entry;

**(3)** The date and the authorized duration of the entry permit;

**(4)** 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: 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.

**(5)** The personnel, by name, currently serving as attendants;

**(6)** The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;

**(7)** The hazards of the permit space to be entered;

**(8)** The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

NOTE: Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

**(9)** The acceptable entry conditions;

**(10)** The results of initial and periodic tests performed under paragraph (d)(5) of this section, accompanied by the names or initials of the testers and by an indication of when the tests were performed;

**(11)** 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;

**(12)** The communication procedures used by authorized entrants and attendants to maintain contact during the entry;

**(13)** Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;

**(14)** Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and

**(15)** Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

**(g) Training.**

**(1)** The employer shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this section.

**(2)** Training shall be provided to each affected employee:

**(i)** Before the employee is first assigned duties under this section;

**(ii)** Before there is a change in assigned duties;

**(iii)** Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;

**(iv)** Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by paragraph (d)(3) of this section or that there are inadequacies in the employee's knowledge or use of these procedures.

**(3)** The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary, for compliance with this section.

**(4)** The employer shall certify that the training required by paragraphs (g)(1) through (g)(3) of this section has been accomplished. The certification shall contain each employee's name, the

signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.

**(h) Duties of authorized entrants.**

**The employer shall ensure that all authorized entrants:**

- (1)** Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- (2)** Properly use equipment as required by paragraph (d)(4) of this section;
- (3)** Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by paragraph (i)(6) of this section;
- (4)** Alert the attendant whenever:
  - (i)** The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
  - (ii)** The entrant detects a prohibited condition; and
- (5)** Exit from the permit space as quickly as possible whenever:
  - (i)** An order to evacuate is given by the attendant or the entry supervisor,
  - (ii)** The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,
  - (iii)** The entrant detects a prohibited condition, or
  - (iv)** An evacuation alarm is activated.

**(i) Duties of attendants.**

**The employer shall ensure that each attendant:**

- (1)** Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- (2)** Is aware of possible behavioral effects of hazard exposure in authorized entrants;
- (3)** Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under paragraph (f)(4) of this section accurately identifies who is in the permit space;



**(4)** Remains outside the permit space during entry operations until relieved by another attendant;

NOTE: When the employer's permit entry program allows attendant entry for rescue, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations as required by paragraph (k)(1) of this section and if they have been relieved as required by paragraph (i)(4) of this section.

**(5)** Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space under paragraph (i)(6) of this section;

**(6)** Monitors activities 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;

**(i)** If the attendant detects a prohibited condition;

**(ii)** If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;

**(iii)** If the attendant detects a situation outside the space that could endanger the authorized entrants; or

**(iv)** If the attendant cannot effectively and safely perform all the duties required under paragraph (i) of this section;

**(7)** Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

**(8)** Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

**(i)** Warn the unauthorized persons that they must stay away from the permit space;

**(ii)** Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and

**(iii)** Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

**(9)** Performs non-entry rescues as specified by the employer's rescue procedure; and

**(10)** Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

**(j) Duties of entry supervisors.**

## **The employer shall ensure that each entry supervisor:**

- (1)** Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- (2)** 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;
- (3)** Terminates the entry and cancels the permit as required by paragraph (e)(5) of this section;
- (4)** Verifies that rescue services are available and that the means for summoning them are operable;
- (5)** Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and
- (6)** 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.

## **(k) Rescue and emergency services.**

- (1)** An employer who designates rescue and emergency services, pursuant to paragraph (d)(9) of this section, shall:
  - (i)** Evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified;

Note to paragraph (k)(1)(i): What will be considered timely will vary according to the specific hazards involved in each entry. For example, 1910.134, 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.

- (ii)** 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;
- (iii)** Select a rescue team or service from those evaluated that:
  - (A)** Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;
  - (B)** Is equipped for and proficient in performing the needed rescue services;

**(iv)** Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and

**(v)** Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

Note to paragraph (k)(1): Non-mandatory Appendix F contains examples of criteria which employers can use in evaluating prospective rescuers as required by paragraph (k)(1) of this section.

**(2)** An employer whose employees have been designated to provide permit space rescue and emergency services shall take the following measures:

**(i)** Provide affected employees with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train affected employees so they are proficient in the use of that PPE, at no cost to those employees;

**(ii)** Train affected employees to perform assigned rescue duties. The employer must ensure that such employees successfully complete the training required to establish proficiency as an authorized entrant, as provided by paragraphs (g) and (h) of this section;

**(iii)** Train affected employees in basic first-aid and cardiopulmonary resuscitation (CPR). The employer shall ensure that at least one member of the rescue team or service holding a current certification in first aid and CPR is available; and

**(iv)** Ensure that affected employees practice making permit space rescues 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. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

**(3)** To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements.

**(i)** Each authorized entrant shall 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 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 is the safest and most effective alternative.

**(ii)** The other end of the retrieval line shall 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 shall be available to

retrieve personnel from vertical type permit spaces more than 5 feet (1.52 m) deep.

**(4)** If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

**(l) Employee participation.**

**(1)** Employers shall consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program required by paragraph (c) of this section.

**(2)** Employers shall make available to affected employees and their authorized representatives all information required to be developed by this section.

**[58 FR 4549, Jan. 14, 1993; 58 FR 34845, June 29, 1993; 59 FR 26115, May 19, 1994; 63 FR 66038, Dec. 1, 1998]**

Note: Appendices 1910.146 A, B, D, E AND F serve to provide information and non-mandatory guidelines to assist employers and employees in complying with the appropriate requirements of this section.

**OSHA Regulations (Standards - 29 CFR)**

**Permit-required Confined Space Decision Flow Chart - 1910.146 App A**

**[58 FR 4549, Jan. 14, 1993; 58 FR 34846, June 29, 1993; 63 FR 66039, Dec. 1, 1998]**

## **OSHA Regulations (Standards - 29 CFR)**

### **Procedures for Atmospheric Testing. - 1910.146 App B**

**Atmospheric testing is required for two distinct purposes, evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.**

**(1)** Evaluation testing. The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure, should be done by, or reviewed by, a technically qualified professional (e.g., OSHA consultation service, or certified industrial hygienist, registered safety engineer, certified safety professional, certified marine chemist, etc.) based on evaluation of all serious hazards.

**(2)** Verification testing. The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.

**(3)** Duration of testing. Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.

**(4)** Testing stratified atmospheres. When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

**(5)** Order of testing. A test for oxygen is performed first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere. 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 and vapors. If tests for toxic gases and vapors are necessary, they are performed last.

**[58 FR 4549, Jan. 14, 1993; 58 FR 34846, June 29, 1993]**

## **OSHA Regulations (Standards - 29 CFR)**

### **Confined Space Pre-Entry Check List -1910.146 App D Sample Permits**

**APPENDIX D-1**  
**CONFINED SPACE ENTRY PERMIT**

Date and Time Issued: \_\_\_\_\_ Date and Time Expires: \_\_\_\_\_

Job site/Space I.D.: \_\_\_\_\_ Job Supervisor: \_\_\_\_\_

Equipment to be worked on: \_\_\_\_\_ Work to be performed: \_\_\_\_\_

Stand-by personnel: \_\_\_\_\_

1. Atmospheric Checks:      Time \_\_\_\_\_  
                                     Oxygen                      \_\_\_\_\_ %  
                                     Explosive                    \_\_\_\_\_ % L.F.L.  
                                     Toxic                            \_\_\_\_\_ PPM

2. Tester's signature: \_\_\_\_\_

3. Source isolation (No Entry):      N/A    Yes    No  
     Pumps or lines blinded,  
     disconnected, or blocked      ( )    ( )    ( )  
   ( )    ( )    ( )

4. Ventilation Modification:          N/A    Yes    No  
     Mechanical                            ( )    ( )    ( )  
     Natural Ventilation only          ( )    ( )    ( )

5. Atmospheric check after  
 isolation and Ventilation:  
 Oxygen \_\_\_\_\_ %      > 19.5 %  
 Explosive \_\_\_\_\_ % L.F.L   < 10 %  
 Toxic \_\_\_\_\_ PPM      < 10 PPM H(2)S  
 Time \_\_\_\_\_

Testers signature: \_\_\_\_\_

6. Communication procedures: \_\_\_\_\_

7. Rescue procedures: \_\_\_\_\_

8. Entry, standby, and back up persons:                      Yes                      No  
     Successfully completed required training?  
     Is it current?    ( )                      ( )

9. Equipment:    N/A                      Yes                      No  
     Direct reading gas monitor tested                      ( )                      ( )                      ( )  
     Safety harnesses and lifelines  
     for entry and standby persons                      ( )                      ( )                      ( )  
     Hoisting equipment    ( )                      ( )                      ( )  
     Powered communications                                      ( )                      ( )                      ( )

SCBA's for entry and standby persons	( )	( )	( )
Protective Clothing	( )	( )	( )
All electric equipment listed			
Class I, Division I, Group D			
and Non-sparking tools	( )	( )	( )

10. Periodic atmospheric tests:

Oxygen	___%	Time	___	Oxygen	___%	Time	___
Oxygen	___%	Time	___	Oxygen	___%	Time	___
Explosive	___%	Time	___	Explosive	___%	Time	___
Explosive	___%	Time	___	Explosive	___%	Time	___
Toxic	___%	Time	___	Toxic	___%	Time	___
Toxic	___%	Time	___	Toxic	___%	Time	___

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Permit Prepared By: (Supervisor) \_\_\_\_\_

Approved By: (Unit Supervisor) \_\_\_\_\_

Reviewed By (Cs Operations Personnel) :

\_\_\_\_\_ (printed name)                      \_\_\_\_\_ (signature)

This permit to be kept at job site. Return job site copy to Safety Office following job completion.

Copies:            White Original (Safety Office)  
                       Yellow (Unit Supervisor)  
                       Hard(Job site)

## APPENDIX D - 2

### ENTRY PERMIT

PERMIT VALID FOR 8 HOURS ONLY. ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED

DATE \_\_\_\_ SITE LOCATION and DESCRIPTION \_\_\_\_\_

PURPOSE OF ENTRY \_\_\_\_\_

SUPERVISOR(S) in charge of crews & Type of Crew Phone # \_\_\_\_\_

COMMUNICATION PROCEDURES \_\_\_\_\_

RESCUE PROCEDURES (PHONE NUMBERS AT BOTTOM)

\* CAPS DENOTE MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY\*

REQUIREMENTS COMPLETED	DATE	TIME
Lock Out/De-energize/Try-out	_____	_____
Line(s) Broken-Capped-Blanked	_____	_____
Purge-Flush and Vent	_____	_____
Ventilation	_____	_____
Secure Area (Post and Flag)	_____	_____
Breathing Apparatus	_____	_____
Resuscitator - Inhalator	_____	_____
Standby Safety Personnel	_____	_____
Full Body Harness w/"D" ring	_____	_____
Emergency Escape Retrieval Equip	_____	_____
Lifelines	_____	_____
Fire Extinguishers	_____	_____
Lighting (Explosive Proof)	_____	_____
Protective Clothing	_____	_____
Respirator(s) (Air Purifying)	_____	_____
Burning and Welding Permit	_____	_____

Note: Items that do not apply enter N/A in the blank.

\*\*RECORD CONTINUOUS MONITORING RESULTS EVERY 2 HOURS

CONTINUOUS MONITORING\*\* Permissible

TEST(S) TO BE TAKEN	Entry Level	_____	_____	_____	_____	_____	_____
PERCENT OF OXYGEN	19.5% to 23.5%	_____	_____	_____	_____	_____	_____
LOWER FLAMMABLE LIMIT	Under 10%	_____	_____	_____	_____	_____	_____
CARBON MONOXIDE	+35 ppm	_____	_____	_____	_____	_____	_____
Aromatic Hydrocarbon	+ 1 ppm * 5ppm	_____	_____	_____	_____	_____	_____
Hydrogen Cyanide	(Skin) * 4ppm	_____	_____	_____	_____	_____	_____
Hydrogen Sulfide	+10 ppm *15ppm	_____	_____	_____	_____	_____	_____
Sulfur Dioxide	+ 2 ppm * 5ppm	_____	_____	_____	_____	_____	_____
Ammonia	*35ppm	_____	_____	_____	_____	_____	_____



\* Short-term exposure limit: Employee can work in the area up to 15 minutes.  
 + 8 hr. Time Weighted Avg.: Employee can work in area 8 hrs (longer with appropriate respiratory protection).

REMARKS: \_\_\_\_\_

GAS TESTER NAME & CHECK #	INSTRUMENT(S) USED	MODEL &/OR TYPE	SERIAL &/OR UNIT #
_____	_____	_____	_____
_____	_____	_____	_____

SAFETY STANDBY PERSON IS REQUIRED FOR ALL CONFINED SPACE WORK

SAFETY STANDBY CHECK #	PERSON(S)	CHECK #	CONFINED SPACE ENTRANT(S)	CHECK #	CONFINED SPACE ENTRANT(S)
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

SUPERVISOR AUTHORIZING - ALL CONDITIONS SATISFIED \_\_\_\_\_

DEPARTMENT/PHONE \_\_\_\_\_

AMBULANCE \_\_\_\_\_ FIRE \_\_\_\_\_ Safety \_\_\_\_\_

Gas Coordinator \_\_\_\_\_

[58 FR 4549, Jan. 14, 1993; 58 FR 34846, June 29, 1993]

## **OSHA Regulations (Standards - 29 CFR)**

### **Sewer System Entry. - 1910.146 App E**

Sewer entry differs in three vital respects from other permit entries; first, there rarely exists any way to completely isolate the space (a section of a continuous system) to be entered; second, because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant or employer, and third, experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

**(1) Adherence to procedure.** The employer should designate as entrants only employees who are thoroughly trained in the employer's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.

**(2) Atmospheric monitoring.** Entrants should be trained in the use of, and be equipped with, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions are encountered: Oxygen concentration less than 19.5 percent; flammable gas or vapor at 10 percent or more of the lower flammable limit (LFL); or hydrogen sulfide or carbon monoxide at or above 10 ppm or 35 ppm, respectively, measured as an 8-hour time-weighted average. Atmospheric monitoring equipment needs to be calibrated according to the manufacturer's instructions. The oxygen sensor/broad range sensor is best suited for initial use in situations where the actual or potential contaminants have not been identified, because broad range sensors, unlike substance-specific sensors, enable employers to obtain an overall reading of the hydrocarbons (flammables) present in the space. However, such sensors only indicate that a hazardous threshold of a class of chemicals has been exceeded. They do not measure the levels of contamination of specific substances. Therefore, substance-specific devices, which measure the actual levels of specific substances, are best suited for use where actual and potential contaminants have been identified. The measurements obtained with substance-specific devices are of vital importance to the employer when decisions are made concerning the measures necessary to protect entrants (such as ventilation or personal protective equipment) and the setting and attainment of appropriate entry conditions. However, the sewer environment may suddenly and unpredictably change, and the substance-specific devices may not detect the potentially lethal atmospheric hazards which may enter the sewer environment.

Although OSHA considers the information and guidance provided above to be appropriate and useful in most sewer entry situations, the Agency emphasizes that each employer must consider the unique circumstances, including the predictability of the atmosphere, of the sewer permit spaces in the employer's workplace in preparing for entry. Only the employer can decide, based upon his or her knowledge of, and experience with permit spaces in sewer systems, what the best type of testing instrument may be for any specific entry operation.

The selected testing instrument should be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrant's direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

**(3)** Surge flow and flooding. Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.

**(4)** Special Equipment. Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBAs) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

**[58 FR 4549, Jan. 14, 1993; 58 FR 34845, June 29, 1993; 59 FR 26115, May 19, 1994]**

## OSHA Regulations (Standards - 29 CFR)

### Permit-required confined spaces - 1910.146 App F Non-Mandatory Appendix F — Rescue Team or Rescue Service Evaluation Criteria

**(1)** This appendix provides guidance to employers in choosing an appropriate rescue service. It contains criteria that may be used to evaluate the capabilities both of prospective and current rescue teams. Before a rescue team can be trained or chosen, however, a satisfactory permit program, including an analysis of all permit- required confined spaces to identify all potential hazards in those spaces, must be completed. OSHA believes that compliance with all the provisions of 1910.146 will enable employers to conduct permit space operations without recourse to rescue services in nearly all cases. However, experience indicates that circumstances will arise where entrants will need to be rescued from permit spaces. It is therefore important for employers to select rescue services or teams, either on-site or off-site, that are equipped and capable of minimizing harm to both entrants and rescuers if the need arises.

**(2)** For all rescue teams or services, the employer's evaluation should consist of two components: an initial evaluation, in which employers decide whether a potential rescue service or team is adequately trained and equipped to perform permit space rescues of the kind needed at the facility and whether such rescuers can respond in a timely manner, and a performance evaluation, in which employers measure the performance of the team or service during an actual or practice rescue. For example, based on the initial evaluation, an employer may determine that maintaining an on-site rescue team will be more expensive than obtaining the services of an off-site team, without being significantly more effective, and decide to hire a rescue service. During a performance evaluation, the employer could decide, after observing the rescue service perform a practice rescue, that the service's training or preparedness was not adequate to effect a timely or effective rescue at his or her facility and decide to select another rescue service, or to form an internal rescue team.

#### A. Initial Evaluation

**I.** The employer should meet with the prospective rescue service to facilitate the evaluations required by 1910.146(k)(1)(i) and 1910.146(k)(1)(ii). At a minimum, if an off-site rescue service is being considered, the employer must contact the service to plan and coordinate the evaluations required by the standard. Merely posting the service's number or planning to rely on the 911 emergency phone number to obtain these services at the time of a permit space emergency would not comply with paragraph (k)(1) of the standard.

**II.** The capabilities required of a rescue service vary with the type of permit spaces from which rescue may be necessary and the hazards likely to be encountered in those spaces. Answering the questions below will assist employers in determining whether the rescue service is capable of performing rescues in the permit spaces present at the employer's workplace.

**1.** What are the needs of the employer with regard to response time (time for the rescue service to receive notification, arrive at the scene, and set up and be ready for entry)? For example, if entry is to be made into an IDLH atmosphere, or into a space that can quickly develop an IDLH atmosphere (if ventilation fails or for other reasons), the rescue team or service would need to be standing by at the permit space. On the other hand, 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.

**2.** How quickly can the rescue team or service get from its location to the permit spaces from which rescue may be necessary? Relevant factors to consider would include: the location of the rescue team or service relative to the employer's workplace, the quality of roads and highways to be traveled, potential bottlenecks or traffic congestion that might be encountered in transit, the reliability of the rescuer's vehicles, and the training and skill of its drivers.

**3.** What is the availability of the rescue service? Is it unavailable at certain times of the day or in certain situations? What is the likelihood that key personnel of the rescue service might be unavailable at times? If the rescue service becomes unavailable while an entry is underway, does it have the capability of notifying the employer so that the employer can instruct the attendant to abort the entry immediately?

**4.** Does the rescue service meet all the requirements of paragraph (k)(2) of the standard? If not, has it developed a plan that will enable it to meet those requirements in the future? If so, how soon can the plan be implemented?

**5.** For off-site services, is the service willing to perform rescues at the employer's workplace? (An employer may not rely on a rescuer who declines, for whatever reason, to provide rescue services.)

**6.** Is an adequate method for communications between the attendant, employer and prospective rescuer available so that a rescue request can be transmitted to the rescuer without delay? How soon after notification can a prospective rescuer dispatch a rescue team to the entry site?

**7.** For rescues into spaces that may pose significant atmospheric hazards and from which rescue entry, patient packaging and retrieval cannot be safely accomplished in a relatively short time (15-20 minutes), employers should consider using airline respirators (with escape bottles) for the rescuers and to supply rescue air to the patient. If the employer decides to use SCBA, does the prospective rescue service have an ample supply of replacement cylinders and procedures for rescuers to enter and exit (or be retrieved) well within the SCBA's air supply limits?

**8.** If the space has a vertical entry over 5 feet in depth, can the prospective rescue service properly perform entry rescues? Does the service have the technical knowledge and equipment to perform rope work or elevated rescue, if needed?

**9.** Does the rescue service have the necessary skills in medical evaluation, patient packaging and emergency response?

**10.** Does the rescue service have the necessary equipment to perform rescues, or must the equipment be provided by the employer or another source?

## **B. Performance Evaluation**

Rescue services are required by paragraph (k)(2)(iv) of the standard to practice rescues at least once every 12 months, provided that the team or service has not successfully performed a permit space rescue within that time. As part of each practice session, the service should

perform a critique of the practice rescue, or have another qualified party perform the critique, so that deficiencies in procedures, equipment, training, or number of personnel can be identified and corrected. The results of the critique, and the corrections made to respond to the deficiencies identified, should be given to the employer to enable it to determine whether the rescue service can quickly be upgraded to meet the employer's rescue needs or whether another service must be selected. The following questions will assist employers and rescue teams and services evaluate their performance.

- 1.** Have all members of the service been trained as permit space entrants, at a minimum, including training in the potential hazards of all permit spaces, or of representative permit spaces, from which rescue may be needed? Can team members recognize the signs, symptoms, and consequences of exposure to any hazardous atmospheres that may be present in those permit spaces?
- 2.** Is every team member provided with, and properly trained in, the use and need for PPE, such as SCBA or fall arrest equipment, which may be required to perform permit space rescues in the facility? Is every team member properly trained to perform his or her functions and make rescues, and to use any rescue equipment, such as ropes and backboards, that may be needed in a rescue attempt?
- 3.** Are team members trained in the first aid and medical skills needed to treat victims overcome or injured by the types of hazards that may be encountered in the permit spaces at the facility?
- 4.** Do all team members perform their functions safely and efficiently? Do rescue service personnel focus on their own safety before considering the safety of the victim?
- 5.** If necessary, can the rescue service properly test the atmosphere to determine if it is IDLH?
- 6.** Can the rescue personnel identify information pertinent to the rescue from entry permits, hot work permits, and MSDSs?
- 7.** Has the rescue service been informed of any hazards to personnel that may arise from outside the space, such as those that may be caused by future work near the space?
- 8.** If necessary, can the rescue service properly package and retrieve victims from a permit space that has a limited size opening (less than 24 inches (60.9 cm) in diameter), limited internal space, or internal obstacles or hazards?
- 9.** If necessary, can the rescue service safely perform an elevated (high angle) rescue?
- 10.** Does the rescue service have a plan for each of the kinds of permit space rescue operations at the facility? Is the plan adequate for all types of rescue operations that may be needed at the facility? Teams may practice in representative spaces, or in spaces that are "worst-case" or most restrictive with respect to internal configuration, elevation, and portal size. The following characteristics of a practice space should be considered when deciding whether a space is truly representative of an actual permit space:

**(1)** Internal configuration.

**(a)** Open — there are no obstacles, barriers, or obstructions within the space. One example is a water tank.

**(b)** Obstructed — the permit space contains some type of obstruction that a rescuer would need to maneuver around. An example would be a baffle or mixing blade. Large equipment, such as a ladder or scaffold, brought into a space for work purposes would be considered an obstruction if the positioning or size of the equipment would make rescue more difficult.

**(2)** Elevation.

**(a)** Elevated — a permit space where the entrance portal or opening is above grade by 4 feet or more. This type of space usually requires knowledge of high angle rescue procedures because of the difficulty in packaging and transporting a patient to the ground from the portal.

**(b)** Non-elevated — a permit space with the entrance portal located less than 4 feet above grade. This type of space will allow the rescue team to transport an injured employee normally.

**(3)** Portal size.

**(a)** Restricted — A portal of 24 inches or less in the least dimension. Portals of this size are too small to allow a rescuer to simply enter the space while using SCBA. The portal size is also too small to allow normal spinal immobilization of an injured employee.

**(b)** Unrestricted — A portal of greater than 24 inches in the least dimension. These portals allow relatively free movement into and out of the permit space.

**(4)** Space access.

**(a)** Horizontal — The portal is located on the side of the permit space. Use of retrieval lines could be difficult.

**(b)** Vertical — The portal is located on the top of the permit space, so that rescuers must climb down, or the bottom of the permit space, so that rescuers must climb up to enter the space. Vertical portals may require knowledge of rope techniques, or special patient packaging to safely retrieve a downed entrant.

**[63 FR 66039, Dec. 1, 1998]**