# **Confined Space Entry**





# **Confined Space**

#### An Overview of OSHA Standards and Confined Space Hazards Developed by Western Iowa Tech Community College

This material was produced under a grant (SH-16634-07-60-F-19) from the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does the mention or trade names, commercial products, or organization imply endorsement by the U.S. government.

# **Confined Space Entry**

- Construction Industry Standard 1926.21(b)(6)
- General Industry Standard 1910.146
- Best Practices for all Industries

# **Confined Space**

All employees required to enter into confined or enclosed spaces shall be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required. The employer shall comply with any specific regulations that apply to work in dangerous or potentially dangerous areas.

# Typical Confined Spaces

- Boiler, Degreaser, Furnace
- Pipeline, Pit, Manholes, Pumping Station
- Reaction or Process Vessel, Mills
- Septic Tank, Sewage Digestor
- Silo, Storage Tank, Barges
- Sewer, Utility Vault, Manhole
- Trenches, Shafts, Caissons

# How to Identify Confined Spaces

- Limited Openings for Entry and Exit
- Unfavorable Natural Ventilation
- Not Designed for Continuous Worker Occupancy







# Limited Openings for Entry/Exit

- Openings as small as 18 inches in diameter.
- Difficult to enter with SCBA or other life-saving equipment.
- Difficult to remove downed worker in folded up or bent over position.
- Exit from large openings may be difficult due to presence of ladders, hoists, etc.

#### Unfavorable Natural Ventilation

- Lack of air movement in and out of the space can create an atmosphere much different than the outside atmosphere.
- Deadly gases can be trapped inside.
- Organic materials can decompose.
- May not be enough oxygen due to presence of other gases or chemical reactions such as rusting.

#### Not Designed for Continuous Worker Occupancy

- Most confined spaces are not designed to enter and work in on a regular basis.
- Designed to store a product.
- Enclose materials or processes.
- Transport products or substances.
- Occasional worker entry for inspection, repair, cleanup, maintenance, etc.

# **Dangerous Combinations**

- Presence of all three confined space characteristics can complicate the situation.
- Working in and around the space.
- Rescue operations during emergencies.
- Worsened conditions due to work activities:
  - Welding and cutting, use of bonding agents
  - Cleaning with solvents, use of other chemicals
  - Use of gas-powered equipment

## Hazards of Confined Spaces

- Oxygen Deficient Atmospheres
- Oxygen Enriched Atmospheres
- Flammable Atmospheres
- Toxic Atmospheres
- Temperature Extremes
- Engulfment Hazards
- Noise, Slick/Wet Surfaces, Falling Objects
- Mechanical Hazards



- "Hazardous atmosphere" means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to selfrescue (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);

#### Hazardous Atmosphere Definitions

"Hazardous atmosphere" (cont'd)

(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 or less.

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

#### Hazardous Atmosphere Definitions

#### "Hazardous atmosphere" (cont'd)

(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 Substance, of this Part which could result in employee exposure in excess of its dose or permissible exposure limit.

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



# **Oxygen Enriched Atmospheres**

- Oxygen level above 21%.
- Causes flammable and combustible materials to burn violently when ignited.
- Hair, clothing, materials, etc.
- Oil soaked clothing and materials.
- Never use pure oxygen to ventilate.
- Never store or place compressed tanks in a confined space.

#### **Flammable Atmospheres**

- Critical Factors:
  - Oxygen content in the air.
  - Presence of a flammable gas, or vapor
  - Presence of dust (visibility of 5' or less)
- Proper air/gas mixture can lead to explosion
- Typical Ignition Sources:
  - Sparking or electric tool.
  - Welding / cutting operations.
  - Smoking

#### Toxic Atmospheres OProduct stored in a confined space: 。 Gases released when cleaning. ° Materials absorbed into walls of confined space. • Decomposition of materials in the confined space. OWork performed in a confined space: • Welding, cutting, brazing, soldering. ° Painting, scraping, sanding, degreasing. Sealing, bonding, melting. OAreas adjacent to a confined space.

o Exhaust , pumps, generators

# Hydrogen Sulfide

- Decomposition of materials. Human waste.
- Rotten egg odor at low concentrations.
- Possibly no warning at high concentrations. <u>Effect</u>

#### <u>PPM</u> 10 ppm 50 - 100

- 200 300 Significant Irritation Unconsciousness, Death 500 -700 >1000 Unconsciousness, Death
- 8 Hours Permissible Exposure Level Mild Irritation - eyes, throat 1 Hour

<u>Time</u>

#### 1 Hour 1/2 - 1 Hour

Minutes

## Carbon Monoxide

- Odorless, Colorless Gas.
- Combustion By-Product.
- Quickly collapse at high concentrations.

<u>PPM</u>	Effect	Time
50	Permissible Exposure Level	8 Hours
200	Slight headache, discomfort	3 Hours
600	Headache, discomfort	1 Hour
1000-2000	Confusion, nausea, headache	2 Hours
1000-2000	Tendency to stagger	1 1/2 Hours
1000-2000	Slight heart palpitation	30 Min.
2000-2500	Unconsciousness	30 Min.

# Temperature Extremes

- Extremely hot or cold temperatures.
- Steam cleaning of confined spaces.
- Humidity factors.
- Extremely cold liquids.
- Work processes inside the confined space can increase temperature extremes.
- Personal protective equipment.

# **Engulfment Hazards**

- Loose, granular materials stored in bins and hoppers grain, sand, coal, etc.
- Crusting and bridging below a worker.
- Flooding of confined space.
- Water or sewage flow.

#### Other Hazards

• Noise

- Amplified due to acoustics within the space.
- Damaged hearing, affect communication.
- Slick / Wet Surfaces
  - Slips and falls.
  - Increased chance of electric shock.
- Falling Objects
  - Topside openings expose workers inside confined space to falling objects.
- Mechanical
  - Drive Shafts
  - Drive Gears

# Testing The Atmosphere

- Verify presence of safe work atmosphere.
- Test all areas of a confined space.
  - Top, Middle, Bottom, and each end
- Methane is lighter than air.
- Carbon Monoxide is the same as air.
- Hydrogen Sulfide is heavier than air.
- Oxygen Deficiency.

#### Ventilation

- First option to correct problems.
- Must be aware of hazards you are trying to correct in the confined space.
- Air intake in a safe location to draw fresh air only.
- Continuous ventilation whenever possible.
- Retest the confined space before entry.

#### Isolation

- Locking and tagging out electrical sources.
- Blanking and bleeding pneumatic and hydraulic lines.
- Disconnecting mechanical drives and shafts.
- Securing mechanical parts.
- Blanking sewer and water flow.
- Locking and tagging out shutoff valves.



- Air-Supplying Respirators
  - Deliver a safe supply of breathing air from a tank or an uncontaminated area nearby.
  - Must be adequately monitored.

# Standby / Rescue

- Worker assigned to remain outside the confined space and be in constant contact with the workers inside.
- Know emergency rescue procedures.
- 50% of workers who die in confined spaces are wouldbe rescuers.
- Trained in use of emergency rescue equipment and PPE.

#### Permit Entry Systems

- Written permit signed by entry supervisor.
- Verifies pre-entry precautions have been taken and the space is safe to enter.
- Posted at entry to confined space.
- Specifies apparent hazards and corrective actions taken prior to entry.
- Requires termination of permit when task is completed or when new conditions exist.



- Date, location, and name of confined space.
- Purpose of entry and known hazards.
- Duration of entry permit time.
- Authorized entrants, attendants, supervisors.
- Air testing results signature of tester.
- Protective measures to be taken.
  - Ventilation, Isolation, Flushing
  - Lockout / Tagout, Purging

# **Entry Permit Requirements**

- Name and phone numbers of rescue and emergency services.
- Communication procedures.
- Special equipment and procedures.
  - Personal protective equipment.
  - Alarm procedures.
  - Rescue equipment.
  - Respirators.

## Training and Education

- All workers who must enter confined spaces
- All attendants and rescue team members.
- Prior to initial work assignment.
- Retraining:
  - Job duties change.
  - Change in permit-space program.
  - New hazards are present.
  - Job performance indicates deficiencies.



• Other related issues of confined space







# **Session Objectives**

You will understand how to:

- Identify the hazards of confined space entry
- Communicate effectively with entrants
- Monitor for dangerous situations
- Prohibit unauthorized confined space entry

## **Statistics**

- 20 workers die annually
- 60 percent of confined space injuries are sustained by the rescuer

# What Is a Confined Space?

- Worker can enter and perform work
- Limited means of entry or exit
- Not designed for continuous occupancy



# What Is a Permit-Required Confined Space?

 Contains or has potential to contain a hazardous atmosphere
 Contains the potential



- for engulfmentInternal configuration that can trap or asphyxiate entrant
- Any other serious safety or health hazard



# Non-Permit-Required Spaces

- Utility closets
- Below-grade trenches
- Storage vaults
- Utility subbasements

# **Engulfment Hazards**

- Presence of grain, sand, water, or other potential engulfment material
- Mode of suffocation
   Entrant covered or part
- Entrant covered or partly covered by materialBehavioral effects
- No response to calls
- Stops breathing

# Oxygen Deficiency Hazards

- Oxygen readings fall below 19.5%
- Behavioral effects
   Impaired coordination
- Increased respiration
- Poor judgment; blue lips
- Disorientation, nauseaComa, death



DANGE

## Oxygen Enrichment Hazards

- Increased fire hazard when oxygen readings exceed 23.5%
- No oxygen lines or cylinders, leaks, or sparks in the space
- Behavioral effects
   Entrant may become disoriented

#### Flammable Gas or Vapor Hazards

- Fire or explosion
- Test for the lower explosive limit (LEL) • LEL >10%
- Behavioral effects—nausea, dizziness

#### **Combustible Dust Hazards**

- Fire or explosion
- Dust meets or exceeds its LEL
- Use visual test to determine LEL
- Vision obscured by dust at a distance of 5 feetBehavioral effects
  - Coughing, sneezing, difficulty breathing

#### **Toxic Substance Hazards**

Toxic gases produce two kinds of risks:

- Asphyxiation
  - Simple asphyxiants
  - Chemical asphyxiants
- Irritation
  - Primary–surface irritationSecondary–systemic effects

# **Toxic Substance Hazards**

(cont.)

- Monitor for carbon monoxide, hydrogen sulfide, and other toxic chemicals
- Check entrants for behavioral effects
  - Nausea and headache
  - Unconsciousness
  - Refer to MSDS



#### **IDLH Hazards**

- Is an immediate threat to life, interferes with ability to escape
- Check SDS for IDLH exposure limits
- Behavioral effects include:
  - Unconsciousness
     Death

# **Physical Hazards**

Surface residue

• Biological and heat

- Structural
- Electrical
- NoiseVibration



# Physical Hazards (cont.)

- Visual inspection
- Type of work performed
- Lockout/tagout
- Behavioral effects
  - Slip, trip, fall
  - Difficulty communicating
  - Muscle cramping

# Wear Personal Protective Equipment

- Glasses, goggles, shield
- Respirator
- Gloves, boots, and
- clothing
- Head protectionHearing protection



# Tools and Other Safety Equipment

- Fire extinguisher
- First aid
- Nonsparking tools
- Explosionproof lighting
- Communication
   equipment
- Rescue equipment



#### **Authorized Entrant Duties**

- Know the hazards of the space
- Follow entry safe work practices
- Communicate with the attendant
- Exit the space when ordered to

## **Entry Supervisor Duties**

- Verifies permit is complete
- Oversees entry
- operationsEnsures rescue
- services are available
- Terminates permit
- Recommends procedure changes



# **Rescuer Responsibilities**

- Understand the hazards of the space
- Be certified in emergency first aidUnderstand entry
- Understand entry procedures
  Know how to use
- Annually practice confined space rescues



#### **Attendant Duties**

- Know the hazards of the space
- Stay outside the space
- Communicate with entrants
- Rescue notification or nonentry rescue
- Keep unauthorized personnel away
- Stay focused on the entrants

## Stay at the Confined Space Until Relieved

- Observe the entrants for symptoms of exposure to hazards
- Do not become distracted
- Monitor activities inside and outside the space
- Monitor ventilation equipment
- Inspect rescue equipment

# **Keep Track of Entrants**

- Accurate account of entrants
- Authorized entrants listed on entry permit



- Attendant log
- Entrant name and identity
- Time entered and exited space

# Communicate With the Entrant

- Monitor activities
- Listen for behavioral effects of exposure to hazards
- Use voice communication for small spaces
- Use radio or walkie-talkie for larger spaces
- Agree on an emergency signal
- Use communication procedures described on the permit

# Monitor Atmospheric Conditions

- Calibrate monitoring device
- Test 4-foot levels of
- stratified atmospheresTest before and during
- entryMonitor in specific
- order • List monitoring results
- on permit
- Entrants observe monitoring



## Prohibit Entry by Unauthorized Persons

- Warn persons to keep away from the area
- Advise unauthorized personnel to exit the space if they have entered it
- Inform authorized entrants and the entry supervisor
- Order an evacuation of the space

#### **Evacuate Entrant**

- A prohibited condition is detected
- The entrant shows behavioral effects of hazard exposure
- A situation outside the space could endanger the entrant(s)
- The attendant cannot safely perform all duties

## **Nonentry Rescue**

- Full-body harness and lifeline
- Visual or verbal
- confirmation of safetyAttempt to untangle
- InesMechanical device or
- fixed point



#### **Summon Rescuers**

- Advise rescue team of the entry in advance
- If entrant incapacitated, contact rescue team
- Summon by alarm, radio, or phone
- Attempt non-entry retrieval
- Prepare for rescue

# • Rescue squad trained

- Trained in first aid and CPR
- Rescue practiced annually
- Provided with PPE
- Summoned by
- attendant
- Outside rescue services may be used



# Maryland Regulations (COMAR) vs. OSHA

- Entrant and Attendant must be trained in rescue and CPR procedures.
- Temporary lighting requirements
- Respirator requirements

## Key Things to Remember

- Primary responsibility is safety of entrants
- Understand all potential confined space hazards
- Detect behavioral effects of hazards
- Monitor activities inside and outside the space
- Stay in constant communication with entrants
- Perform non-entry rescue and summon rescue team

#### Subpart AA—Confined Spaces in Construction

1926.1200	Reserved
1926.1201	Scope
1926.1202	Definitions
1926.1203	General requirements
1926.1204	Permit-required confined space program
1926.1205	Permitting process
1926.1206	Entry permit
1926.1207	Training
1926.1208	Duties of authorized entrants
1926.1209	Duties of attendants
1926.1210	Duties of entry supervisors
1926.1211	Rescue and emergency services
1926.1212	Employee participation
1926.1213	Provision of documents to Secretary

Authority: 40 U.S.C. 3701 <u>et seq.</u>; 29 U.S.C. 653, 655, 657; Secretary of Labor's Order No. 1-2012 (77 FR 3912); and 29 CFR Part 1911.

#### §1926.1201 Scope.

(a) This standard sets forth requirements for practices and procedures to protect employees engaged in construction activities at a worksite with one or more confined spaces, subject to the exceptions in paragraph (b) of this section.

Note to paragraph §1926.1201(a). Examples of locations where confined spaces may occur include, but are not limited to, the following: Bins; boilers; pits (such as elevator, escalator, pump, valve or other equipment); manholes (such as sewer, storm drain, electrical, communication, or other utility); tanks (such as fuel, chemical, water, or other liquid, solid or gas); incinerators; scrubbers; concrete pier columns; sewers; transformer vaults; heating, ventilation, and air-conditioning (HVAC) ducts; storm drains; water mains; precast concrete and other pre-formed manhole units; drilled shafts; enclosed beams; vessels; digesters; lift stations; cesspools; silos; air receivers; sludge gates; air preheaters; step up transformers; turbines; chillers; bag houses; and/or mixers/reactors.

- (b) Exceptions. This standard does not apply to: (1) Construction work regulated by \$1926 subpart P—Excavations. (2) Construction work regulated by \$1926 subpart S—Underground Construction, Caissons, Cofferdams and Compressed Air. (3) Construction work regulated by \$1926 subpart Y—Diving.
- (c) Where this standard applies and there is a provision that addresses a confined space hazard in another applicable OSHA standard, the employer must comply with both that requirement and the applicable provisions of this standard.

#### §1926.1202 Definitions.

The following terms are defined for the purposes of this subpart only:

<u>Acceptable entry conditions</u> means the conditions that must exist in a permit space, before an employee may enter that space, to ensure that employees can safely enter into, and safely work within, the space.

<u>Attendant</u> means an individual stationed outside one or more permit spaces who assesses the status of authorized entrants and who must perform the duties specified in \$1926.1209.

<u>Authorized entrant</u> means an employee who is authorized by the entry supervisor to enter a permit space.

Barrier means a physical obstruction that blocks or limits access.

<u>Blanking</u> or <u>blinding</u> 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.

<u>Competent person</u> means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

*Confined space* means a space that:

- (1) Is large enough and so configured that an employee can bodily enter it;
- (2) Has limited or restricted means for entry and exit; and
- (3) Is not designed for continuous employee occupancy.

<u>*Control*</u> means the action taken to reduce the level of any hazard inside a confined space using engineering methods (for example, by ventilation), and then using these methods to maintain the reduced hazard level. Control also refers to the engineering methods used for this purpose. Personal protective equipment is not a control.

<u>Controlling Contractor</u> is the employer that has overall responsibility for construction at the worksite.

Note. If the controlling contractor owns or manages the property, then it is both a controlling employer and a host employer.

<u>Double block and bleed</u> means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

*Early-warning system* means the method used to alert authorized entrants and attendants that an engulfment hazard may be developing. Examples of early-warning systems include, but are not limited to: alarms activated by remote sensors; and lookouts with equipment for immediately communicating with the authorized entrants and attendants.

<u>*Emergency*</u> means any occurrence (including any failure of power, hazard control or monitoring equipment) or event, internal or external, to the permit space that could endanger entrants.

<u>Engulfment</u> means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, crushing, or suffocation.

<u>Entry</u> means the action by which any part of a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space, whether or not such action is intentional or any work activities are actually performed in the space.

<u>Entry Employer</u> means any employer who decides that an employee it directs will enter a permit space.

Note. An employer cannot avoid the duties of the standard merely by refusing to decide whether its employees will enter a permit space, and OSHA will consider the failure to so decide to be an implicit decision to allow employees to enter those spaces if they are working in the proximity of the space.

<u>Entry permit</u> (permit) means the written or printed document that is provided by the employer who designated the space a permit space to allow and control entry into a permit space and that contains the information specified in §1926.1206 of this standard.

*Entry rescue* occurs when a rescue service enters a permit space to rescue one or more employees.

<u>Entry supervisor</u> means the qualified person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this standard.

Note. An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this standard for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

*Hazard* means a physical hazard or hazardous atmosphere. See definitions below.

<u>Hazardous atmosphere</u> 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 combustible dust obscures vision at a distance of 5 feet (1.52 meters) or less.

- (3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
- (4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart D—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 definition.

(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 Safety Data Sheets that comply with the Hazard Communication Standard, §1926.59 of this part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

<u>*Host employer*</u> means the employer that owns or manages the property where the construction work is taking place.

Note. If the owner of the property on which the construction activity occurs has contracted with an entity for the general management of that property, and has transferred to that entity the information specified in §1203(h)(1), OSHA will treat the contracted management entity as the host employer for as long as that entity manages the property. Otherwise, OSHA will treat the owner of the property as the host employer. In no case will there be more than one host employer.

<u>*Hot work*</u> means operations capable of providing a source of ignition (for example, riveting, welding, cutting, burning, and heating).

<u>Immediately dangerous to life or health (IDLH)</u> means any condition that would interfere with an individual's ability to escape unaided from a permit space and that poses a threat to life or that would cause irreversible adverse health effects.

Note. Some materials—hydrogen fluoride gas and cadmium vapor, for example—may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" after recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

<u>*Inerting*</u> means displacing the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Note. This procedure produces an IDLH oxygen-deficient atmosphere.

<u>Isolate or isolation</u> means the process by which employees in a confined space are completely protected against the release of energy and material into the space, and contact with a physical hazard, by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; blocking or disconnecting all mechanical linkages; or placement of barriers to eliminate the potential for employee contact with a physical hazard.

<u>Limited or restricted means for entry or exit</u> means a condition that has a potential to impede an employee's movement into or out of a confined space. Such conditions include, but are not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces and ladders.

<u>Line breaking</u> 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.

<u>Lockout</u> means the placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

*Lower flammable limit or lower explosive limit* means the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion.

<u>Monitor</u> or <u>monitoring</u> means the process used to identify and evaluate the hazards after an authorized entrant enters the space. This is a process of checking for changes that is performed in a periodic or continuous manner after the completion of the initial testing or evaluation of that space.

<u>Non-entry rescue</u> occurs when a rescue service, usually the attendant, retrieves employees in a permit space without entering the permit space.

<u>Non-permit confined space</u> means a confined space that meets the definition of a confined space but does not meet the requirements for a permit-required confined space, as defined in this subpart.

<u>Oxygen deficient atmosphere</u> means an atmosphere containing less than 19.5 percent oxygen by volume.

<u>Oxygen enriched atmosphere</u> means an atmosphere containing more than 23.5 percent oxygen by volume.

<u>Permit-required confined space</u> (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.

<u>Permit-required confined space program</u> (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.

<u>*Physical hazard*</u> means an existing or potential hazard that can cause death or serious physical damage. Examples include, but are not limited to: explosives (as defined by

paragraph (n) of §1926.914, definition of "explosive"); mechanical, electrical, hydraulic and pneumatic energy; radiation; temperature extremes; engulfment; noise; and inwardly converging surfaces. Physical hazard also includes chemicals that can cause death or serious physical damage through skin or eye contact (rather than through inhalation).

<u>Prohibited condition</u> means any condition in a permit space that is not allowed by the permit during the period when entry is authorized. A hazardous atmosphere is a prohibited condition unless the employer can demonstrate that personal protective equipment (PPE) will provide effective protection for each employee in the permit space and provides the appropriate PPE to each employee.

<u>*Qualified person*</u> means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

<u>Representative permit space</u> means a mock-up of a confined space that has entrance openings that are similar to, and is of similar size, configuration, and accessibility to, the permit space that authorized entrants enter.

<u>*Rescue*</u> means retrieving, and providing medical assistance to, one or more employees who are in a permit space.

<u>Rescue service</u> means the personnel designated to rescue employees from permit spaces.

<u>Retrieval system</u> means the equipment (including a retrieval line, chest or full body harness, wristlets or anklets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

<u>Serious physical damage</u> means an impairment or illness in which a body part is made functionally useless or is substantially reduced in efficiency. Such impairment or illness may be permanent or temporary and includes, but is not limited to, loss of consciousness, disorientation, or other immediate and substantial reduction in mental efficiency. Injuries involving such impairment would usually require treatment by a physician or other licensed health-care professional.

<u>*Tagout*</u> means:(1) Placement of a tagout device on a circuit or equipment that has been deenergized, in accordance with an established procedure, to indicate that the circuit or equipment being controlled may not be operated until the tagout device is removed; and (2) The employer ensures that (i) tagout provides equivalent protection to lockout, or (ii) that lockout is infeasible and the employer has relieved, disconnected, restrained and otherwise rendered safe stored (residual) energy.

<u>Test or testing</u> 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.

<u>Ventilate</u> or <u>ventilation</u> means controlling a hazardous atmosphere using continuous forced-air mechanical systems that meet the requirements of §1926.57—Ventilation.

#### §1926.1203 General requirements.

- (a) Before it begins work at a worksite, each employer must ensure that a competent person identifies all confined spaces in which one or more of the employees it directs may work, and identifies each space that is a permit space, through consideration and evaluation of the elements of that space, including testing as necessary.
- (b) If the workplace contains one or more permit spaces, the employer who identifies, or who receives notice of, a permit space must:
  - (1) Inform exposed employees by posting danger signs or by any other equally effective means, of the existence and location of, and the danger posed by, each permit space; and

Note to paragraph §1926.1203(b)(1). A sign reading "DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or using other similar language would satisfy the requirement for a sign.

- (2) Inform, in a timely manner and in a manner other than posting, its employees' authorized representatives and the controlling contractor of the existence and location of, and the danger posed by, each permit space.
- (c) Each employer who identifies, or receives notice of, a permit space and has not authorized employees it directs to work in that space must take effective measures to prevent those employees from entering that permit space, in addition to complying with all other applicable requirements of this standard.
- (d) If any employer decides that employees it directs will enter a permit space, that employer must have a written permit space program that complies with §1926.1204 implemented at the construction site. The written program must be made available prior to and during entry operations for inspection by employees and their authorized

representatives.

- (e) An employer may use the alternate procedures specified in paragraph §1926.1203(e)(2) for entering a permit space only under the conditions set forth in paragraph §1926.1203(e)(1).
  - (1) An employer whose employees enter a permit space need not comply with §§1926.1204 through 1206 and §§1926.1208 through 1211, provided that all of the following conditions are met:
    - (i) The employer can demonstrate that all physical hazards in the space are eliminated or isolated through engineering controls so that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;
    - (ii) The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry, and that, in the event the ventilation system stops working, entrants can exit the space safely;
    - (iii) The employer develops monitoring and inspection data that supports the demonstrations required by paragraphs §1926.1203(e)(1)(i) and §1926.1203(e)(1)(ii);
    - (iv) If an initial entry of the permit space is necessary to obtain the data required by paragraph §1926.1203(e)(1)(iii), the entry is performed in compliance with §§1926.1204 through 1211 of this standard;
    - (v) The determinations and supporting data required by paragraphs §1926.1203(e)(1)(i), (e)(1)(ii), and (e)(1)(iii) are documented by the employer and are made available to each employee who enters the permit space under the terms of paragraph §1926.1203(e) or to that employee's authorized representative; and
    - (vi) Entry into the permit space under the terms of paragraph §1926.1203(e)(1) is performed in accordance with the requirements of paragraph §1926.1203(e)(2).

Note to paragraph §1926.1203(e)(1). See paragraph §1926.1203(g) for reclassification of a permit space after all hazards within the space have been eliminated.

(2) The following requirements apply to entry into permit spaces that meet the conditions set forth in paragraph §1926.1203(e)(1):

- (i) Any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed.
- (ii) When entrance covers are removed, the opening must be immediately guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
- (iii) Before an employee enters the space, the internal atmosphere must be tested, with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Any employee who enters the space, or that employee's authorized representative, must be provided an opportunity to observe the pre-entry testing required by this paragraph.
- (iv) No hazardous atmosphere is permitted within the space whenever any employee is inside the space.
- (v) Continuous forced air ventilation must be used, as follows:
  - (A) An employee must not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;
  - (B) The forced air ventilation must be so directed as to ventilate the immediate areas where an employee is or will be present within the space and must continue until all employees have left the space;
  - (C) The air supply for the forced air ventilation must be from a clean source and must not increase the hazards in the space.
- (vi) The atmosphere within the space must be continuously monitored unless the entry employer can demonstrate that equipment for continuous monitoring is not commercially available or periodic monitoring is sufficient. If continuous monitoring is used, the employer must ensure that the monitoring equipment has an alarm that will notify all entrants if a specified atmospheric threshold is achieved, or that an employee will check the monitor with sufficient frequency to ensure that entrants have adequate time to escape. If continuous monitoring is not used, periodic monitoring is required. All monitoring must ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Any employee who enters the space, or that employee's

authorized representative, must be provided with an opportunity to observe the testing required by this paragraph.

- (vii) If a hazard is detected during entry:
  - (A) Each employee must leave the space immediately;
  - (B) The space must be evaluated to determine how the hazard developed; and
  - (C) The employer must implement measures to protect employees from the hazard before any subsequent entry takes place.
- (viii) The employer must ensure a safe method of entering and exiting the space. If a hoisting system is used, it must be designed and manufactured for personnel hoisting; however, a job-made hoisting system is permissible if it is approved for personnel hoisting by a registered professional engineer, in writing, prior to use.
- (ix) The employer must verify that the space is safe for entry and that the preentry measures required by paragraph §1926.1203(e)(2) have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification must be made before entry and must be made available to each employee entering the space or to that employee's authorized representative.
- (f) When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, or some indication that the initial evaluation of the space may not have been adequate, each entry employer must have a competent person reevaluate that space and, if necessary, reclassify it as a permitrequired confined space.
- (g) A space classified by an employer as a permit-required confined space may only be reclassified as a non-permit confined space when a competent person determines that all of the applicable requirements in paragraphs §1926.1203(g)(1) through (g)(4) have been met:
  - (1) If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated or isolated without entry into the space (unless the employer can demonstrate that doing so without entry is infeasible), the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated or isolated;

(2) The entry employer must eliminate or isolate the hazards without entering the space, unless it can demonstrate that this is infeasible. If it is necessary to enter the permit space to eliminate or isolate hazards, such entry must be performed under §§1926.1204 through 1211 of this standard. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated or isolated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated or isolated;

Note to paragraph §1926.1203(g)(2). Control of atmospheric hazards through forced air ventilation does not constitute elimination or isolation of the hazards. Paragraph §1926.1203(e) covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.

- (3) The entry employer must document the basis for determining that all hazards in a permit space have been eliminated or isolated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification must be made available to each employee entering the space or to that employee's authorized representative; and
- (4) If hazards arise within a permit space that has been reclassified as a non-permit space under paragraph §1926.1203(g), each employee in the space must exit the space. The entry employer must then reevaluate the space and reclassify it as a permit space as appropriate in accordance with all other applicable provisions of this standard.
- (h) Permit Space Entry Communication and Coordination:
  - (1) Before entry operations begin, the host employer must provide the following information, if it has it, to the controlling contractor:
    - (i) The location of each known permit space;
    - (ii) The hazards or potential hazards in each space or the reason it is a permit space; and
    - (iii) Any precautions that the host employer or any previous controlling contractor or entry employer implemented for the protection of employees in the permit space.
  - (2) Before entry operations begin, the controlling contractor must:

- (i) Obtain the host employer's information about the permit space hazards and previous entry operations; and
- (ii) Provide the following information to each entity entering a permit space and any other entity at the worksite whose activities could foreseeably result in a hazard in the permit space:
  - (A) The information received from the host employer;
  - (B) Any additional information the controlling contractor has about the subjects listed in paragraph (h)(1) of this section; and
  - (C) The precautions that the host employer, controlling contractor, or other entry employers implemented for the protection of employees in the permit spaces.
- (3) Before entry operations begin, each entry employer must:
  - (i) Obtain all of the controlling contractor's information regarding permit space hazards and entry operations; and
  - (ii) Inform the controlling contractor of the permit space program that the entry employer will follow, including any hazards likely to be confronted or created in each permit space.
- (4) The controlling contractor and entry employer(s) must coordinate entry operations when:
  - (i) More than one entity performs permit space entry at the same time; or
  - (ii) Permit space entry is performed at the same time that any activities that could foreseeably result in a hazard in the permit space are performed.
- (5) After entry operations:
  - (i) The controlling contractor must debrief each entity that entered a permit space regarding the permit space program followed and any hazards confronted or created in the permit space(s) during entry operations;
  - (ii) The entry employer must inform the controlling contractor in a timely manner of the permit space program followed and of any hazards confronted or created in the permit space(s) during entry operations; and

(iii) The controlling contractor must apprise the host employer of the information exchanged with the entry entities pursuant to this subparagraph.

Note to paragraph §1926.1203(h). Unless a host employer or controlling contractor has or will have employees in a confined space, it is not required to enter any confined space to collect the information specified in this paragraph (h).

(iv) If there is no controlling contractor present at the worksite, the requirements for, and role of, controlling contactors in §1926.1203 must be fulfilled by the host employer or other employer who arranges to have employees of another employer perform work that involves permit space entry.

#### §1926.1204 Permit-Required Confined Space Program.

Each entry employer must:

- (a) Implement the measures necessary to prevent unauthorized entry;
- (b) Identify and evaluate the hazards of permit spaces before employees enter them;
- (c) Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following:
  - (1) Specifying acceptable entry conditions;
  - (2) Providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces;
  - (3) Isolating the permit space and physical hazard(s) within the space;
  - (4) Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;

Note to paragraph 1204(c)(4). When an employer is unable to reduce the atmosphere below 10 percent LFL, the employer may only enter if the employer inerts the space so as to render the entire atmosphere in the space non-combustible, and the employees use PPE to address any other atmospheric hazards (such as oxygen deficiency), and the employer eliminates or isolates all physical hazards in the space.

- (5) Determining that, in the event the ventilation system stops working, the monitoring procedures will detect an increase in atmospheric hazard levels in sufficient time for the entrants to safely exit the permit space;
- (6) Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards;
- (7) Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry, and ensuring that employees are not allowed to enter into, or remain in, a permit space with a hazardous atmosphere unless the employer can demonstrate that personal protective equipment (PPE) will provide effective protection for each employee in the permit space and provides the appropriate PPE to each employee; and
- (8) Eliminating any conditions (for example, high pressure) that could make it unsafe to remove an entrance cover.
- (d) Provide the following equipment (specified in paragraphs §1926.1204(d)(1) through (d)(9)) at no cost to each employee, maintain that equipment properly, and ensure that each employee uses that equipment properly:
  - Testing and monitoring equipment needed to comply with paragraph §1926.1204(e);
  - (2) Ventilating equipment needed to obtain acceptable entry conditions;
  - (3) Communications equipment necessary for compliance with paragraphs §1926.1208(c) and §1926.1209(e), including any necessary electronic communication equipment for attendants assessing entrants' status in multiple spaces;
  - (4) Personal protective equipment insofar as feasible engineering and work-practice controls do not adequately protect employees;

Note to paragraph §1926.1204(d)(4). The requirements of subpart E of this part and other PPE requirements continue to apply to the use of PPE in a permit space. For example, if employees use respirators, then the respirator requirements in §1926.103 (Respiratory protection) must be met.

(5) Lighting equipment that meets the minimum illumination requirements in §1926.56, that is approved for the ignitable or combustible properties of the specific gas, vapor, dust, or fiber that will be present, and that is sufficient to

enable employees to see well enough to work safely and to exit the space quickly in an emergency;

- (6) Barriers and shields as required by paragraph 1926.1204(c)(4);
- (7) Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;
- (8) Rescue and emergency equipment needed to comply with paragraph §1926.1204(i), except to the extent that the equipment is provided by rescue services; and
- (9) Any other equipment necessary for safe entry into, safe exit from, and rescue from, permit spaces.
- (e) Evaluate permit space conditions in accordance with the following paragraphs (e)(1) through (6) of this section when entry operations are conducted:
  - (1) Test conditions in the permit space to determine if acceptable entry conditions exist before changes to the space's natural ventilation are made, and before entry is authorized to begin, except that, if an employer demonstrates that isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), the employer must:
    - (i) Perform pre-entry testing to the extent feasible before entry is authorized; and,
    - (ii) If entry is authorized, continuously monitor entry conditions in the areas where authorized entrants are working, except that employers may use periodic monitoring in accordance with paragraph §1926.1204(e)(2) for monitoring an atmospheric hazard if they can demonstrate that equipment for continuously monitoring that hazard is not commercially available;
    - (iii) Provide an early-warning system that continuously monitors for nonisolated engulfment hazards. The system must alert authorized entrants and attendants in sufficient time for the authorized entrants to safely exit the space.
  - (2) Continuously monitor atmospheric hazards unless the employer can demonstrate that the equipment for continuously monitoring a hazard is not commercially available or that periodic monitoring is of sufficient frequency to ensure that the atmospheric hazard is being controlled at safe levels. If continuous monitoring is not used, periodic monitoring is required with

sufficient frequency to ensure that acceptable entry conditions are being maintained during the course of entry operations;

- (3) When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors;
- (4) Provide each authorized entrant or that employee's authorized representative an opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces;
- (5) Reevaluate the permit space in the presence of any authorized entrant or that employee's authorized representative who requests that the employer conduct such reevaluation because there is some indication that the evaluation of that space may not have been adequate; and
- (6) Immediately provide each authorized entrant or that employee's authorized representative with the results of any testing conducted in accordance with \$1926.1204 of this standard.
- (f) Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations;
  - (1) Attendants may be assigned to more than one permit space provided the duties described in §1926.1209 of this standard can be effectively performed for each permit space.
  - (2) Attendants may be stationed at any location outside the permit space as long as the duties described in §1926.1209 of this standard can be effectively performed for each permit space to which the attendant is assigned.
- (g) If multiple spaces are to be assigned to a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of those permit spaces without distraction from the attendant's responsibilities under §1926.1209 of this standard;
- (h) Designate each person who is to have an active role (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each such employee, and provide each such employee with the training required by \$1926.1207 of this standard;
- (i) Develop and implement procedures for summoning rescue and emergency services (including procedures for summoning emergency assistance in the event of a failed

non-entry rescue), for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue;

- (j) Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this standard, including the safe termination of entry operations under both planned and emergency conditions;
- (k) Develop and implement procedures to coordinate entry operations, in consultation with the controlling contractor, when employees of more than one employer are working simultaneously in a permit space or elsewhere on the worksite where their activities could, either alone or in conjunction with the activities within a permit space, foreseeably result in a hazard within the confined space, so that employees of one employer do not endanger the employees of any other employer;
- Develop and implement procedures (such as closing off a permit space and canceling the permit) necessary for concluding the entry after entry operations have been completed;
- (m) Review entry operations when the measures taken under the permit space program may not protect employees and revise the program to correct deficiencies found to exist before subsequent entries are authorized; and

Note to paragraph §1926.1204(m). Examples of circumstances requiring the review of the permit space program include, but are not limited to: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.

(n) Review the permit space program, using the canceled permits retained under paragraph §1926.1205(f), within 1 year after each entry and revise the program as necessary to ensure that employees participating in entry operations are protected from permit space hazards.

Note to paragraph §1926.1204(n). Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.

#### <u>§1926.1205 Permitting Process.</u>

- (a) Before entry is authorized, each entry employer must document the completion of measures required by paragraph §1926.1204(c) of this standard by preparing an entry permit.
- (b) Before entry begins, the entry supervisor identified on the permit must sign the entry permit to authorize entry.
- (c) The completed permit must be made available at the time of entry to all authorized entrants or their authorized representatives, by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed.
- (d) The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit in accordance with paragraph \$1926.1206(b) of this standard.
- (e) The entry supervisor must terminate entry and take the following action when any of the following apply:
  - (1) Cancel the entry permit when the entry operations covered by the entry permit have been completed; or
  - (2) Suspend or cancel the entry permit and fully reassess the space before allowing reentry when a condition that is not allowed under the entry permit arises in or near the permit space and that condition is temporary in nature and does not change the configuration of the space or create any new hazards within it; and
  - (3) Cancel the entry permit when a condition that is not allowed under the entry permit arises in or near the permit space and that condition is not covered by subparagraph (e)(2) of this section.
- (f) The entry employer must retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program required by paragraph §1926.1204(n) of this standard. Any problems encountered during an entry operation must be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

#### §1926.1206 Entry permit.

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

(a) The permit space to be entered;

- (b) The purpose of the entry;
- (c) The date and the authorized duration of the entry permit;
- (d) The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space;

Note to paragraph §1926.1206(d). This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.

- (e) Means of detecting an increase in atmospheric hazard levels in the event the ventilation system stops working;
- (f) Each person, by name, currently serving as an attendant;
- (g) The individual, by name, currently serving as entry supervisor, and the signature or initials of each entry supervisor who authorizes entry;
- (h) The hazards of the permit space to be entered;
- (i) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

Note to paragraph §1926.1206(i). Those measures can include, but are not limited to, the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

- (j) The acceptable entry conditions;
- (k) The results of tests and monitoring performed under paragraph §1926.1204(e) of this standard, accompanied by the names or initials of the testers and by an indication of when the tests were performed;
- (1) The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;
- (m) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;

- (n) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this standard;
- (o) Any other information necessary, given the circumstances of the particular confined space, to ensure employee safety; and
- (p) Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

#### <u>§1926.1207 Training.</u>

- (a) The employer must provide training to each employee whose work is regulated by this standard, at no cost to the employee, and ensure that the employee possesses the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this standard. This training must result in an understanding of the hazards in the permit space and the methods used to isolate, control or in other ways protect employees from these hazards, and for those employees not authorized to perform entry rescues, in the dangers of attempting such rescues.
- (b) Training required by this section must be provided to each affected employee:
  - (1) In both a language and vocabulary that the employee can understand;
  - (2) Before the employee is first assigned duties under this standard;
  - (3) Before there is a change in assigned duties;
  - (4) Whenever there is a change in permit space entry operations that presents a hazard about which an employee has not previously been trained; and
  - (5) Whenever there is any evidence of a deviation from the permit space entry procedures required by paragraph §1926.1204(c) of this standard or there are inadequacies in the employee's knowledge or use of these procedures.
- (c) The training must establish employee proficiency in the duties required by this standard and must introduce new or revised procedures, as necessary, for compliance with this standard.
- (d) The employer must maintain training records to show that the training required by paragraphs §1926.1207(a) through (c) of this standard has been accomplished. The training records must contain each employee's name, the name of the trainers, and the dates of training. The documentation must be available for inspection by

employees and their authorized representatives, for the period of time the employee is employed by that employer.

#### §1926.1208 Duties of authorized entrants.

The entry employer must ensure that all authorized entrants:

- (a) Are familiar with and understand the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- (b) Properly use equipment as required by paragraph §1926.1204(d) of this standard;
- (c) Communicate with the attendant as necessary to enable the attendant to assess entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by paragraph §1926.1209(f) of this standard;
- (d) Alert the attendant whenever:
  - (1) There is any warning sign or symptom of exposure to a dangerous situation; or
  - (2) The entrant detects a prohibited condition; and
- (e) Exit from the permit space as quickly as possible whenever:
  - (1) An order to evacuate is given by the attendant or the entry supervisor;
  - (2) There is any warning sign or symptom of exposure to a dangerous situation;
  - (3) The entrant detects a prohibited condition; or
  - (4) An evacuation alarm is activated.

#### §1926.1209 Duties of attendants.

The entry employer must ensure that each attendant:

- (a) Is familiar with and understands the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- (b) Is aware of possible behavioral effects of hazard exposure in authorized entrants;

- (c) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under paragraph 1926.1206(d) of this standard accurately identifies who is in the permit space;
- (d) Remains outside the permit space during entry operations until relieved by another attendant;

Note to paragraph §1926.1209(d). Once an attendant has been relieved by another attendant, the relieved attendant may enter a permit space to attempt a rescue when the employer's permit space program allows attendant entry for rescue and the attendant has been trained and equipped for rescue operations as required by paragraph §1926.1211(a).

- (e) Communicates with authorized entrants as necessary to assess entrant status and to alert entrants of the need to evacuate the space under paragraph §1926.1208(e);
- (f) Assesses activities and conditions inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:
  - (1) If there is a prohibited condition;
  - (2) If the behavioral effects of hazard exposure are apparent in an authorized entrant;
  - (3) If there is a situation outside the space that could endanger the authorized entrants; or
  - (4) If the attendant cannot effectively and safely perform all the duties required under \$1926.1209 of this standard;
- (g) Summons rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;
- (h) Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:
  - (1) Warns the unauthorized persons that they must stay away from the permit space;
  - (2) Advises the unauthorized persons that they must exit immediately if they have entered the permit space; and

- (3) Informs the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;
- (i) Performs non-entry rescues as specified by the employer's rescue procedure; and
- (j) Performs no duties that might interfere with the attendant's primary duty to assess and protect the authorized entrants.

#### §1926.1210 Duties of entry supervisors.

The entry employer must ensure that each entry supervisor:

- (a) Is familiar with and understands the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- (b) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;
- (c) Terminates the entry and cancels or suspends the permit as required by paragraph 1926.1205(e) of this standard;
- (d) Verifies that rescue services are available and that the means for summoning them are operable, and that the employer will be notified as soon as the services become unavailable;
- (e) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and
- (f) Determines, whenever responsibility for a permit space entry operation is transferred, and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

#### §1926.1211 Rescue and emergency services.

- (a) An employer who designates rescue and emergency services, pursuant to paragraph \$1926.1204(i) of this standard, must:
  - (1) Evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified;

Note to paragraph §1926.1211(a)(1). What will be considered timely will vary according to the specific hazards involved in each entry. For example, §1926.103—Respiratory Protection requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.

- (2) Evaluate a prospective rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular permit space or types of permit spaces identified;
- (3) Select a rescue team or service from those evaluated that:
  - (i) Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;
  - (ii) Is equipped for, and proficient in, performing the needed rescue services;
  - (iii) Agrees to notify the employer immediately in the event that the rescue service becomes unavailable;
- (4) Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and
- (5) Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue team or service can develop appropriate rescue plans and practice rescue operations.
- (b) An employer whose employees have been designated to provide permit space rescue and/or emergency services must take the following measures and provide all equipment and training at no cost to those employees:
  - (1) Provide each affected employee with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train each affected employee so the employee is proficient in the use of that PPE;
  - (2) Train each affected employee to perform assigned rescue duties. The employer must ensure that such employees successfully complete the training required and establish proficiency as authorized entrants, as provided by §§1926.1207 and 1926.1208 of this standard;
  - (3) Train each affected employee in basic first aid and cardiopulmonary resuscitation (CPR). The employer must ensure that at least one member of the

rescue team or service holding a current certification in basic first aid and CPR is available; and

- (4) Ensure that affected employees practice making permit space rescues before attempting an actual rescue, and at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces, except practice rescue is not required where the affected employees properly performed a rescue operation during the last 12 months in the same permit space the authorized entrant will enter, or in a similar permit space. Representative permit spaces must, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.
- (c) Non-entry rescue is required unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. The employer must designate an entry rescue service whenever non-entry rescue is not selected. Whenever non-entry rescue is selected, the entry employer must ensure that retrieval systems or methods are used whenever an authorized entrant enters a permit space, and must confirm, prior to entry, that emergency assistance would be available in the event that non-entry rescue fails. Retrieval systems must meet the following requirements:
  - (1) Each authorized entrant must use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point which the employer can establish presents a profile small enough for the successful removal of the entrant. Wristlets or anklets may be used in lieu of the chest or full body harness if the employer can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets or anklets is the safest and most effective alternative.
  - (2) The other end of the retrieval line must be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device must be available to retrieve personnel from vertical type permit spaces more than 5 feet (1.52 meters) deep.
  - (3) Equipment that is unsuitable for retrieval must not be used, including, but not limited to, retrieval lines that have a reasonable probability of becoming entangled with the retrieval lines used by other authorized entrants, or retrieval lines that will not work due to the internal configuration of the permit space.

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

#### §1926.1212 Employee participation.

- (a) Employers must consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program required by \$1926.1203 of this standard.
- (b) Employers must make available to each affected employee and his/her authorized representatives all information required to be developed by this standard.

#### §1926.1213 Provision of documents to Secretary.

For each document required to be retained in this standard, the retaining employer must make the document available on request to the Secretary of Labor or the Secretary's designee.

# **OSHAFactSheet**

# **Procedures for Atmospheric Testing** in Confined Spaces<sup>1</sup>

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

A confined space is one that is large enough to enter and perform assigned work in; it has limited or restricted ways to enter or exit the space; and it was not designed to be occupied continuously by a worker.

#### **Evaluation testing**

The atmosphere within a confined space must be tested using equipment that is designed to detect the chemicals that may be present at levels that are well below the defined exposure limits. Evaluation testing is done to:

- determine what chemical hazards are or may become present in the space's atmosphere, and
- identify what steps must be followed and what conditions must be met to ensure that atmospheric conditions are safe for a worker to enter the space.

The testing results and the decisions about what steps must be followed before entry must be evaluated by, or reviewed by, a technically qualified professional like an OSHA consultation service, a certified industrial hygienist, a registered safety engineer, or a certified safety professional. The technically qualified professional must consider all of the serious hazards in his/her evaluation or review.

A permit space is a confined space that has one or more of the following features: it has or may contain a hazardous atmosphere; it contains a material that can engulf a person who enters; it has an inside design that could trap or asphyxiate a person who enters (inwardly converging walls, or a floor that slopes downward to a smaller section); or it has any other serious safety or health hazards.

#### **Verification Testing**

Before a permit space that may have a hazardous atmosphere can be entered, the atmosphere must be tested using the steps identified on the permit (developed during evaluation testing). Verification testing is done to make sure that the chemical hazards that may be present are below the levels necessary for safe entry, and that they meet the conditions identified on the permit. Test the atmosphere in the following order: (1) for oxygen, (2) for combustible gases, and then (3) for toxic gases and vapors.<sup>2</sup> The testing results -- the actual test concentrations -must be recorded on the permit near the levels identified for safe entry.

#### **Duration of Testing**

For each test required on the permit, you must allow enough time for the air from the space to be drawn into the equipment and for the sensor (or other detection device) to react to the chemical if it is present. This is considered the "minimum response time" and it will be noted by the manufacturer in the operator's manual. Be aware that you will need to add time to this "minimum response time" if you have attached hosing or a probe extension to the inlet. The additional time is needed to allow the air from the different depths of the space to be pulled into the equipment inlet.

#### Testing Conditions in Spaces that May Have Layered Atmospheres

For permit spaces that are deep or have areas leading away from the entry point, the atmosphere may be layered or may be different in remote areas. For these spaces, testing must be done in the area surrounding the worker, which is considered four (4) feet in the direction of travel and to each side. If a sample probe is used to do the testing, then the worker must move slowly enough so that testing is completed, keeping the equipment "response time" in mind, before he/she moves into the new area.

# Retesting the Space During Entry or Before Re-Entry

Test the permit space routinely to make sure that the atmospheric conditions continue to be safe for entry.<sup>3</sup>

<sup>1</sup>Title 29 Code of Federal Regulations 1910.146, Appendix B. <sup>2</sup> 29 CFR 1910.146(c)(5)(ii)(C) and (d)(5)(iii). <sup>3</sup> 29 CFR 1910.146(c)(5)(ii)(F) and (d)(5)(ii).

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.



DSTM 9/2005

# **Sample Confined Space Entry Permits**

Use with Chapter 296-809 WAC, Confined Spaces

The following 3 fill-in-the-blank confined space entry permits can be modified to fit your particular entry. Make sure you use only the appropriate portions of the forms to create your own entry permit.

You can also design your own entry permit. You're **not** required to use the fill-in-the-blank entry permits provided here.

#### CONFINED SPACE ENTRY PERMIT Sample 1

		• • •				
Date:						
Site location or description:						
Purpose of entry:						
Supervisor(s) in charge of crews:         Type of crew (welding, plumbing, etc)         Phone #:						
Permit duration:						
Communication procedures (includin	ig equip	ment):				
Rescue procedures (also see emerg	ency co	ntact phone	e numbers at end of form):			
			1		•	1
	DATE	TIME	REQUIREMENTS COMPLETE	D	DATE	TIME
Lockout/De-energize/Try-out			Supplied Air Respirator (N/A	if		
			alternate entry)			
Line(s) Broken-Capped-Blank			Respirator(s) (Air Purifying)			
Purge-Flush and Vent			Protective Clothing			
Ventilation			Full Body Harness w/ "D" ring	9		
Secure Area (Post and Flag)			Emergency Escape Retrieva	l Equip		
Lighting (Explosive Proof)			Lifelines			
Hotwork Permit			Standby safety personnel (Na alternate entry)	/A if		
Fire Extinguishers			Resuscitator—Inhalator (N/A alternate entry)	if		
Add other specific information, if need examples in bold print.	ded, or a	ttach additi	onal instructions or requiremen	ts. See the	followin	g
Line(s) to be bled/blanked:						
Ventilation equipment:						
PPE clothing:						
Respirator(s):						
Fire extinguisher(s):						
Emergency retrieval equipment:						

#### CONFINED SPACE ENTRY PERMIT Sample 1 (continued)

AIR MONITORING									
Substance Monitor	ed	Permissi	ble Levels	Monitoring Results					
Time monitored (put time)	R	Record the time							
Percent Oxygen	1	9.5% to 23	.5%						
LEL/LFL	L	Inder 10%							
Toxic 1:		PEL	STEL						
Toxic 2:	_	PEL	STEL						
Toxic 3:	_	PEL	STEL						
Toxic 4:		PEL	STEL						
REMARKS:								 	-
Air Tester Name ID#		Instrument(s) Used (For example: oxygen meter, combustible gas indicator, etc.)			Model # or Type		Serial# or U	nit	
			TTENDANTS		TDANTS				
Attenda	ant(s)		ID#		Confined S	Space Entran	t(s)	ID#	
(Required for all confined alternate entry)	space wor	k except					-(-)		
									-
SUPERVISOR AUTHORIZ	ZATION -		DITIONS SATIS	SFIED					_
Department or phone num	ber:								
EMERGENCY CONTACT	PHONE		:						
AMBULANCE:	FIRE:		SAFET	Y:		RESCUE TE	EAM:	OTHER:	
									_

#### CONFINED SPACE ENTRY PERMIT Sample 2

	oumpic				
Date and time issued:					
Job site/space I.D.:					
Equipment to be worked on:					
Standby personnel:					
Date and time expires:					
Job supervisor:					
Work to be performed:					
4 Atas sentencia Oberglas. Tissue					
1. Atmospheric Checks: Time:					
Oxygen%					
Explosives%L.F.N	/I.				
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:					
Oxvaen: % >19.5%					
Explosive:% L.F.M. <10%					
Toxic:PPM <10PPM	1 H2S				
Time:					
Tester's signature:					
6. Communication procedures:					

#### CONFINED SPACE ENTRY PERMIT Sample 2 (continued)

7. Rescue procedures:								
8. Entry standby and backup persons successfully	completed r	equired train	ing?		Yes	No D		
Is it current?								
					1	1		
9. Equipment: N/A								
Direct reading gas monitor-tested:								
Safety harnesses and lifelines for entry and star	ndby persons	3:						
Hoisting equipment:								
Powered communications:								
SCBA's for entry and standby persons:								
Protective clothing:								
All electric equipment listed: Class I, Division	I, Group D a	nd non-sparl	king tools					
10 Deriodio atmospherio testa:								
TO. Penduc almospheric tests.								
Oxygen% Time	Oxygen		% Time _					
Oxygen% Time Oxygen% Time								
Explosive% Time	Explosive% Time Explosive% Time							
Explosive% Time	xplosive% Time Explosive% Time							
Toxic% Time	Toxic% Time							
Toxic% Time	Toxic		% Time _					
We have review the work authorized by this permit and the information contained here. Written instruction and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit not valid unless all appropriate items are completed.								
Approved by:	Approved by:							
Unit Super Review by:	visor							
Operations Manager								
This permit is to be kept at the job site. Return this	job site copy	to the unit su	upervisor follo	owing job co	mpletio	n.		
Entrants Name	Sign in	Sign out	Sign in	Sig	n out			

#### CONFINED SPACE ENTRY PERMIT

#### Sample 3

PERMIT VALID FOR 8 HC	OURS ONLY	. ALL P	ERMIT CC	PIES MUST REMAI	IN AT THE SITE UNT	IL JOB IS COM	PLETED.		
Date: S	Site locatior	n /descri	ption:						
Purpose of entry:									
Oursen is set (s) is shores			Turne of C	TOW	Talanhana	#			
Supervisor (s) in charge	e of crews		Type of C	iew	relephone	#			
Communication proce	dures:								
Rescue procedures (te	elephone n	umber a	it bottom)						
BOLD INDIC	ATES MININ Note	MUM RE	QUIREMEI	NTS TO COMPLETE	E AND REVIEW PRIO A in the blank.	R TO ENTRY			
REQUIREMENTS COM	MPLETED	DATE	TIME	REQUIREMEN	TS COMPLETED	DATE	TIME		
Lockout/De-energize/Tag	gout			Full Body Harne	ss w/"D" Ring				
Ling(a) Broken Conned E	Dank			Emergency Esca	ape Retrieval				
Line(s) Broken-Capped-E	Siank			Equipment					
Purge-Flush and Vent				Lifelines					
Ventilation				Fire Extinguishers					
Secure Area (Post and Fi	lag)			Lighting (Explosive proof)					
Breathing Apparatus				Protective Clothing					
Resuscitator - Inhalator				Respirator(s) (Air Purifying)					
Standby Safety Personne	el			Burning and Weld	ding Permit				
				<b>J</b>	3				
Continuous Monitori	ing:		🛛 Yes	🛛 No					
Periodic Monitorina	Frequenc	v:							
Test(s)		J ·		Permissible	entry level				
Percent of oxygen				19.5% TO 23	.5%				
Lower flammable limit				Under 10%	Under 10%				
Carbon monoxide				+35 PPM	+35 PPM				
Aromatic Hydrocarbon		+1 PPM *5 P	+1 PPM *5 PPM						
Hydrogen Cyanide (Skin) *4 PPM									
Hydrogen Sulfide				+10 PPM *15	+10 PPM *15 PPM				
Sulfur Dioxide     +2 PPM *5 PPM									
Ammonia				* 35 PPM					
<ul> <li>Short-term exposure lim</li> <li>+ 8 hour Time Weighted A</li> </ul>	Average: En	ees can v nployees	can work i	area up to 15 minute n the area 8 hours (le	es. onger with appropriate	e respiratory pro	tection).		

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

# CONFINED SPACE ENTRY PERMIT Sample 3 (continued)

GAS TESTER NAME & CHECK #:		
INSTRUCTIONS USED:		
MODEL &/OR TYPE:		
SERIAL &/OR UNIT #:		
SAFETY STANDBY IS REQU	UIRED FOR ALL CONFINED SPACE WORK	
SAFETY STANDBY PERSON(S)	CHECK#	
CONFINED SPACE ENTRANT(S)	CHECK #	
		. <u></u>
SUPERVISOR AUTHORIZATION - ALL CONDIT	ITIONS SATISFIED:	
Department or phone number:		
EMERGENCY CONTACT PHONE NUMBERS:		
Ambulance:		
Fire:		
Safety:		
Gas coordinator:	_	

#### INSPECTION AND RECERTIFICATION

At Webb Rite safety, we don't only help you get the fall protection you need for your job site, project, or other endeavor, we also help you keep it in compliance. Both ANSI and OSHA require that fall protection systems and equipment be inspected and recertified at least once every 12 months (more often under certain conditions) by a competent person other than the user.

We offer site visit to your job site or facilities to inspect your systems and equipment; or you can send your equipment to us for inspection at our installations, where we are also equipped to make repairs to your equipment.

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- Other engineered systems
- Harnesses
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- Lanyards



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- And many more

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