



# Permit Required Confined Space (OSHA 1910.146)

## Entrant, Attendant, Supervisor & Rescue – Students' Manual

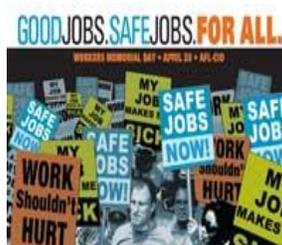
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### Health & Safety Department International Union, UAW

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# Course Goal

**Course Goal** – *The aim of this program is to provide comprehensive on-site training to high-risk workers (i.e. skilled trades and maintenance workers) and management on the requirements of Permit Required Confined Space 1910.146 and the prevention of serious injuries at their worksites. Participants will develop understanding of the requirements of OSHA 1910.146 including, identifying confined spaces, recognition of confined space hazards, requirements of Confined Space written program and permits.*

Section	Content	Objective
1	<b>Introduction to Confined Spaces</b>	Participants will be able to: <ul style="list-style-type: none"> <li>• Explain the issues (statistics) associated with confined spaces in the workplace.</li> <li>• Recall key definitions such as, Confined Space and Permit Required Confined Space</li> <li>• Describe the intent of a Permit Required Confined Space (PRCS) Program and list the essential elements of an effective program.</li> <li>• Be able to perform Confined Space assessment in their facility.</li> <li>• Use a “Status Check” survey to assess the facility’s Permit Required Confined Space program and where necessary develop strategies for improvement.</li> </ul>
2	<b>Identifying Potential C.S. Hazards</b>	Participants will be able to: <ul style="list-style-type: none"> <li>• List types of potential hazards to entrants in PRCS               <ul style="list-style-type: none"> <li>○ Lack of Oxygen or too much</li> <li>○ Mechanical Hazards</li> <li>○ Electrical Hazards</li> <li>○ Engulfment Hazards</li> <li>○ Chemical Hazards</li> <li>○ Lack of lighting</li> <li>○ Animals, etc....</li> </ul> </li> <li>• Recognize signs and symptoms of exposure</li> <li>• Recognize behavioral effects of exposure</li> </ul>
3	<b>OSHA Requirements</b>	Participants will be able to: <ul style="list-style-type: none"> <li>• Identify requirements specified in OSHA 29 CFR 1910.146               <ul style="list-style-type: none"> <li>○ Written Program.</li> <li>○ Entry procedures.</li> <li>○ Training Requirements (Entrant, Attendant, Entry Supervisor and Rescue).</li> <li>○ Direct read air monitors.</li> <li>○ Permit Required Confined Space Permit requirements.</li> <li>○ Personal Protection required for entry.</li> <li>○ Rescue Team selection criteria.</li> <li>○ Review of Permits at least annually.</li> </ul> </li> </ul>
4	<b>Review of Facility Specific Written Program and Permit</b>	Participants will be able to: <ul style="list-style-type: none"> <li>• Identify areas that are not in compliance with 1910.146</li> <li>• Recognize when a non-permit space would become a PRCS.</li> </ul>

5	<b>Other relevant OSHA Standards that may have an impact on their Permit Required Confined Space Program and application.</b>	<p>Participants will be able to:</p> <ul style="list-style-type: none"> <li>• List the basic types of personal protective equipment (PPE) for tasks involving entry into Permit Required Confined Spaces (Sub Part I - PPE) and PRCS Standard</li> <li>• Control of Hazardous Energy 1910.147 (Lockout/Tagout).</li> <li>• Welding, Cutting or Brazing in Confined Space requirements.</li> </ul>
6	<b>Action Planning and Course Wrap-up</b>	<p>Participants will be able to:</p> <ul style="list-style-type: none"> <li>• Outline an Action Plan to improve their Permit Required Confined Space Program.</li> <li>• Provide assistance to help achieve workplace goals and compliance with the PRCS OSHA Standard.</li> </ul>



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# Permit Required Confined Space (PRCS) 1910.146

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- \*8. EXERCISE: Hazards/Dangers in a Confined Space
- \*19. EXERCISE: Identifying Confined Spaces
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- \*62. Develop a One year Plan for Improving – Exercise
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- \*71 UAW Confined Space Fatalities and Injuries

## Identify Your Permit Required Confined Space (PRCS) Program Status

**Column 1 -- Does this item describe your PRCS Program?** Answer YES, NO, or SOMEWHAT

**Column 2 -- Is this item important to PRCS effectiveness?** Respond YES, NO or SOMEWHAT

ITEM -- Each sentence starts with "Does Your PRCS Program..."	1	2
1. ...have a list of all your confined spaces and location of each?		
2. ...maintain signs at the confined spaces indicating "Authorized Personnel Only" may enter?		
3. ...jointly conduct all aspects of the PRCS Program– research, design and implementation?		
4. ...have clearly defined roles & responsibilities for your Confined Space Team members?		
5. ...have training for "Entrants, Attendants, Entry Supervisors and Rescue Team to ensure they are knowledgeable and capable?"		
6. ... provide for "Direct Read" instruments to monitor the air?		
7. ...indicate what air contaminants the meter tests for?		
8. ...list the acceptable entry levels of the air contaminants present?		
9. ...have all the equipment available for safe entry?		
10. ...provide for "re-classifying" of PRCS's or alternative entry procedures?		
11. ...require wearing a harness and life line when entering a PRCS?		
12. ...indicate if your rescue service is in-house or external rescue?		
13. ...provide for review of all entry permits at least once a year?		
14. ...require pre-entry briefings with all parties involved with the entry?		
15. ...provide access to spaces for "Rescue Service" at least annually?		

**3. Circle the items that your facility most needs to improve.**

**4. Next, compare your responses:**

- *What are the common understandings?*
- *Where are the differences?*
- *What work has to be done?*



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**Exercise 1:** What is your groups definition of a **“CONFINED SPACE”**??

**Objective:** To identify features that make a work area a confined space.

**Write your groups own definition of a confined space. This will be a set of rules for deciding whether a work area is a confined space or not. Think about what do all confined spaces have in common.**

A work area is a “Confined Space :

- 1.) \_\_\_\_\_
- 2.) \_\_\_\_\_
- 3.) \_\_\_\_\_
- 4.) \_\_\_\_\_
- 5.) \_\_\_\_\_
- 6.) \_\_\_\_\_





**Exercise 2:** What makes a confined space a “Permit Required Confined Space”?

According to the OSHA Standard 1910.146, not all confined spaces are covered by a permit system. Our employers have to evaluate all confined spaces to determine the “potential hazards” a space might contain. A confined space must be covered by a permit system if: In your group make a list of what the potential hazards may be.

1.)

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2.)

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3.)

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4.)

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5.)

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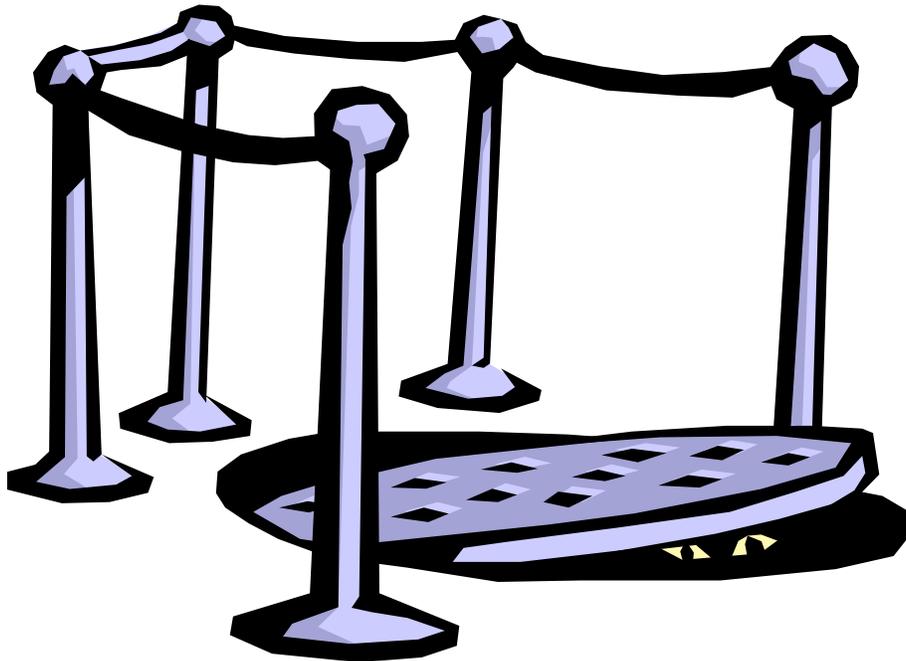
The OSHA Standard 1910.146 defines a **“Permit Required Confined Space” (PRCS)** as a space that :

- 1.) Meets the definition of a “Confined Space” *and*
- 2.) Has one “or” more of the following:

1. Contains, or has the potential to contain a hazardous atmosphere;  
or
2. Contains a material which could engulf an entrant  
or
3. Has a shape that makes it possible for a person to be trapped or asphyxiated by inwardly converging walls or because the floor slopes downward and tapers to a smaller cross-section  
or
4. Contains any other recognized or potentially serious safety or health hazard.

**NOTE:**

To meet the definition of a “PRCS” **only one** of the above criteria needs to apply!! Keep in mind the more hazards in a PRCS the more dangerous it can be!





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**Exercise 3: What are the potential hazards of working in a “PRCS” ?**

In your group list as many hazards as you can think of that you might face in a Confined Space.

- 1.) \_\_\_\_\_
- 2.) \_\_\_\_\_
- 3.) \_\_\_\_\_
- 4.) \_\_\_\_\_
- 5.) \_\_\_\_\_
- 6.) \_\_\_\_\_
- 7.) \_\_\_\_\_
- 8.) Too much oxygen—creates danger of fire or explosion
- 9.) \_\_\_\_\_



**Don't roll the dice.**

**It's your life !!**



## CONFINED SPACE HAZARDS

### Introduction

- Overview
- Types of Confined Spaces
- Reasons for Entering Confined Spaces

### Hazardous Atmospheres

- Flammable Atmospheres
- Toxic Atmospheres
- Irritant (Corrosive) Atmospheres
- Asphyxiating Atmospheres

### General Safety Hazards

- Mechanical
- Communication Problem
- Entry and Exit
- Physical
  - Thermal Effects
  - Noise
  - Vibration
  - General/Physical

## INTRODUCTION

### Overview

The **hazards encountered and associated with entering and working in confined spaces are capable of causing bodily injury, illness, and death to the worker.** Accidents occur among workers because of failure to recognize that a confined space is a potential hazard. It should therefore be considered that the most unfavorable situation exists in every case and that the danger of explosion, poisoning, and asphyxiation will be present at the onset of entry.

Before forced ventilation is initiated, information such as restricted areas within the confined space, voids, the nature of the contaminants present, the size of the space, the type of work to be performed, and the number of people involved should be considered. The ventilation air should not create an additional hazard due to recirculation of contaminants, improper arrangement of the inlet duct, or by the



substitution of anything other than fresh (normal) air (approximately 20.9% oxygen, 78.1% nitrogen, and 1% argon with small amounts of various other gases). The terms air and oxygen are sometimes considered synonymous. However, this is a dangerous assumption, since the use of oxygen in place of fresh (normal) air for ventilation will expand the limits of flammability and increase the hazards of fire and explosion.

**Hazardous conditions covered in this discussion include: Hazardous Atmospheres (flammable, toxic, irritant, and asphyxiating), and General Safety Hazards (mechanical, communications, entry and exit, and physical).**

### **Types of Confined Spaces**

Confined spaces can be categorized generally as those with open tops and with a depth that will restrict the natural movement of air, and enclosed spaces with very limited openings for entry. In either of these cases, the space may contain mechanical equipment with moving parts. Any combination of these parameters will change the nature of the hazards encountered. Degreasers, pits, and certain types of storage tanks may be classified as open topped confined spaces that usually contain no moving parts. However, gases that are heavier than air (butane, propane, and other hydrocarbons) remain in depressions and will flow to low points where they are difficult to remove. Open topped water tanks that appear harmless may develop toxic atmospheres such as hydrogen sulfide from the vaporization of contaminated water. Therefore, these gases (heavier than air) are a primary concern when entry into such a confined space is being planned. Other hazards may develop due to the work performed in the confined space or because of corrosive residues that accelerate the decomposition of scaffolding supports and electrical components.

Confined spaces such as sewers, casings, tanks, silos, vaults, and compartments of ships usually have limited access. The problems arising in these areas are similar to those that occur in open topped confined spaces. However, the limited access increases the risk of injury. Gases which are heavier than air such as carbon dioxide and propane, may lie in a tank or vault for hours or even days after the containers have been opened. Because some gases are odorless, the hazard may be overlooked with fatal results. Gases that are lighter than air may also be trapped within an enclosed type confined space, especially those with access from the bottom or side.

**Hazards specific to a confined space are dictated by: (1) the material stored or used in the confined space; as an example, damp activated carbon in a filtration tank will absorb oxygen, thus creating an oxygen deficient atmosphere; (2) the activity carried out, such as the fermentation of molasses that creates ethyl alcohol vapors and decreases the oxygen content of the atmosphere; or (3) the external environment, as in the case of sewer systems that may be affected by high tides, heavier than air gases, or flash floods.**

The most hazardous kind of confined space is the type that combines limited access and mechanical devices. All the hazards of open top and limited access confined spaces may be present together with the additional hazard of moving parts. Digesters and boilers usually contain power-driven equipment which, unless properly isolated, may be inadvertently activated after entry. Such equipment may also contain physical hazards that further complicate the work environment and the entry and exit process.



## Reasons for Entering Confined Spaces

Entering a confined space as part of the industrial activity may be done for various reasons. It is done usually to **perform a necessary function**, such as inspection, repair, maintenance (cleaning or painting), or similar operations which would be an infrequent or irregular function of the total industrial activity.

Entry may also be made **during new construction**. Potential hazards should be easier to recognize during construction since the confined space has not been used. The types of hazards involved will be limited by the specific work practices. When the area meets the criteria for a confined space, all ventilation and other requirements should be enforced.

One of the most difficult entries to control is that of unauthorized entry, especially when there are large numbers of workers and trades involved, such as welders, painters, electricians, and safety monitors.

A final and most important reason for entry would be **emergency rescue**. This, and all other reasons for entry, must be well planned before initial entry is made and the hazards must be thoroughly reviewed. The standby person and all rescue personnel should be aware of the structural design of the space, emergency exit procedures, and life support systems required.

## HAZARDOUS ATMOSPHERES

**Hazardous atmospheres** encountered in confined spaces can be divided into **four distinct categories: Flammable, Toxic, Irritant and/or Corrosive, and Asphyxiating.**

### Flammable Atmospheres

**A flammable atmosphere generally arises from enriched oxygen atmospheres, vaporization of flammable liquids, byproducts of work, chemical reactions, concentrations of combustible dusts, and de-sorption of chemical from inner surfaces of the confined space.**

An atmosphere **becomes flammable when the ratio of oxygen to combustible material in the air is neither too rich nor too lean for combustion to occur.** Combustible gases or vapors will accumulate when there is inadequate ventilation in areas such as a confined space. Flammable gases such as acetylene, butane, propane, hydrogen, methane, natural or manufactured gases or vapors from liquid hydrocarbons can be trapped in confined spaces, and since many gases are heavier than air, they will seek lower levels as in pits, sewers, and various types of storage tanks and vessels. In a closed top tank, it should also be noted that lighter than air gases may rise and develop a flammable concentration if trapped above the opening.

The **byproducts of work procedures** can generate flammable or explosive conditions within a confined space. Specific kinds of work such as spray painting can result in the release of explosive gases or vapors. Welding in a confined space is a major cause of explosions in areas that contain combustible gas.

**Chemical reactions** forming flammable atmospheres occur when surfaces are initially exposed to the atmosphere, or when chemicals combine to form flammable gases. This condition arises when dilute sulfuric acid reacts with iron to form hydrogen or when calcium carbide makes contact with water to form acetylene. Other examples of spontaneous chemical reactions that may produce explosions from small amounts of unstable compounds are acetylene-metal compounds, peroxides, and nitrates. In a dry



state, these compounds have the potential to explode upon percussion or exposure to increased temperature. Another class of chemical reactions that form flammable atmospheres arise from deposits of pyrophoric substances (carbon, ferrous oxide, ferrous sulfate, iron, etc.) that can be found in tanks used by the chemical and petroleum industry. These tanks containing flammable deposits will spontaneously ignite upon exposure to air.

**Combustible dust concentrations** are usually found during the process of loading, unloading, and conveying grain products, nitrated fertilizers, finely ground chemical products, and any other combustible material. High charges of static electricity, which rapidly accumulate during periods of relatively low humidity (below 50%), can cause certain substances to accumulate electrostatic charges of sufficient energy to produce sparks and ignite a flammable atmosphere. These sparks may also cause explosions when the right air or oxygen to dust or gas mixture is present.

### Toxic Atmospheres

The substances to be regarded as toxic in a confined space can cover the entire spectrum of **gases, vapors, and finely-divided airborne dust** in industry. The sources of toxic atmospheres encountered may arise from the following:

1. The manufacturing process (for example, in producing polyvinyl chloride, hydrogen chloride is used as well as vinyl chloride monomer, which is carcinogenic).
2. The product stored [removing decomposed organic material from a tank can liberate toxic substances, such as hydrogen sulfide ( $H_2S$ )].
3. The operation performed in the confined space (for example, welding or brazing with metals capable of producing toxic fumes).

During loading, unloading, formulation, and production, mechanical and/or human error may also produce toxic gases which are not part of the planned operation.

**Carbon monoxide (CO) is a hazardous gas** that may build up in a confined space. This **odorless, colorless gas that has approximately the same density as air** is formed from incomplete combustion of organic materials such as wood, coal, gas, oil, and gasoline; it can be formed from microbial decomposition of organic matter in sewers, silos, and fermentation tanks. Carbon monoxide is an insidious toxic gas because of its poor warning properties. Early stages of CO intoxication are nausea and headache. Carbon monoxide may be fatal at 1000 ppm in air, and is considered dangerous at 200 ppm, because it forms carboxyhemoglobin in the blood which prevents the distribution of oxygen in the body.

Carbon monoxide is a relatively abundant colorless, odorless gas, therefore, any untested atmosphere must be suspect. It must also be noted that a safe reading on a combustible gas indicator does not ensure that CO is not present. Carbon monoxide must be tested for specifically. The formation of CO may result from chemical reactions or work activities, therefore fatalities due to CO poisoning are not confined to any particular industry. There have been fatal accidents in sewage treatment plants due to decomposition products and lack of ventilation in confined spaces. Another area where CO results as a product of decomposition is in the formation of silo gas in grain storage elevators. In another area, the paint industry, varnish is manufactured by introducing the various ingredients into a kettle, and heating them in an inert atmosphere, usually town gas, which is a mixture of carbon dioxide and nitrogen.



In **welding operations**, oxides of nitrogen and ozone are gases of major toxicologic importance, and incomplete oxidation may occur and carbon monoxide can form as a byproduct.

Another poor work practice, which has led to fatalities, is the **recirculation of diesel exhaust emissions**. Increased CO levels can be prevented by strict control of the ventilation and the use of catalytic converters.

### **Irritant (Corrosive) Atmospheres**

Irritant or corrosive atmospheres can be divided into **primary and secondary groups**. The **primary irritants** exert **no systemic toxic effects (effects on the entire body)**. Examples of primary irritants are chlorine, ozone, hydrochloric acid, hydrofluoric acid, sulfuric acid, nitrogen dioxide, ammonia, and sulfur dioxide. A **secondary irritant** is one that **may produce systemic toxic effects** in addition to surface irritation. Examples of secondary irritants include benzene, carbon tetrachloride, ethyl chloride, trichloroethane, trichloroethylene, and chloropropene.

Irritant gases vary widely among all areas of industrial activity. They can be found in plastics plants, chemical plants, the petroleum industry, tanneries, refrigeration industries, paint manufacturing, and mining operations.

Prolonged exposure at irritant or corrosive concentrations in a confined space may produce little or no evidence of irritation. This may result in a **general weakening of the defense reflexes from changes in sensitivity**. **The danger in this situation is that the worker is usually not aware of any increase in his/her exposure to toxic substances.**

### **Asphyxiating Atmospheres**

The **normal atmosphere** is composed approximately of **20.9% oxygen and 78.1% nitrogen, and 1% argon with small amounts of various other gases**. Reduction of oxygen in a confined space may be the result of either consumption or displacement.

The **consumption of oxygen takes place during combustion of flammable substances**, as in welding, heating, cutting, and brazing. A more subtle consumption of oxygen occurs during bacterial action, as in the fermentation process. Oxygen may also be consumed during **chemical reactions as in the formation of rust** on the exposed surface of the confined space (iron oxide). **The number of people working in a confined space and the amount of their physical activity will also influence the oxygen consumption rate.**

A second factor in oxygen deficiency is **displacement by another gas**. Examples of gases that are used to displace air, and therefore reduce the oxygen level are helium, argon, and nitrogen. Carbon dioxide may also be used to displace air and can occur naturally in sewers, storage bins, wells, tunnels, wine vats, and grain elevators. Aside from the natural development of these gases, or their use in the chemical process, certain gases are also used as inerting agents to displace flammable substances and retard pyrophoric reactions. Gases such as nitrogen, argon, helium, and carbon dioxide, are frequently referred to as non-toxic inert gases but have claimed many lives. The use of nitrogen to inert a confined space has claimed more lives than carbon dioxide. The total displacement of oxygen by nitrogen will cause immediate collapse and death. Carbon dioxide and argon, with specific gravities greater than air, may lie in a tank or manhole for hours or days after opening. Since these gases are colorless and odorless, they



pose an immediate hazard to health unless appropriate oxygen measurements and ventilation are adequately carried out.

**Oxygen deprivation is one form of asphyxiation.** While it is desirable to maintain the atmospheric oxygen level at 21% by volume, the body can tolerate deviation from this ideal. When the **oxygen level falls to 17%, the first sign of hypoxia is a deterioration to night vision which is not noticeable until a normal oxygen concentration is restored.** Physiologic effects are increased breathing volume and accelerated heartbeat. Between **14-16% physiologic effects** are increased breathing volume, accelerated heartbeat, very poor muscular coordination, rapid fatigue, and intermittent respiration. Between **6-10% the effects are nausea, vomiting, inability to perform, and unconsciousness. Less than 6%, spasmodic breathing, convulsive movements, and death in minutes.**

## GENERAL SAFETY HAZARDS

### Mechanical

If **activation of electrical or mechanical equipment** would cause injury, each piece of equipment should be manually isolated to prevent inadvertent activation before workers enter or while they work in a confined space. The interplay of hazards associated with a confined space, such as the potential of flammable vapors or gases being present, and the build-up of static charge due to mechanical cleaning, such as abrasive blasting, all influence the precautions which must be taken.

**To prevent vapor leaks, flashbacks, and other hazards, workers should completely isolate the space. To completely isolate a confined space, the closing of valves is not sufficient. All pipes must be physically disconnected or isolation blanks bolted in place.** Other special precautions must be taken in cases where flammable liquids or vapors may re-contaminate the confined space. The pipes blanked or disconnected should be inspected and tested for leakage to check the effectiveness of the procedure. Other areas of concern are steam valves, pressure lines, and chemical transfer pipes. A less apparent hazard is the space referred to as a void, such as double walled vessels, which must be given special consideration in blanking off and inerting.

### Communication Problems

**Communication between the worker inside and the standby person outside is of utmost importance.** If the worker should suddenly feel distressed and not be able to summon help, an injury could become a fatality. Frequently, the body positions that are assumed in a confined space make it difficult for the standby person to detect an unconscious worker. When visual monitoring of the worker is not possible because of the design of the confined space or location of the entry hatch, a voice or alarm-activated explosion proof type of communication system will be necessary.

**Suitable illumination** of an approved type is required to provide sufficient visibility for work in accordance with the recommendations made in the Illuminating Engineering Society Lighting Handbook.

### Entry and Exit

**Entry and exit time** is of major significance as a physical limitation and is directly related to the potential hazard of the confined space. The extent of precautions taken and the standby equipment needed to maintain a safe work area will be determined by the means of access and rescue. The following should be considered: type of confined space to be entered, access to the entrance, number and



size of openings, barriers within the space, the occupancy load, and the time requirement for exiting in event of fire or vapor incursion, and the time required to rescue injured workers.

## Physical

The hazards described in this section include **thermal effects (heat and cold), noise, vibration, radiation, and fatigue while working in a confined space.**

### Thermal Effects

Four factors influence the interchange of heat between people and their environment. They are: **(1) air temperature, (2) air velocity, (3) moisture contained in the air, and (4) radiant heat.** Because of the nature and design of most confined spaces, moisture content and radiant heat are difficult to control. As the body temperature rises progressively, workers will continue to function until the body temperature reaches approximately 102°F. When this body temperature is exceeded, the workers are less efficient, and are prone to heat exhaustion, heat cramps, or heat stroke. In a cold environment, certain physiologic mechanisms come into play, which tend to limit heat loss and increase heat production. The most severe strain in cold conditions is chilling of the extremities so that activity is restricted. Special precautions must be taken in cold environments to prevent frostbite, trench foot, and general hypothermia.

Protective insulated clothing for both hot and cold environments will add additional bulk to the worker and must be considered in allowing for movement in the confined space and exit time. Therefore, air temperature of the environment becomes an important consideration when evaluating working conditions in confined spaces.

### Noise

Noise problems are usually intensified in confined spaces because the interior tends to cause sound to reverberate and thus expose the worker to higher sound levels than those found in an open environment. This intensified noise increases the risk of hearing damage to workers which could result in temporary or permanent loss of hearing. Noise in a confined space which may not be intense enough to cause hearing damage may still disrupt verbal communication with the emergency standby person on the exterior of the confined space. If the workers inside are not able to hear commands or danger signals due to excessive noise, the probability of severe accidents can increase.

### Vibration

Whole body vibration may affect multiple body parts and organs depending upon the vibration characteristics. Segmental vibration, unlike whole body vibration, appears to be more localized in creating injury to the fingers and hands of workers using tools, such as pneumatic hammers, rotary grinders or other hand tools which cause vibration.

### General/Physical

Some physical hazards cannot be eliminated because of the nature of the confined space or the work to be performed. These hazards include such items as **scaffolding, surface residues, and structural hazards.** The use of scaffolding in confined spaces has contributed to many accidents caused by workers or materials falling, improper use of guard rails, and lack of maintenance to insure worker safety. The choice of material used for scaffolding depends upon the type of work to be performed, the calculated



weight to be supported, the surface on which the scaffolding is placed, and the substance previously stored in the confined space.

**Surface residues** in confined spaces can increase the already hazardous conditions of electrical shock, reaction of incompatible materials, liberation of toxic substances, and bodily injury due to slips and falls. Without protective clothing, additional hazards to health may arise due to surface residues.

**Structural hazards** within a confined space such as baffles in horizontal tanks, trays in vertical towers, bends in tunnels, overhead structural members, or scaffolding installed for maintenance constitute physical hazards, which are exacerbated by the physical surroundings. In dealing with structural hazards, workers must review and enforce safety precautions to assure safety.

Rescue procedures may require withdrawal of an injured or unconscious person. Careful planning must be given to the relationship between the internal structure, the exit opening, and the worker. If the worker is above the opening, the system must include a rescue arrangement operated from outside the confined space, if possible, by which the employee can be lowered and removed without injury.





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### EXERCISE: Identifying Confined Spaces

List the areas at your workplace that are or may be confined spaces. Is the space marked as a “Confined Space”? Describe why you would enter the spaces. What kind(s) of hazards might you find in each space.

<u>Confined Space</u> <small>[Note: The area must meet ALL THREE of the criteria to be considered a C.S.]</small>	Is the space marked as C.S.?	Purpose of entry	List the dangers or hazards of the space.
1.			
2.			
3.			
4.			
5.			

**Note:** 1910.146 (c) (1) requires your employer to evaluate each Confined Space to determine if any are a “Permit Required Confined Space”. **Keep in mind we can create the hazard by the work we are assigned to perform in the space!!**



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### ***WARNING SIGNS THAT SOMETHING IS WRONG!!!!***

There are many ways the air in a confined space can become poisonous. Entrants attendants and entry supervisors must be constantly alert for signs in the entrants behavior that something may be wrong.

**Suspicious signs indicate the entrant must exit or be removed from the space—immediately and emergency help summoned. Here is a few examples of “Physical Distress Symptoms:**

- dizziness
- disorientation
- weakness in the knees
- shallow/rapid breathing
- blurred vision
- exaggerated sense of feeling “good”
- profuse sweating
- chest pain
- loss of coordination
- change in heartbeat
- ringing in the ears
- nausea
- skin irritation
- inability to work as skillfully as normal (loss of manual dexterity)

If any of these signs are observed by the attendant, entry supervisor or felt by the entrant they “MUST” exit the space immediately.



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### Paragraphs of 1910.146 Permit Required Confined Space

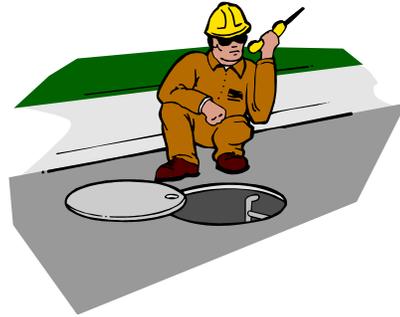
**Paragraph:   Topic:**

- (a) Scope and Application
- (b) Definitions
- (c) General Requirements
- (d) Permit Required Confined Space Program
- (e) Permit System
- (f) Entry Permit
- (g) Training
- (h) Duties of authorized entrants
- (i) Duties of attendants
- (j) Duties of entry supervisors
- (k) Rescue and Emergency Services
- (l) Employee participation

**Note:** Appendix “F” assists employers in compliance with the rescue service or in-house rescue team required by 1910.146 but is non-mandatory guidance.



# UAW Health & Safety Department



## 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.

**(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.

“**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.

“**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 oxygen by volume.

“**Permit-required confined space (permit space)**” means a confined space that has one or more of the following characteristics:

- (1) Contains or has a potential to contain a hazardous atmosphere; or
- (2) Contains a material that has the potential for engulfing an entrant; or
- (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.

**(c) General requirements.**

**(c)(1)** The employer **shall evaluate the workplace** to determine if any spaces are permit-required confined spaces.

**(c)(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.



**(c)(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.

**(c)(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.

**(c)(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.

(c)(5)(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:

(c)(5)(i)(A) The employer can demonstrate that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;

(c)(5)(i)(B) The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry

(c)(5)(i)(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;

(c)(5)(i)(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;

(c)(5)(i)(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

(c)(5)(i)(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.

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

(c)(5)(ii)(A) Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.

(c)(5)(ii)(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)(5)(ii)(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.**

(c)(5)(ii)(c)(1) Oxygen content,

(c)(5)(ii)(c)(2) Flammable gases and vapors, and

(c)(5)(ii)(c)(3) Potential toxic air contaminants.

(c)(5)(ii)(D) There may be no hazardous atmosphere within the space whenever any employee is inside the space.

(c)(5)(ii)(E) Continuous forced air ventilation shall be used, as follows:



- (c)(5)(ii)(E)(1) An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;
- (c)(5)(ii)(E)(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;
- (c)(5)(ii)(E)(3) The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.
- (c)(5)(ii)(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.
- (c)(5)(ii)(G) If a hazardous atmosphere is detected during entry:
- (c)(5)(ii)(G)(1) Each employee shall leave the space immediately;
- (c)(5)(ii)(G)(2) The space shall be evaluated to determine how the hazardous atmosphere developed; and
- (c)(5)(ii)(G)(3) Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
- (c)(5)(ii)(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.
- (c)(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.
- (c)(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:
- (c)(7)(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.
- (c)(7)(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.
- (c)(7)(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.
- (c)(7)(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.

**(c)(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:

(c)(8)(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;

(c)(8)(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;

(c)(8)(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;

(c)(8)(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

(c)(8)(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.

**(c)(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:

(c)(9)(i) Obtain any available information regarding permit space hazards and entry operations from the host employer;

(c)(9)(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

(c)(9)(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.

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

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

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

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

(d)(3)(i) Specifying acceptable entry conditions;

(d)(3)(ii) Providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces;

(d)(3)(iii) Isolating the permit space;

(d)(3)(iv) Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;

(d)(3)(v) Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and

(d)(3)(vi) Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry.

**(d)(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:



- (d)(4)(i) Testing and monitoring equipment needed to comply with paragraph (d)(5) of this section;
- (d)(4)(ii) Ventilating equipment needed to obtain acceptable entry conditions;
- (d)(4)(iii) Communications equipment necessary for compliance with paragraphs (h)(3) and (i)(5) of this section;
- (d)(4)(iv) Personal protective equipment insofar as feasible engineering and work practice controls do not adequately protect employees;
- (d)(4)(v) Lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency;
- (d)(4)(vi) Barriers and shields as required by paragraph (d)(3)(iv) of this section;
- (d)(4)(vii) Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;
- (d)(4)(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
- (d)(4)(ix) Any other equipment necessary for safe entry into and rescue from permit spaces.
- (d)(5)** Evaluate permit space conditions as follows when entry operations are conducted:
  - (d)(5)(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;
  - (d)(5)(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
  - (d)(5)(iii) When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors.
  - (d)(5)(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;
  - (d)(5)(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;**
  - (d)(5)(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.
- (d)(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.
- (d)(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;
- (d)(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;

(d)(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;

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

(d)(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;

(d)(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;

(d)(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

(d)(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.**

(e)(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..

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

(e)(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.

(e)(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.

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

(e)(5)(i) The entry operations covered by the entry permit have been completed; or

(e)(5)(ii) A condition that is not allowed under the entry permit arises in or near the permit space.

(e)(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:

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

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

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



- (f)(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.
- (f)(5) The personnel, by name, currently serving as attendants;
- (f)(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;
- (f)(7) The hazards of the permit space to be entered;
- (f)(8) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;
- (f)(9) The acceptable entry conditions;
- (f)(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;
- (f)(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;
- (f)(12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;
- (f)(13) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;
- (f)(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.**

- (g)(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.
- (g)(2) Training shall be provided to each affected employee:
  - (g)(2)(i) Before the employee is first assigned duties under this section;
  - (g)(2)(ii) Before there is a change in assigned duties;
  - (g)(2)(iii) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;
  - (g)(2)(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.
- (g)(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.
- (g)(4) The employer shall certify that the training required by paragraphs (g)(1) →(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:

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



**(i) Duties of attendants.** The employer shall ensure that each attendant:

- (i)(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
  - (i)(2) Is aware of possible behavioral effects of hazard exposure in authorized entrants;
  - (i)(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;
  - (i)(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.
- (i)(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;
  - (i)(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)(6)(i) If the attendant detects a prohibited condition;



- (i)(6)(ii) If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;
- (i)(6)(iii) If the attendant detects a situation outside the space that could endanger the authorized entrants; or
- (i)(6)(iv) If the attendant cannot effectively and safely perform all the duties required under paragraph (i) of this section;
- (i)(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;
- (i)(8)** Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:
  - (i)(8)(i) Warn the unauthorized persons that they must stay away from the permit space;
  - (i)(8)(ii) Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and
  - (i)(8)(iii) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;
- (i)(9)** Performs non-entry rescues as specified by the employer's rescue procedure; and
- (i)(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:

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

- (k)(1)** An employer who designates rescue and emergency services, pursuant to paragraph (d)(9) of this section, shall:
  - (k)(1)(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.



- (k)(1)(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;
- (k)(1)(iii) Select a rescue team or service from those evaluated that:
  - (k)(1)(iii)(A) Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;
  - (k)(1)(iii)(B) Is equipped for and proficient in performing the needed rescue services;
- (k)(1)(iv) Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and
- (k)(1)(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)(l) of this section.
- (k)(2)** An employer whose employees have been designated to provide permit space rescue and emergency services shall take the following measures:
  - (k)(2)(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;
  - (k)(2)(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;
  - (k)(2)(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
  - (k)(2)(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.
- (k)(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.
  - (k)(3)(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.
  - (k)(3)(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
- (k)(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.**

(l)(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.

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



## 1910.146 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.



# Health and Safety Department



## EXERCISE: Confined Space Permit Checklist for Compliance

Does your permit meet OSHA requirements? Use the following checklist to evaluate your "PERMIT".

Does your permit say.....

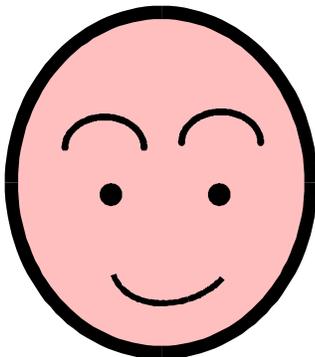
YES NO

- 1. where the confined space is located? \_\_\_\_\_
- 2. what kind of work will be done? \_\_\_\_\_
- 3. how long it is good for? \_\_\_\_\_
- 4. what the dangers are in the space? \_\_\_\_\_
- 5. how fresh air will be blown into the space? \_\_\_\_\_
- 6. what safety equipment will be used? \_\_\_\_\_
- 7. how the air will be tested/monitored? \_\_\_\_\_
- 8. who the entrant and attendant are? \_\_\_\_\_
- 9. when the space is safe to enter(%oxygen & LEL, other gases)? \_\_\_\_\_
- 10. how the energy sources will be controlled/LOTO? \_\_\_\_\_
- 11. who will the rescue & how to contact in an emergency? \_\_\_\_\_
- 12. how the entrant and attendant will communicate? \_\_\_\_\_
- 13. what special procedures will be used for work inside the space? \_\_\_\_\_

GOOD PERMIT

" OR "

PERMIT NEEDS WORK!!





# UAW Health & Safety Department

(Reprinted for Training purposes)

OSHA Directives

CPL 2.100 – Application of the **Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146.**

May 5, 1995

Directorate of Compliance Programs

**Purpose.** This instruction establishes enforcement policy and provides explanation of the standard to ensure uniform enforcement.

## Appendix B

### **Specific Vertical Standards Taking Precedence**

These particular vertical standards take precedence over the Permit-required Confined Space standard for the hazards they address. Clarification note: The term “confined space(s)” as used in standards promulgated before the PRCS standard are to be considered equivalent to a “permit space(s)” in 29 CFR 1910.146.

#### **Standard:                      Working in Confined Spaces**

- 1910.252(a)(4)(i)              Removal of arc welding electrodes during suspension of work in confined spaces.
- 1910.252(b)(4)(i) to (vii)    Protection of personnel welding in confined spaces(ventilation, securing welding equipment, lifelines, attendants, electrode removal, gas cylinder shutoff, warnings).
- 1910.252(c)(4)                Health protection and ventilation for welder and outside helper during welding operations in confined space.
- 1910.252(c)(9)                Specifies ventilation and respiratory protection requirements for welding in confined spaces using cadmium-bearing filler metal.
- 1910.252(c)(10)              Specifies local exhaust ventilation or respiratory protection for welding and cutting mercury-coated or-bearing materials, including paint, in confined spaces.
- 1910.261(b)(5)                Specifies safe practices (lifeline, safety harness, attendant, atmospheric testing, availability of SCBA, and lock out) for entering a vessel in pulp, paper, and paperboard mills



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1910.268(o)	Addresses certain hazards involving manhole and unvented vault entry by telecommunication employees.
1910.269(e)	Applies to routine entry into enclosed spaces by qualified employees performing operations or maintenance work within the scope and application of 1910.269.
1910.269(t)	Provides additional requirements for work in underground electrical installations.
1910.272(g)	Specifies entry procedures for bins, silos, and flat storage buildings and tanks with a diameter less than the height, and for all top entries of these structures in grain facilities.

## Appendix E

### Questions and Answers for PRCS Standard Clarification

#### SECTION (a) – Scope and Application

1. Are only those employers engaged in manufacturing operations covered by the PRCS standard?

**No. The standard applies to all general industry places of employment.**

Among them are Agricultural services, Manufacturing, Transportation and Utilities, Wholesale Trade, Food Stores, Hotels and Other Lodging, Health Services, Museums, Botanical Gardens and Zoos but to name a few.

2. Must an employer covered by an industry-specific standard perform the initial workplace evaluation required by 1910.146(c)(1)?

**Yes.** Employers with spaces covered by a specific industry standard must still determine if they have spaces which would qualify as a permit space not covered by the industry specific standard. Therefore, all employers must do an initial evaluation under 1910.146(c)(1).

3. A facility, falling within the scope of the General Industry standards, is undertaking physical changes involving work in permit spaces. These changes will also employ construction practices either by in-house or contractual employees. Which standard, 1910.146 or 1926.21(b)(6), will be enforced for the work involved in the permit-required confined spaces?

Generally speaking, refurbishing of existing equipment and space is maintenance; reconfiguration of space or installation of substantially new equipment (as for a process



change) is usually construction. Those spaces identified under 1910.146(c)(1) as permit spaces that are undergoing maintenance or modifications, which do not involve construction, would be subject to the General Industry standards.

A confined space created during or as a result of construction activity or entered to perform construction activity would usually fall within the scope of the 29 CFR 1926 standards and the general duty clause until the space is turned over for General Industry operations.

**Some examples:**

- The lining in a tank is in need of restoration either to prevent the structural part of the tank from deteriorating or to prevent the product from being contaminated by the material making up the tank structure. In either case, the partial patching or total removal of existing lining and replacement is maintenance. The installation of a new lining for the above reasons is also maintenance.
- The relining of a furnace with new refractory is maintenance.

**SECTION (b) Definitions**

1. Under what circumstances will **stairs or ladders constitute a limited or restricted means of egress** under the standard?

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

2. **Does the fact that a space has a door mean that the space does not have limited or restricted means of entry or exit and, therefore, is not a "confined space"?**

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



3. **Can the distance an employee must travel in a space such as a tunnel, to reach a point of safety be a determinant for classifying a space as a confined space?**

**Yes.** The determination would most likely be a function of the time of travel to the point of safety.

4. How will OSHA **assess a space which is entirely open on one plane, such as a pit**, in determining whether a space has limited or restricted means for entry or exit?

In determining whether a space has limited or restricted means for entry or exit, OSHA will **evaluate its overall characteristics to determine if an entrant's ability to escape in an emergency would be hindered**. Thus, a pit, shaft or tank that is entirely open on one plane can be considered a confined space if the means for entering the space (stairway, ladderway, etc.) are narrow or twisted, or otherwise configured in such a way as to hinder an entrant's ability to quickly escape (See question No. 1 of this section). **Similarly, the pit, shaft, or tank itself may be confining because of the presence of pipes, ducts, baffles, equipment or other factors which would hinder an entrant's ability to escape.**

5. How will compliance officers interpret a "condition in which the dust obscures vision" with reference to the definition of a hazardous atmosphere?

The phrase appears in a note and is meant to be an informational aid to employers and employees in approximating the lower flammable limits. It should be noted that combustible dusts have differing lower flammable limits which are dependent on the composition of the dusts, the particle size, distribution and other factors. Since the airborne concentration may vary considerably within the space, and the settled dust may also pose hazards, it is important that the employer recognize the potential hazards when entering confined spaces containing such dust and that the employer take appropriate precautions for protection of entrants.

Regarding flammable dusts in confined space, it will be OSHA policy to sample and to analyze such dusts for combustibility, prior to issuing citations, whenever there is doubt as to the nature and extent of the dust hazard. Note that existing permissible exposure limits for nuisance dusts and other standards continue to apply.

6. How will OSHA address a space that does not satisfy the criteria for a confined space but that potentially contains a hazardous atmosphere?

Employers must comply with the permissible exposure limits and other requirements contained in standards addressing specific toxic substances and air contaminants, to the extent applicable, in all spaces in which employees may be present. In addition, the respiratory protection standard, 29 C.F.R. 1910.134, applies where an employee must enter a space in which a hazardous atmosphere may be present and no other specific standard applies. The respiratory protection standard contains special precautions for working in atmospheres that are oxygen deficient or immediately dangerous to life or health.

7. Are the hazards posed by a confined space to be considered in determining whether a space meets the definition of a confined space?



The determination whether a space **has “limited or restricted means for entry or exit”** within the meaning of the standard’s definition of “confined space” should include consideration of whether, in light of the hazards posed by the particular space at issue, the configuration or other characteristics of the space **would interfere with an entrant’s ability to escape or be rescued in an emergency situation.**

8. Can a space that is initially designed for continuous human occupancy become a “confined space” because of changes in its use?

If the changes alter the character of the space or if new or more serious hazards are introduced, those changes require reevaluation of whether the space is fit for continuous employee occupancy. If the space is not fit for continuous employee occupancy and the other criteria of the confined space definition are met, the space should be reclassified as a confined space.

9. Does the characteristic **“contains or has a potential to contain a hazardous atmosphere”** in the definition of “permit-required confined space” refer only to those atmospheres which pose an acute hazard?

Where employees are exposed to atmospheric or toxic hazards which do not present an immediate danger of death or disability that would render the employee unable to escape from the confined space e.g., air contaminants such as arsenic or asbestos) OSHA’s health standards for those hazards apply rather than 1910.146, and employees must be appropriately protected in accordance with those health standards. The PRCS standard is intended to protect entrants against short-term, acute hazards (not exposures at or below the permissible exposure limits); other standards address a broader range of health and safety concerns.

As noted in the definition of “hazardous atmosphere” relating to atmospheric concentration of any substance for which a dose or permissible exposure limit is published in Subparts “G” and “Z”, any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to health effects is not covered by the PRCS standard.

10. The definition of permit-required confined space contains the phrase **“any other recognized serious safety and health hazard”** as one of its hazard characteristics which would result in a confined space being classified as a permit space. Does the mere presence of a non-specified hazards such as physical hazards (e.g. grinding, agitators, steam, mulching, falling/tripping, other moving parts); corrosive chemical hazards; biological hazards; and other hazards (i.e. electrical, rodents, snakes, spiders, poor visibility, wind, weather, or insecure footing), which do not pose an immediate danger to life or health or impairment of an employee’s ability to escape from the space constitute a hazard which would invoke this characteristic?

**When a hazard in a confined space is immediately dangerous to life or health, the “permit space” classification is triggered.** The list referenced above is only illustrative of the general range of confined space hazards which could, but not necessarily always, constitute a hazard which would present an immediate danger to life or health, such that



“permit space” protection would be required. The determination of whether the resulting exposure to a hazard in a confined space will impair the employee’s ability to perform self-rescue is the aspect that must be addressed by the employer.

**In order for “serious safety and health hazard” to be recognized as being an impairment to escape, its severity potential for resulting physical harm to an employee must be considered.**

11. Does the mere presence of water in a confined space such as a manhole trigger the application of the PRCS standard in order to work in that space?

No

12. If the presence of water alone is not considered a hazard characteristic which would trigger the classification of a PRCS, what would?

As previously stated, the mere presence of water alone would not be a basis for applying the PRCS standard; there must be a quantity sufficient either to endanger the life of the entrant or to interfere with escape from the space. Water in combination with other hazards conditions could trigger the application of the permit space provisions of the PRCS standard. For example, a small quantity of water (perhaps as much as 2 to 3 inches deep) in the confined space may not trigger the PRCS classification; however, if the water conceals trip and fall hazards such as abandoned machine pads or floor holes and openings, the combination of these conditions may very well cause the confined space to be classified as a permit space.

**SECTION (c) – General Requirements**

1. Are employers covered by the PRCS standard in violation of paragraph (c)(1) of the standard if they have not evaluated their workplace to determine if any permit-required confined spaces?

**Yes.** As of the effective date of the standard (April 15, 1993), employers were required to evaluate their workplace to determine if any spaces were permit-required confined spaces. Employers who have not performed the evaluation would be in violation of paragraph (c)(1) unless the workplace does not and could not contain any confined spaces.

2. Can OSHA cite an employer for not documenting the initial evaluation of the workplace required by paragraph 1910.146(c)(1)?

The evaluation need not be documented. The employer, however, must be able to explain how the evaluation was conducted and describe the results. Thus, OSHA’s citation will be for failure to evaluate as required by the standard, rather than for failure to create a record of the evaluation.

3. Does the initial survey for determining if a confined space is a permit space, required by paragraph (c)(1), mandate a specific physical survey of each space?



Not necessarily; the survey requirement may be met through information is adequate to make the determination required by the standard. For example, a telecommunications company may have records which show that the hazards of all manholes in one section of the region can be addressed by the 1910.268(o) procedures and that the manholes in another section of the region may contain toxins due to ground water contamination. Only manholes in the latter section would need to be surveyed. This same approach can be used for any industry which has a number of identical spaces and records to support its determination(s).

**4. How will OSHA interpret the language in paragraph 1910.146(c)(2) requiring employers to inform employees of permit spaces by posting signs or “by any other equally effective means?”**

Ordinarily, information about permit spaces is most effectively and economically communicated through the use of signs. Consequently, signs would be the principal method of warning under the standard. Alternative methods, such as additional training, may be used where they are truly effective in warning all employees who could reasonably be expected to enter the space. It is the employer’s obligation to assure that an alternative method is at least as effective as a sign. In some cases, employers may have to provide training in addition to signs, to protect employees who do not speak English or who would have difficulty understanding or interpreting signs. (One method by which OSHA can gauge an employer’s effectiveness is through random interviews of affected employees.)

If a space has locked entry cover or panel, or an access door that can only be opened with special tools, the use of signs may be unnecessary if the employer ensures that all affected employees are informed about such spaces and know that they are not to be opened without taking proper precautions, including temporary signs, to restrict unexpected or unknowing entry.

**5. Upon deciding that no employee will enter a permit space, 1910.146(c)(3) requires that “... the employer shall take effective measures to prevent its employees from entering the permit spaces ...” What does OSHA consider “effective measures”?**

These measures could include permanently closing the space and physical barriers, as well as bolting and locking the space, supplemented by training employees and posting danger signs. The steps taken by the employer must be capable of preventing employees from entering permit spaces.

**6. How will an employer determine a “safe for entry” level for contaminants under the provisions of paragraph (c)(5)?**

**OSHA is willing to accept as the minimal “safe for entry” level, that which is 50% of the flammable or toxic substance that would constitute a hazardous atmosphere.**

The two examples footnoted on page 4488 of the preamble to the final rule are:

- The LFL for methane is a concentration of 5 percent by volume. Ten percent of this value is 0.5 percent, a concentration which would be considered hazardous by definition. Under the guideline the measured concentration of methane cannot exceed 0.25 percent after ventilation in order for the procedures specified in paragraph (c)(5)(ii) of the final rule to be acceptable.



- The 8-hour time weighted average PEL for chlorine, under Table Z-1, is 1.0 parts per million. This concentration of chlorine would be considered hazardous by the definition of “hazardous atmosphere”. Under the guideline, the measured concentration of chlorine cannot exceed 0.5 parts per million after ventilation in order for the procedures specified in paragraph (c)(5)(ii) of the final rule to be acceptable.
- Entry under (c)(5) would not be acceptable if hazards in the space quickly increased if the ventilation were to stop. Sufficient time must be available for an entrant to safely exit the space if the ventilation stops.

**7. What type of documentation will OSHA look for if an employer uses the alternate procedure of paragraph (c)(5)?**

The data must demonstrate that there are no non-atmospheric hazards and that the ventilation will keep the air inside the permit space safe for entry. This should include initial data in the form of:

- Volume of the space to be entered;
- Capacity and configuration of the ventilation equipment to be used;
- Identified atmospheric hazards and potential hazards;

The sampling results from routine testing of the space from the time ventilating has begun through final determination of acceptable entry conditions; and

- Atmospheric hazards created by work in the space.

**8. What is meant by the phrase “immediate area where an employee is or will be present within the space” as used in paragraph (c)(5)(ii)(E)(2)?**

The forced clean air ventilation must be directed to where the employee is working or will be working. If the space is so configured or so large that directed air cannot be delivered by local ventilation (such as fans and blowers), ducting the “clean” air is required.

NOTE: The exhaust discharge of contaminants from the permit space to areas adjacent to the permit space must not endanger the employees of the other work areas. Also, the supplied air ventilation for the permit space must not cause ventilation imbalances which would create hazards in the work area from which it is taken.

**9. How much periodic testing is required?**

The frequency of testing depends on the nature of the permit space and the results of the initial testing performed under paragraph (c)(5)(ii)(c).



The requirement in paragraph (c)(5)(ii)(F) for periodic testing as necessary to ensure the space is maintained within the limits of the acceptable entry conditions is critical. OSHA believes that all permit space atmospheres are dynamic due to variables such as temperature, pressure, physical characteristics of the material posing the atmospheric hazard, variable efficiency of ventilation equipment and air delivery system, etc.

The employer will have to determine and document on an individual permit space basis what the frequency of testing will be and under what conditions the verification testing will be done.

**10. What are the minimal credentials for the person authorized to certify the space safe for entry referred to in paragraph (c)(5)(ii)(H).**

**OSHA would consider as acceptable any employer representative who possesses a level of knowledge, training, and understanding of the specific permit space equal to that of an Entry Supervisor.**

**11. What does OSHA consider to be examples of changes in “use and configuration” which might increase the hazard to entrants and require reevaluation and reclassifying non-permit confined spaces under paragraph 1910.146(c)(6).**

Changes in “configuration” address physical changes in the space such as shape (adding or removal of inwardly converging floor), volume, equipment or components (addition or removal of a blender), means of access or egress.

Changes in “use” include changes in the function of the space, the contents or atmosphere created within it, the temperature and humidity, and the work practices being performed or anticipated in the space.

**12. What does the phrase “made available” mean in paragraphs (c)(5)(ii)(H) and (c)(7)(iii)?**

The certificate must be made available to employees entering the space so they can have the means to evaluate the measures taken for their protection. **This requirement can be satisfied either by providing each affected employee with a copy of the certificate or by posting the certificate so that each affected employee is able to inspect it.** In addition, the individual who prepared the certificate must be available to explain the measures taken to eliminate the hazards if any of the affected employees are reading-impaired or cannot understand the language in which the permit is written.

**13. What are the employer’s responsibilities in multi-employer permit space entries?**

Coordination between employers who have employees entering a particular permit space is required by 1910.146(c)(8)(iv), (c)(9)(ii) and (d)(11). The host employer who arranges for a permit space entry by contractor employees has a duty to instruct the contractor on the hazards or potential hazards and other factors that make the space a permit space.



The contractor who will have employees enter the permit space is responsible for obtaining that information prior to entry. All employers who will have employees in the permit space are responsible for developing and implementing procedures to coordinate entry operations (for example, determining operational control over the space, affected employee training, rescue, emergency services, and all other aspects of the standard requiring coordination). Any one of the employers having employees enter the permit space could have operational control over the permit space during dual entry. All parties (host employer and contractors) retain responsibility for the protection of their own employees even though all the employers have agreed to a specific permit space controlling employer. There should be absolutely no doubt, by any permit space entrant, attendant, and entry supervisor regarding who the controlling employer is and whose policy and permit space practices are to be followed.

**14. Does an employer who has permit spaces at his work site and had initially met its obligation under paragraph (c)(3), have to take additional measures when a contractor begins to alter a permit space?**

**Yes**, the host employer has a continuing obligation under the standard to prevent affected employees from entering permit spaces. Paragraphs (c)(8) and (c)(9) require coordination when both the host and contractor employees are in or near a permit space during entry operations. Only affected employees (those working in or who routinely pass through the work area) are required to be informed.

**15. What information about the present or previous contents of the permit space must be provided to the contractor before its employees enter?**

At a minimum, the applicable Material Safety Data Sheet (MSDS) or hazard information on the contents, coatings or liners, potential hazardous atmospheres, sampling data base, and residue(s) found or anticipated in the permit space. All information generated in the original evaluation of the permit space must also be provided.

**16. Are simple alarm devices considered to be the “direct reading instruments” referenced in paragraph (c)(5).**

**No**, simple “alarm only” devices which do not provide readings, are not considered acceptable direct reading instruments, for either initial (pre-entry) or periodic (assurance) testing of a “(c)(5)” space since they do not provide enough information relative to the established acceptable entry conditions which is essential to the entrants knowledge. Combination units which have a meter or display which reflect the actual concentrations and a preset alarm feature would be acceptable and possibly desirable because they provide “real time” information on actual concentrations as well as the benefit of automatic (unattended) alarming at a predetermined value.

**17. What does OSHA accept as a “calibrated” direct reading instrument required by paragraph (c)(5)(ii)(c) for entrants to test the atmosphere for permit space entry?**

A testing instrument calibrated in accordance with the manufacturer’s recommendations meets this requirement. The best way for an employer to verify calibration is through documentation.



18. Are the examples explaining physical hazards and their relationship to paragraph (c)(7) in the preamble at 58 Fed. Reg. 4490-4491 and note 15 of instances in which hazards will be deemed eliminated from permit-required confined spaces by compliance with 29 CFR 1910.147 and 1910.303 exclusive?

**No.** The principle embodied in the preamble that **hazards will be deemed removed from permit-required confined spaces by compliance with existing standards, applies to any standard that eliminates the hazard.**

19. How long can a space reclassified remain a non-permit confined space?

Once a space has been reclassified as a non-PRCS, it remains reclassified as long as all hazards remain eliminated. The basis for determining that all the hazards have been eliminated and thus can be reclassified must be documented. The documentation required must be kept until entry operations have been completed.

#### SECTION **(d)- Permit Space Entry Program**

1. **Continuous monitoring is required by 1910.146(d)(5)(i) in the areas where the authorized entrants will be working when the employer allows entry without pre-entry determination of acceptable entry conditions for spaces and where isolation is infeasible because the space is large or part of a continuous system such as a sewer system. Does each entrant have to be monitored individually or can an area monitor be used?**

An area monitor could be used where small groups (two or three employees) work together in close proximity as long as the monitor can measure hazards encountered by the employees. However, all the entrants must remain together as a group for the entire entry procedure.

2. **What does testing or monitoring “as necessary” mean as required by 1910.146(d)(5)(ii) to decide if the acceptable entry conditions are being maintained?**

The standard does not have specific frequency rates because of the performance oriented nature of the standard and the unique hazards of each permit space. However, there will always be, to some degree, testing or monitoring during entry operations which is reflective of the atmospheric hazard. **The employer must determine the degree and the frequency of testing or monitoring. Some of the factors that affect frequency are:**

- Results of test allowing entry.
- The regularity of entry (daily, weekly, or monthly).
- The uniformity of the permit space (the extent to which the configuration, use, and contents vary).
- The documented history of previous monitoring activities.



**3. Knowledge of the hazards which affect the permit space as well as the historical experience gained from monitoring results of previous entries.**

Knowledge and recorded data gained from successive entries (such as ventilation required to maintain acceptable entry conditions) may be used to document changes in the frequency of monitoring.

**4. Are the results of the air sampling and exposure monitoring required by this standard considered exposure records for purposes of 29 C.F.R. 1910.1020 (c)(5) OSHA's Record Access rule?**

Those results which show the composition of an atmosphere to which an employee is actually exposed (even if the employee is using a respirator) are exposure records under 29 C.F.R. 1910.1020(c)(5). Conversely, if the employer determines as the result of initial air sampling not to allow entry into a confined space until additional ventilation and purging of the atmosphere has occurred, the sample would not be considered as exposure record because no employee would ever have been exposed to the atmosphere sampled. Once the employer takes corrective action so that an employee can enter, however, the results of subsequent air sampling that show the atmosphere the employee actually entered would be considered exposure records.

**SECTION (h) Duties of Authorized Entrants**

- Can an employee be both an Entry Supervisor and Authorized Entrant for an entry?

The standard allows an employee to be both an entry supervisor and entrant as long as the employee has had the appropriate training and the duties of one activity do not conflict with the duties of the other.

**SECTION (i) Duties of Attendants**

- When a single attendant is monitoring more than one permit space, is there a limit on how far the attendant can be from any of the spaces monitored?

The bench mark for monitoring multiple permit spaces by a single attendant is his/her ability to perform all their (attendant) duties without compromising the safety of any entrants in all the permit spaces being monitored by the attendant. There is no minimum proximity requirement.

**SECTION (j) – Duties of Entry Supervisor(s)**

- **Does an employer have to verify the availability of the off-site rescue service each time a permit space entry is scheduled or attempted?**



**Yes**, the employer has overall responsibility for employee safety. **If the off-site rescue service indicates, for any reason, that it would be unable to respond to a rescue summons, entry shall not be authorized unless an adequate alternative rescue service is arranged.**

## SECTION **(k)- Rescue Service**

### 1. **Does an off-site rescue service have to have a permit space program?**

**No** - a complete program is not necessary; however, **rescue plans and procedures are necessary**. Rescue services (on-site and off-site) are required by paragraph (k) to have members who are trained, equipped, and practiced for safe entry into the particular permit spaces from which they will be expected to rescue entrants.

### 2. **What is OSHA policy on “horizontal” non-entry rescue?**

When practical, non-entry rescue is required by paragraph (k)(3) of the standard and is the preferred method of rescue, even for horizontal entries. OSHA recognizes that the danger of entanglement due to lifelines or lanyards snagging or obstructions within a permit space may be greater for horizontal permit spaces than for vertical spaces.

### 3. **Would a rescuer entering an Immediately Dangerous to Life and Health (IDLH) atmosphere using a supplied-air respirator in combination with SCBA (escape bottle), be in violation of OSHA regulations?**

**Yes** - however, under the conditions addressed below, the violation can be considered as de minimis.

The PRCS standard because of its performance nature does not specify the personal protective or rescue equipment necessary for rescue. The OSHA standard for respiratory protection is 1910.134. **Currently paragraph 1910.134(e)(3)(iii) requires, when an IDLH atmosphere exists, .... A standby man or men with suitable self-contained breathing apparatus shall be at the nearest fresh air base for emergency rescue.**

The 1910.134 standard published in the June 27, 1974 issue of the Federal Register was derived from a now out-of-date voluntary standard (ANSI consensus standard Z88.2-1969). The most recent (1992) version of this same ANSI standard for respiratory protection for working in IDLH conditions has been changed. The new change specifies either a SCBA or a combination supplied-air respirator with SCBA for IDLH conditions.



It is OSHA policy to accept compliance with a provision in a current national consensus standard (ANSI) which provides an equivalent or greater level of protection from the hazards.

A rescue service can employ the use of supplied-air respirators in combination with self-contained breathing apparatus (SCBA) when conducting rescue operations. If a rescue service employer chooses to use combination supplied-air respirator with SCBA over the SCBA specified in the respiratory protection standard 1910.134(e)(3)(iii), for permit-required confined space rescue, the violation will be considered as de minimis as long as the following minimum conditions are also employed:

1. An evaluation of the permit space to be entered has been done to determine which appropriate respiratory protection (SCBA or Supplied-air with SCBA) is best suited for the rescue.
2. The rescuer's respirators and air source meet the requirements of the 1910.134 standard.
3. The air source for the rescuer's respiratory protection is independent from that which is being used by the authorized entrants.



## **1910.146 Permit Required Confined Space “Program” Checklist**

### **(b)Definitions.**

“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.

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

(c)(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.

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

<b>Description of Requirement:</b>	<b>Yes</b>	<b>No</b>	<b>Inc.</b>
1. Implement the measures necessary to prevent unauthorized entry			
2. Identify & evaluate hazards of permit spaces before employees entered			
3. Develop & implement the means, procedures, and practices necessary for safe permit space entry			
4. Specify acceptable entry conditions			
5. Provide opportunity to observe any monitoring or testing of permit spaces			
6. Isolating the permit space			
7. Purging, inerting, flushing, or ventilating the permit space to eliminate or control atmospheric hazards			
8. Provide barriers as necessary to protect entrants from external hazards			
9. Verifying that conditions are acceptable for entry throughout the duration of an authorized entry.			
10. <b>Provide equipment at no cost to employees, maintain that equipment properly, and ensure that employees use that equipment properly:</b> Such as: 1.)Testing and monitoring equipment 2.)Ventilating equipment 3.) Communications equipment 4.) Lighting equipment 5.) Personal protective equipment 6.) Barriers and shields 7.) Equipment, such as ladders, needed for safe ingress and egress 8.) Rescue and emergency equipment 9.) Any other equipment necessary for safe entry into and rescue from permit spaces.			



11. Evaluate permit space conditions for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors			
12. Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations			
13. Designate the persons who are to have active roles (authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere), identify the duties of each such employee, and provide each such employee with the training required			
14. Develop & implement procedures for summoning rescue & emergency services			
15. Develop & implement procedures for preventing unauthorized personnel from attempting a rescue			
16. Develop & implement a system for the preparation, issuance, use, and cancellation of entry permits			
17. Develop & implement procedures necessary for concluding the entry after entry operations have been completed			
18. 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			
19. Review the permit space program, using the canceled permits retained 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			





## REPORTED OCCUPATIONAL FATALITIES IN UAW REPRESENTED WORKPLACES 2007

1. **January 16, 2007 – James Bains: 64** years old; Electrician; 6 years seniority; **CC Metal and Alloys**; Calvert City, Kentucky; **LU 523, Region 3**. The victim was found mortally injured near the base of a manlift vertical conveyor used to travel up and down 4 levels of an electric arc furnace. He had apparently fallen while descending on the manlift. The victim had been assigned to change light bulbs at the top of the eight story furnace and was working alone at the time of the incident. The victim fell from the 8<sup>th</sup> floor to 4<sup>th</sup> floor, a distance of approximately 66 feet.
2. **February 2, 2007 – Francisco Fraticelli: 59** years old; Core Tech/Utility; 32 years seniority; **Ford Motor Company – Cleveland Casting Plant**; Brook Park, Ohio; **LU 1250, Region 2B**. The victim was found lying face down inside a core machine. He had relieved the regular operator approximately 20 minutes earlier. There were no witnesses to the incident and it is unclear why the victim entered the machine. Core machine operators routinely perform tasks in this area and it appeared that a perimeter barrier (railing) had been removed to gain access. The victim was working alone at the time of the incident.
3. **February 12, 2007 – Michael Tiller: 51** years old; Electrician; 32 years seniority; **DaimlerChrysler – Toledo North Assembly**; Toledo, Ohio; **LU 12, Region 2B**. The victim was found lying on the roller bed of a Hydra-Handler battery changing truck, fatally injured, with his arm pinned in the battery washer door. He was assigned to change, charge and maintain batteries for powered industrial vehicles at the facility. There were no witnesses to the incident and it is unclear why the victim was on the roller bed in front of the battery washer. The victim was working alone at the time of the incident. Initial investigation indicates the washer door may have mis-cycled and closed on the victim's arm causing him to fall to the roller bed.
4. **April 21, 2007 - Anthony J. Dier: 64** years old; Mechanic; 35 years seniority; **Kohler Company**; Kohler, Wisconsin; **LU 833, Region 4**. The victim and another mechanic were assigned to disassemble the lid of an electric arc furnace, which included a shaft and yoke assembly, and remove it from the building. After disassembly, the mechanics moved the lid by fork truck to a second story access door and dropped it to the yard below. They could not separate the yoke and shaft as planned so a decision was made to move it in one piece. At this point, the second mechanic went down to the first floor. It is likely the victim used a fork truck to move the shaft and yoke assembly to the second story access door and attempted to transfer it to the yard using a 10 ton, pendulum controlled, overhead crane located nearby. The shaft and yoke assembly apparently fell, striking the victim in the head and pinning him to the floor. The victim was working alone at the time of the incident.



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## REPORTED OCCUPATIONAL FATALITIES IN UAW REPRESENTED WORKPLACES 2007

5. **September 13, 2007- Neil McMichael: 61** years old; Machine Operator; 43 years seniority; PPG Incorporated; Crestline, OH; **LU (not assigned - newly organized); Region 2-B**. Victim was crushed and killed when he was caught in a glass washing machine while un-jamming glass from the machines roller conveyor.
  
6. **September 22, 2007- Jon Kelley Wright: 48** years old; Machine Operator; 21 year seniority; Chrysler Corporation-Kokomo Transmission: Kokomo, IN; **LU 1166, Region 3**. The victim was working on Die Cast Machine 403 making visual checks of parts and removing overflows and flash from bell housings at the time of the incident. At approximately 2 am. he notified his supervisor of problems with an ejector limit switch which he had tightened a bolt on earlier in the shift. He further stated if the bolt came loose again skilled trades would need to be called. A co-worker found the victim in the machine near the ejector limit switch at approximately 5 am. fatally injured. He had apparently entered the machine through an access door equipped with a basic safety interlock. He was crushed between the slide and die block when the machine cycled.
  
7. **December 7, 2007 – Jesse A. Brown II: 40** years old; Production, 18 years seniority; Federal Mogul Corporation, Powertrain Energy Systems; Sparta MI; **LU 8, Region 1D**. The victim, assigned to the shakeout job on #6 Line, was found shortly after the start of overtime with his body pinned across the shoulder and chest by the hydraulic powered lid of a shot blast machine. No fixed guarding or presence sensing devices safeguard this area. The equipment, found in the automatic mode, allows the lid, weighing approximately 1000 lbs., to close automatically on a time delay. A plastic insert designed to prevent smaller parts from falling through openings onto the shakeout conveyor may not have been in place at the time of the incident. The victim was apparently reaching down into the machine to collect parts that had fallen onto the shakeout conveyor when the lid came down and crushed him.



## REPORTED OCCUPATIONAL FATALITIES IN UAW REPRESENTED WORKPLACES 2008

5. **January 8, 2008 – William D. LaVanway** (died 2-4-08): **54** years old; Electrician; 14 years seniority; **Robert Bosch Corp. Chassis Systems**; St. Joseph, Michigan; **LU 383, Region 1D**. The victim was assigned to investigate a “hot spot” found by thermograph scans on a power distribution panelboard in Dept. 48. He was working on a fusible switch bucket to determine the problem in the fuse block. The victim followed established procedures placing the disconnect switch in the off position prior to opening the bucket door and tested to verify power was off to both the load side and line side of the fuse block. The fusible switch bucket is an older design which does not have visible switch blades for positive identification of their position. He was using a screw driver to demonstrate to his supervisor that the fuse clip had good compression and was not loose when an arc fault explosion occurred.
  
6. **February 20, 2008 – David Wentz**: **38** years old; Maintenance Mechanic: 11 years seniority; **AK Steel Coshocton Works**; Coshocton, Ohio; **LU 3462, Region 2B**. The victim was assigned to check torque on a nut in the fan assembly at the base of a bell furnace prior to the loading of coiled flat steel. The bell furnace base is located in an 11 foot deep pit. This task had become necessary before each load cycle because preventive maintenance resources have been reduced. Also, prior to the reductions two Maintenance Mechanics were assigned to perform this task. As the victim bent over tightening the bolt, an overhead trolley crane positioned and lowered a 17 ton roll of steel on to the base, crushing him. The victim was working alone at the time of the incident.
  
7. **March 13, 2008 – Hiram Torres**: **61** years old; Warehouse Worker; 9 years seniority; **Jose Santiago**; Catano, Puerto Rico; **LU 3401, Region 9A**. The victim was assigned as a helper to deliver food products and materials to a second floor cafeteria at a customer location. His normal job was in the warehouse and he was filling in for the regular worker that day. The driver and victim unloaded material from the delivery truck, placed it on a powered lift platform using a two-wheeled hand truck, closed the lift doors and activated the lift. Both workers walked to the second floor and opened the lift doors to unload materials. The victim stepped onto the lift platform to position himself behind the hand truck and fell through an unguarded 28” x 78” opening between the lift platform and the back wall. The second floor area has poor lighting and this was both workers first time delivering to this location.



8. **May 9, 2008 – Luis Ruiz Otero:** 37 years old; Road Worker; 4 years seniority; **Department of Transportation and Public Works (DTOP);** Yauco, Puerto Rico; **Local 2341, Region 9A.** The victim was working on an asphalt patching crew in the left lane of eastbound PR-2 when he and another worker were struck by a car. He sustained a skull fracture at the scene and died as a result of his injuries. Highway PR-2 is a 4-lane divided highway separated by a guard rail on a narrow median. Initial investigation revealed the work zone safety plan was inadequate. The work zone was condensed, traffic control devices such as barricades and barriers were not in use and DTOP workers assigned to roadway operations received little or no training.
  
9. **May 22, 2008 – Abel J. Gonzales** (died 6-6-08): 55 years old; Truck Driver 300; 7 years seniority; **City of Lansing;** Lansing, MI: **Local 2256, Region 1C.** The victim was assigned to drive a tandem-axle dump truck to remove material from a 'dig-down' site on a public roadway. When he arrived at the site, another dump truck (single-axle) was present in the work zone. The dump trucks had to back up to the 'dig-down' site one at a time to be loaded. The route through the work zone to the loading location was curved and slightly up hill. The victim had difficulty maneuvering the truck backwards up the route and was unable to reach the loading location. He normally drove a smaller, single-axle, dump truck. The job site supervisor instructed the drivers to switch trucks. The drivers parked the trucks side by side near the entrance to the work zone and in position to back up to the loading site. The victim gathered personal items, exited his truck and walked around behind both trucks as they switched. As he passed behind the second truck he was switching to, witnesses observed him drop some papers which blew behind the vehicle he just left. As he went to retrieve the papers, the other truck, which had just started to back up, struck him and knocked him to the ground.
  
10. **July 23, 2008 – Frederick A. Todd:** 39 years old; Die Setter; 19 years seniority; **Ford Woodhaven Stamping;** Trenton, MI; **Local 387, Region 1A.** The victim and other maintenance workers were preparing four dies for placement into a transfer press. The dies are moved using transfer bolsters. The transfer bolster in use was positioned in a staging area near the press doors, and parallel to a second transfer bolster. The transfer bolsters are air driven and controlled by a two-button pendant with directional movement set by three air valves. The pendant had been set down on the bolster work platform. The victim walked on the platform path (approximately 1' wide) between the two transfer bolsters to the air supply valve located 14-feet away. He turned the valve, located between the bolsters, to the on position. The transfer bolster he was working on unexpectedly moved toward the second, stationary bolster trapping the victim. He died of crushing injuries when he was caught between the pillars of the two transfer bolsters.



## REPORTED OCCUPATIONAL FATALITIES IN UAW REPRESENTED WORKPLACES 2009

1. **May 20, 2009 – Jeff Malins: 51** years old; Toolmaker; 7 years seniority; **Detroit Diesel Corp.**; Redford, Michigan; **LU 163, Region 1A**. The victim was working inside a machine, assisting two other toolmakers un-jamming a parts feeder, when the machine cycled, striking and trapping his head. The machine was not locked out and an access gate equipped with an interlock device was open. The interlock device was bypassed with a “cheat key” (actuator). The use of “cheat keys” to bypass interlock devices was a common, well known and accepted practice in this facility.
2. **December 26, 2009 - Ron Cassidy - Pipefitter – Ford**; Louisville, KY; **Local 862, Region 3** Final Assembly at KTP was killed this morning when struck by an 11 foot piece of I beam. A team was in the process of removing the piece of I beam from the ceiling. Cassidy who was on the ground spotting was struck when the final cut was made and the beam slid off the lift.



## REPORTED OCCUPATIONAL FATALITIES IN UAW REPRESENTED WORKPLACES 2010

1. **March 19, 2010 – Roger Brooner: 58** years old; Maintenance Mechanic; 3 years seniority (30 year diesel mechanic) ; **Spirit AeroSystems**; Tulsa, Oklahoma; **LU 952, Region 5**. The victim was working on a semi-tractor outside the maintenance shop when the vehicle went into motion striking and trapping him underneath. The vehicle was being serviced for a leak in the air system and the victim had finished replacing the “air brake DOT” fitting just prior to the fatal incident. The final step in repair is to charge the air system by starting the vehicle and letting it run for a short time; turning the truck off and listening for air leaks. It appears the truck did not start properly and the victim used a battery booster in an attempt to jump-start the engine. At some point the victim was either standing just in front of or positioned laying under the truck as it took off dragging him approximately three hundred feet. The vehicle was chocked and the victim was working alone at the time of the incident.



**March 7, 2002 – John Aue; 52 years old; Millwright (S/T); 32 years seniority; Federal Mogul; Sparta, MI; LU 8, Region 1D.** The victim was checking for leaking bags in an unlighted dust collector with an ultraviolet (black) light, when he fell 30 feet down an unguarded 60-inch clean air duct.



## The Hierarchy of Health & Safety Controls

A heated debate often occurs between labor and management in the health and safety arena that is sometimes referred to as the “Do we fix the workplace or the worker?” issue.

Management’s tendency, given its focus on workers’ behavior and short-term cost reduction, is to argue for ‘fixing the worker’ solutions: protective gear and discipline for failure to follow procedures. The Union considers this to be “blaming the victim” and advocates for solutions that ‘fix the workplace.’

Research indicates that the latter approach is actually more effective and less expensive in the long run. One reason is that human behavior can never be completely regulated and controlled, so solutions based on compliance with procedures will always lead to mishaps. Machine controls and replacement of hazardous materials are much more capable of guaranteeing safety and health. The UAW’s and OSHA’s analysis of control effectiveness is captured in the graph below.

<b>MOST EFFECTIVE</b>	1. Elimination or Substitution	<ul style="list-style-type: none"> <li>• substitute for hazardous material</li> <li>• change process to eliminate noise</li> <li>• perform task at ground level</li> <li>• automated material handling</li> </ul>
↓	2. Engineering Controls	<ul style="list-style-type: none"> <li>• ventilation systems</li> <li>• machine guarding</li> <li>• sound enclosures</li> <li>• circuit breakers</li> <li>• platforms and guard railing</li> <li>• interlocks</li> <li>• lift tables, conveyors, balancers</li> </ul>
↓	3. Warnings	<ul style="list-style-type: none"> <li>• computer warnings</li> <li>• odor in natural gas</li> <li>• signs</li> <li>• back-up alarms</li> <li>• beepers</li> <li>• horns</li> <li>• labels</li> </ul>
↓	4. Training & Procedures	<ul style="list-style-type: none"> <li>• Safe job procedures</li> <li>• Safety equipment inspections</li> <li>• Hazard Communications Training</li> <li>• Safe Lifting Training</li> <li>• Lock-out</li> <li>• Confined Space Entry, etc...</li> </ul>
<b>LEAST EFFECTIVE</b>	5. Personal Protective Equipment	<ul style="list-style-type: none"> <li>• safety glasses</li> <li>• ear plugs</li> <li>• face shields</li> <li>• safety harnesses and lanyards</li> <li>• knee pads</li> </ul>

**What is the “best” possible solution?**

1. What could we do if a gauge was in a PRCS that required entry to check? \_\_\_\_\_
2. Entry required to empty a bucket of leaking hydraulic fluid daily, what could you do? \_\_\_\_\_
3. Repair something that has broken in a PRCS, what could you do? \_\_\_\_\_



## Developing a One Year Plan

List some issues that you have identified during the training with your PRCS Program. Think about the time frame that may be needed to address them. List objectives for the next year that your group would like to address.

### Example:

<b><u>Month # 1</u></b> Inspect all PRCS Equipment & Meet with Rescue Team or Service	<b><u>Month # 2</u></b> Purchase/Replace Missing or Worn out Equipment	<b><u>Month # 3</u></b> Review current PRCS Program (Including Permit)	<b><u>Month # 4</u></b>	<b><u>Month # 5</u></b> Develop Entry Procedures for All PRCS	<b><u>Month # 6</u></b>
<b><u>Month # 7</u></b>	<b><u>Month # 8</u></b>	<b><u>Month # 9</u></b> Review all Permits from Entries for Any issues that may have arisen	<b><u>Month # 10</u></b>	<b><u>Month # 11</u></b>	<b><u>Month # 12</u></b> Refresher/Update Training for all Entrants, Attendants, Entry Supervisors and Rescue

### Your Plan for the next year:

<b><u>Month # 1</u></b>	<b><u>Month # 2</u></b>	<b><u>Month # 3</u></b>	<b><u>Month # 4</u></b>	<b><u>Month # 5</u></b>	<b><u>Month # 6</u></b>
<b><u>Month # 7</u></b>	<b><u>Month # 8</u></b>	<b><u>Month # 9</u></b>	<b><u>Month # 10</u></b>	<b><u>Month # 11</u></b>	<b><u>Month # 12</u></b>



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**Introduction**

Many workplaces contain spaces that are considered to be "confined" because their configurations hinder the activities of employees who must enter into, work in or exit from them. In many instances, employees who work in confined spaces also face increased risk of exposure to serious physical injury from hazards such as entrapment, engulfment and hazardous atmospheric conditions. Confinement itself may pose entrapment hazards and work in confined spaces may keep employees closer to hazards such as machinery components than they would be otherwise. For example, confinement, limited access and restricted airflow can result in hazardous conditions that would not normally arise in an open workplace.

The terms "permit-required confined space" and "permit space" refer to spaces that meet OSHA's definition of a "confined space" and contain health or safety hazards. For this reason, OSHA requires workers to have a permit to enter these spaces. Throughout this publication, the term "permit space" will be used to describe a "permit-required confined space."

**Definitions**

By definition, a **confined space**:

- Is large enough for an employee to enter fully and perform assigned work;
- Is not designed for continuous occupancy by the employee; and
- Has a limited or restricted means of entry or exit.

These spaces may include underground vaults, tanks, storage bins, pits and diked areas, vessels, silos and other similar areas.

By definition, a **permit-required confined space** has one or more of these characteristics:

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



- Contains a material with the potential to engulf someone who enters the space;
- Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; and/or
- Contains any other recognized serious safety or health hazards.

### **OSHA's Confined Space Standard**

OSHA's standard for confined spaces (29 CFR 1910.146) contains the requirements for practices and procedures to protect employees in general industry from the hazards of entering permit spaces.

Employers in general industry must evaluate their workplaces to determine if spaces are permit spaces. (See flow chart, page 5.) If a workplace contains permit spaces, the employer must inform exposed employees of their existence, location and the hazards they pose. This can be done by posting danger signs such as "DANGER -- PERMIT-REQUIRED CONFINED SPACE -- AUTHORIZED ENTRANTS ONLY" or using an equally effective means.

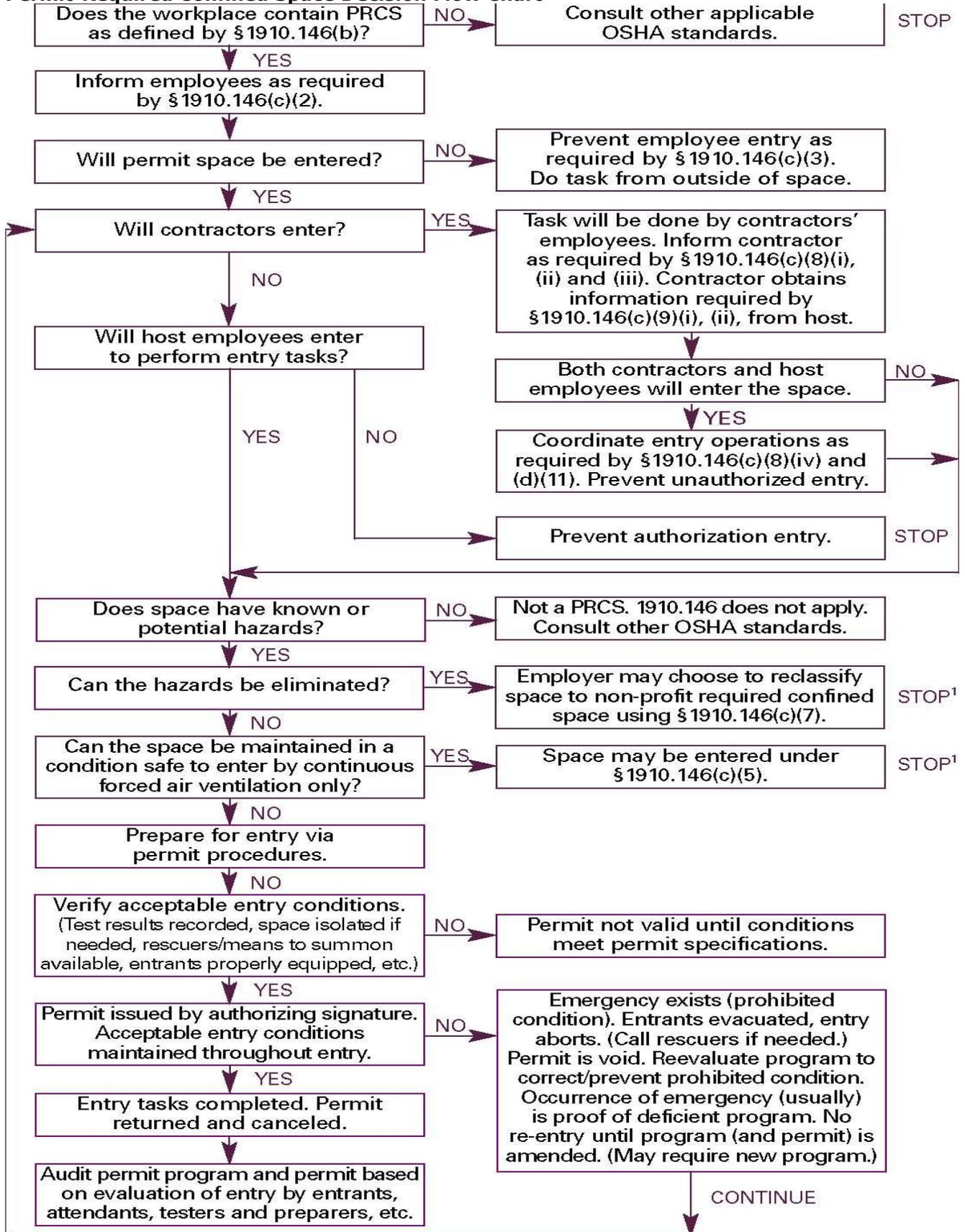
If employees are not to enter and work in permit spaces, employers must take effective measures to prevent them from entering these spaces. If employees are expected to enter permit spaces, the employer must develop a written permit space program and make it available to employees or their representatives.

### **Alternative to a full permit entry**

Under certain conditions described in the standard, the employer may use alternate procedures for worker entry into a permit space. For example, if an employer can demonstrate with monitoring and inspection data that the only hazard is an actual or potential hazardous atmosphere that can be made safe for entry using continuous forced air ventilation, the employer may be exempted from some requirements, such as permits and attendants. However, even in these circumstances, the employer must test the internal atmosphere of the space for oxygen content, flammable gases and vapors, and the potential for toxic air contaminants before any employee enters it. The employer must also provide continuous ventilation and verify that the required measurements are performed before entry.



**Permit-Required Confined Space Decision Flow Chart**





## Written Programs

Any employer who allows employee entry into a permit space must develop and implement a written program for the space. Among other things, the OSHA standard requires the employer's written program to:

- Implement necessary measures to prevent unauthorized entry;
- Identify and evaluate permit space hazards before allowing employee entry;
- Test atmospheric conditions in the permit space before entry operations and monitor the space during entry;
- Perform appropriate testing for the following atmospheric hazards in this sequence: oxygen, combustible gases or vapors, and toxic gases or vapors;
- Establish and implement the means, procedures and practices to eliminate or control hazards necessary for safe permit space entry operations;
- Identify employee job duties;
- Provide and maintain, at no cost to the employee, personal protective equipment and any other equipment necessary for safe entry and require employees to use it;
- Ensure that at least one attendant is stationed outside the permit space for the duration of entry operations;
- Coordinate entry operations when employees of more than one employer are working in the permit space;
- Implement appropriate procedures for summoning rescue and emergency services, and preventing unauthorized personnel from attempting rescue;
- Establish, in writing, and implement a system for the preparation, issue, use and cancellation of entry permits;
- Review established entry operations annually and revise the permit space entry program as necessary; and
- Implement the procedures that any attendant who is required to monitor multiple spaces will follow during an emergency in one or more of those spaces.

## Controlling Hazards

The employer's written program should establish the means, procedures and practices to eliminate or control hazards necessary for safe permit space entry operations. These may include:

- Specifying acceptable entry conditions;
- Isolating the permit space;
- Providing barriers;
- Verifying acceptable entry conditions; and
- Purging, making inert, flushing or ventilating the permit space.



## Equipment for safe entry

In addition to personal protective equipment, other equipment that employees may require for safe entry into a permit space includes:

- Testing, monitoring, ventilating, communications and lighting equipment;
- Barriers and shields;
- Ladders; and
- Retrieval devices.

## Detection of hazardous conditions

If hazardous conditions are detected during entry, employees must immediately leave the space. The employer must evaluate the space to determine the cause of the hazardous atmosphere and modify the program as necessary.

When entry to permit spaces is prohibited, the employer must take effective measures to prevent unauthorized entry. Non-permit confined spaces must be evaluated when changes occur in their use or configuration and, where appropriate, must be reclassified as permit spaces.

A space with no potential to have atmospheric hazards may be classified as a non-permit confined space only when all hazards are eliminated in accordance with the standard. If entry is required to eliminate hazards and obtain data, the employer must follow specific procedures in the standard.

## Informing Contract Employees

Employers must inform any contractors whom they hire to enter permit spaces about:

- The permit spaces and permit space entry requirements;
- Any identified hazards;
- The employer's experience with the space, such as knowledge of hazardous conditions; and
- Precautions or procedures to be followed when in or near permit spaces.

When employees of more than one employer are conducting entry operations, the affected employers must coordinate entry operations to ensure that affected employees are appropriately protected from permit space hazards. The employer also must give contractors any other pertinent information regarding hazards and operations in permit spaces and be debriefed at the conclusion of entry operations.

## Entry Permits

A permit, signed by the entry supervisor, must be posted at all entrances or otherwise made available to entrants before they enter a permit space. The permit must verify that pre-entry preparations outlined in the standard have been completed. The duration of entry permits must not exceed the time required to complete an assignment.

Entry permits must include:



- Name of permit space to be entered, authorized entrant(s), eligible attendants and individuals authorized to be entry supervisors;
- Test results;
- Tester's initials or signature;
- Name and signature of supervisor who authorizes entry;
- Purpose of entry and known space hazards;
- Measures to be taken to isolate permit spaces and to eliminate or control space hazards;
- Name and telephone numbers of rescue and emergency services and means to be used to contact them;
- Date and authorized duration of entry;
- Acceptable entry conditions;
- Communication procedures and equipment to maintain contact during entry;
- Additional permits, such as for hot work, that have been issued authorizing work in the permit space;
- Special equipment and procedures, including personal protective equipment and alarm systems; and
- Any other information needed to ensure employee safety.

### **Cancelled entry permits**

The entry supervisor must cancel entry permits when an assignment is completed or when new conditions exist. New conditions must be noted on the canceled permit and used in revising the permit space program. The standard requires that the employer keep all canceled entry permits for at least one year.

### **Worker Training**

Before the initial work assignment begins, the employer must provide proper training for all workers who are required to work in permit spaces. After the training, employers must ensure that the employees have acquired the understanding, knowledge and skills necessary to safely perform their duties. Additional training is required when:

- The job duties change;
- A change occurs in the permit space program or the permit space operation presents any new hazard; and
- An employee's job performance shows deficiencies. In addition to this training, rescue team members also require training in CPR and first aid. Employers must certify that this training has been provided.

After completion of training, the employer must keep a record of employee training and make it available for inspection by employees and their authorized representatives. The record must include the employee's name, the trainer's signature or initials and dates of the training.



## Assigned Duties

### Authorized entrant

Authorized entrants are required to:

- Know space hazards, including information on the means of exposure such as inhalation or dermal absorption, signs of symptoms and consequences of the exposure;
- Use appropriate personal protective equipment properly;
- Maintain communication with attendants as necessary to enable them to monitor the entrant's status and alert the entrant to evacuate when necessary;
- Exit from the permit space as soon as possible when:
  - Ordered by the authorized person;
  - He or she recognizes the warning signs or symptoms of exposure;
  - A prohibited condition exists; or
  - An automatic alarm is activated.
- Alert the attendant when a prohibited condition exists or when warning signs or symptoms of exposure exist.

### Attendant

The attendant is required to:

- Remain outside the permit space during entry operations unless relieved by another authorized attendant;
- Perform non-entry rescues when specified by the employer's rescue procedure;
- Know existing and potential hazards, including information on the mode of exposure, signs or symptoms, consequences and physiological effects;
- Maintain communication with and keep an accurate account of those workers entering the permit space;
- Order evacuation of the permit space when:
  - A prohibited condition exists;
  - A worker shows signs of physiological effects of hazard exposure;
  - An emergency outside the confined space exists; and
  - The attendant cannot effectively and safely perform required duties.
- Summon rescue and other services during an emergency;
- Ensure that unauthorized people stay away from permit spaces or exit immediately if they have entered the permit space;



- Inform authorized entrants and the entry supervisor if any unauthorized person enters the permit space; and
- Perform no other duties that interfere with the attendant's primary duties.

### **Entry supervisor**

Entry supervisors are required to:

- Know space hazards including information on the mode of exposure, signs or symptoms and consequences;
- Verify emergency plans and specified entry conditions such as permits, tests, procedures and equipment before allowing entry; Terminate entry and cancel permits when entry operations are completed or if a new condition exists;
- Verify that rescue services are available and that the means for summoning them are operable;
- Take appropriate measures to remove unauthorized entrants; and
- Ensure that entry operations remain consistent with the entry permit and that acceptable entry conditions are maintained.

### **Emergencies**

#### **Rescue service personnel**

The standard requires employers to ensure that responders are capable of responding to an emergency in a timely manner. Employers must provide rescue service personnel with personal protective and rescue equipment, including respirators, and training in how to use it. Rescue service personnel also must receive the authorized entrants training and be trained to perform assigned rescue duties.

The standard also requires that all rescuers be trained in first aid and CPR. At a minimum, one rescue team member must be currently certified in first aid and CPR. Employers must ensure that practice rescue exercises are performed yearly and that rescue services are provided access to permit spaces so they can practice rescue operations. Rescuers also must be informed of the hazards of the permit space.

#### **Harnesses and retrieval lines**

Authorized entrants who enter a permit space must wear a chest or full body harness with a retrieval line attached to the center of their backs near shoulder level or above their heads. Wristlets may be used if the employer can demonstrate that the use of a chest or full body harness is not feasible or creates a greater hazard.

Also, the employer must ensure that the other end of the retrieval line is attached to a mechanical device or a fixed point outside the permit space. A mechanical device must be available to retrieve someone from vertical type permit spaces more than five feet (1.524 meters) deep.

#### **MSDS**

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 other written information must be made available to the medical facility personnel treating the exposed entrant.



## UAW CONFINED SPACE FATALITIES & CASES HISTORIES

- 09/23/74      Louisville, Kentucky (International Harvester)  
**Two dead, five overcome** – carbon monoxide in foundry cupola.
- 04/04/75      Flint, Michigan (General Motors Corp. – Buick Div.)  
**Three overcome** – carbon monoxide in foundry cupola.
- 04/06/77      Willow Run, Michigan (General Motors Corp. – Hydra-Matic Division)  
**Two dead, twenty overcome** – solvent vapors in press pit.
- 10/23/77      Pontiac, Michigan (General Motors Corp. – Pontiac Div.)  
**Eleven overcome** – carbon monoxide in foundry cupola.
- 05/29/78      South Haven, Michigan (National Motor Castings)  
**One dead** – entered sand muller – not locked out.
- 08/31/78      Milwaukee, Wisconsin (Allis Chalmers)  
**One dead** – entered sand muller – not locked out.
- 03/23/79      Lansing, Michigan (General Motors Corp. – Oldsmobile Div.)  
**One dead** – cleaning out oil pit – not covered.
- 12/23/80      Westmoreland, Pennsylvania (Volkswagen of America, Inc.)  
**Six overcome** – solvent vapors in a tanker trailer truck.
- 09/04/81      Dearborn, Michigan (Ford Motor Company)  
**One dead** – carbon monoxide in restroom near blast furnace.
- 07/20/82      Houston, Texas (General Motors Corp. – Parts Depot)  
**Three overexposed** to butylamine vapors in a truck trailer.
- 08/02/82      Lansing, Michigan (General Motors Corp. - Fisher Body Div.)  
**Three dead, two overcome** – solvent vapors in plant sludge pit.
- 08/22/82      Warren, Michigan (General Dynamics Corporation)  
**One overcome** – solvent vapors in a conveyor pit.
- 01/23/83      Windsor, Ontario, Canada (Windsor Bumper Company)  
**One overcome** – Hydraulic fluid vapors in a pit.
- 03/29/83      Warren, Michigan (General Dynamics Corporation)  
**One overcome** – solvent vapors while driving a M-1 military tank.
- 09/21/83      Warren, Michigan (General Dynamics Corporation)  
**One overcome** – solvent vapors in a M-1 military tank turret.



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11/01/83	Warren, Michigan (General Dynamics Corporation – Warren, Michigan) <b>One overcome</b> – solvent vapors in a M-1 military tank.
11/15/83	Centerline, Michigan (General Dynamics Corporation) <b>One dead</b> – Freon vapors in a M-1 military tank.
08/10/84	New Orleans, Louisiana (Martin Marietta Aerospace) <b>One dead</b> – Freon vapors in a pit.
08/23/84	Hudson, Michigan (Metalloy Corp., Foundry Div.) <b>One dead</b> – suffocation by sand in shakeout sand hopper.
01/04/86	Toledo, Ohio (General Motors Corp. – Hydra-Matic Div.) <b>Three overcome</b> – RX gas exposures in a heat treat oven/furnace area.
10/07/86	Livonia, Michigan (General Motors Corp. – Delco Products Div.) <b>Two burned</b> – iron dust explosion in a dust collector for a shot blast machine.
07/18/87	Muskegon, Michigan (Teledyne Continental Motors – General Products Division) <b>One dead</b> – solvent vapors in a degreaser tank.
10/05/87	Detroit, Michigan (BASF Corp. – Inmont Division) <b>One dead, one burnt</b> – fire/explosion in a paint storage vessel-tank.
04/07/88	Moline, Illinois (Frank Foundries Corporation) <b>One dead</b> – carbon monoxide in foundry cupola dust collector.
02/20/89	Dearborn, Michigan (Rouge Steel Company) <b>One dead</b> – suffocation by iron ore pellets in a bin.
08/15/89	Pontiac, Michigan (General Motors Corp. – Truck and bus Division) <b>One dead</b> – Solvent vapors in a hose washer solvent tank.
01/17/91	Rockford, Illinois (Gunitite Corporation – Rockford Foundry) <b>One dead</b> – Suffocation by limestone pellets in a cupola feed hopper.
12/13/91	Hurst, Texas (Bell Helicopter) <b>One dead, one overcome</b> – acid vapors in plating process sump pit.
08/13/92	St. Johns, Michigan (Federal Mogul) <b>One dead</b> – Contact Cement vapors in 6 ft. deep X 4 ft. diameter furnace.



- 11/20/93 St. Joseph, Michigan (Allied Signal Inc.)  
**One dead (died November 21, 1993)** – burned when clothing was ignited by cigarette due to oxygen enriched atmosphere while lowering himself into cupola to ram bottom sand.
- 12/02/93 Cicero, Illinois (National Castings, Inc.)  
**One dead** – crushed by sand-slinger when work clothing caught in belt conveyor, dragging him into unit while cleaning in foundry basement.
- 12/30/93 Butlerville, Indiana (Muscatatuck State Developmental Center)  
**One dead** – engulfed and buried when coal collapsed under him while working inside coal storage silo.
- 10/29/94 Toledo, Ohio (Baron Steel Corporation)  
**Two dead (one October 29, 1994, and the other October 31, 1994)** died of injuries received rescuing fellow employee (a general foreman) also deceased from a tank of 1900F. chemical soap.
- 01/25/01 Saginaw, Michigan (General Motors Saginaw Metal Castings Operations)  
**One dead** – victim was crushed when a section of brick inside the furnace collapsed during a re-bricking procedure. The furnace was tilted so that an unbraced portion was overhead.
- 03/07/02 Sparta, Michigan (Federal Mogul)  
**One dead** – victim fell 30 feet through an unguarded 60” air duct inside a dust collector plenum.

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