

# Confined Space Entry

<b><u>INSTRUCTIONAL GOAL:</u></b> .....	3
<b><u>ENABLING OBJECTIVES:</u></b> .....	3
<b><u>INTRODUCTION</u></b> .....	4
<b><u>COMPANY NAME’S CONFINED SPACE ENTRY GUIDELINES</u></b> .....	5
<b><u>DEFINITIONS</u></b> .....	5
<u>ACCEPTABLE ENTRY CONDITIONS</u> .....	5
<u>ATTENDANT</u> .....	6
<u>AUTHORIZED ENTRANT</u> .....	6
<u>BLANKING OR BLINDING</u> .....	6
<u>COMBUSTIBLE LIQUID</u> .....	6
<u>CONFINED SPACE</u> .....	6
<u>CONTROL</u> .....	6
<u>DOUBLE BLOCK AND BLEED OR EQUIVALENT</u> .....	7
<u>ELIMINATE</u> .....	7
<u>EMERGENCY</u> .....	7
<u>ENGULFMENT</u> .....	7
<u>ENTRY</u> .....	7
<u>FLAMMABLE LIQUID</u> .....	7
<u>HAZARDOUS ATMOSPHERE</u> .....	7
<u>HOT WORK PERMIT</u> .....	8
<u>IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH)</u> .....	8
<u>INERTING</u> .....	9
<u>ISOLATION</u> .....	9
<u>LINE BREAKING</u> .....	9
<u>NON-PERMIT CONFINED SPACE</u> .....	9
<u>OXYGEN DEFICIENT ATMOSPHERE</u> .....	9
<u>OXYGEN ENRICHED ATMOSPHERE</u> .....	9
<u>PERMIT REQUIRED CONFINED SPACE</u> .....	10
<u>PERMIT SYSTEM</u> .....	10
<u>PROHIBITED CONDITION</u> .....	10
<u>RECLASSIFICATION</u> .....	10
<u>RESCUE SERVICE</u> .....	10
<u>RETRIEVAL SYSTEM</u> .....	11
<u>TESTING</u> .....	11
<b><u>DUTIES OF AUTHORIZED ENTRANTS</u></b> .....	11
<b><u>DUTIES OF ATTENDANTS</u></b> .....	12
<b><u>DUTIES OF THE ENTRY SUPERVISOR</u></b> .....	13
<b><u>PERMIT REQUIRED CONFINED SPACE ENTRY</u></b> .....	15
<u>IDENTIFICATION AND EVALUATION OF CONFINED SPACES</u> .....	15
<u>ACCESS CONTROL</u> .....	16
<u>“DANGER - CONFINED SPACE - ENTER BY PERMIT ONLY”</u> .....	16
<b><u>PERMIT SYSTEM</u></b> .....	16
<b><u>RECLASSIFICATION OF PERMIT SPACES</u></b> .....	17

SAMPLE

---

---

<u>PRE-ENTRY INSTRUCTION REQUIREMENTS</u> .....	17
<u>PRE-ENTRY PROCEDURES</u> .....	18
<u>ENERGY ISOLATION (LOCKOUT/TAGOUT)</u> .....	18
<u>SPACE EVALUATION</u> .....	18
<u>ATMOSPHERIC TESTING</u> .....	20
<u>TOXIC ATMOSPHERES</u> .....	21
<u>VENTILATION</u> .....	22
<u>CONFINED SPACE ENTRY RESCUE</u> .....	23
<u>RETRIEVAL RESCUE METHODS</u> .....	24
<u>OUTSIDE CONTRACTORS</u> .....	24

**SAMPLE**

# CONFINED SPACE ENTRY

## INSTRUCTIONAL GOAL:

Upon completion of this topic, the student will be able to recognize confined space and permit required confined space, and be able to implement the procedures used in permit required confined space entry.

## ENABLING OBJECTIVES:

Considering the information presented in the classroom, the student will be able to:

1. Explain the use of **COMPANY NAME**'s Confined Space Entry Guidelines
2. Demonstrate the ability to prepare a confined space for entry based upon **COMPANY NAME** Entry Procedures
3. Explain the actions taken if a confined space to be entered does not have an entry procedure
4. List the PPE needed for a selected confined space entry
5. Demonstrate the use of **COMPANY NAME**'s energy isolation procedures
6. Correctly establish the ventilation procedure for a given space
7. Describe the duties of the entrant as explained in **COMPANY NAME**'s Confined Space Guidelines
8. Use proper **COMPANY NAME** entry procedure; radio, verbal, and rope communication during a space entry
9. Demonstrate the ability to initiate self-rescue and implement external rescue procedures during a space entry
10. Compare the precautions and equipment used in making a top entry vs. a side entry into a confined space
11. Locate the requirements for outside contractors in the training manual

## INTRODUCTION

Before entering a confined space a review of the specific guidelines for appropriate safe entry and emergency exit is vital. Actual entry into a confined space should be allowed only after the following has taken place:

- All entrants and attendants have received proper training and equipment.
- The Entry Supervisor has issued the proper permit.
- The appropriate PPE is in place and utilized
- **COMPANY NAME**'s required procedures have been put into effect.

Note: No one should ever enter a permit required confined space unattended.

The **COMPANY NAME** procedures set forth in the following sections are based on OSHA's standard in 29 CFR 1910.146. The procedures are a means of protecting worker health and of avoiding accidental injury and death associated with entering, working in, and exiting confined spaces. They are designed to make the confined space safe for the worker, as well as make workers aware of the hazards associated with confined space entry and the safe work practices necessary to deal with these hazards.

A permit is required prior to entry into a permit space. Types of spaces at **COMPANY NAME** that would require permits include cooling tower, pipe runs, tunnels and boilers

**COMPANY NAME** has determined that personnel who enter permit required confined spaces might be exposed to the various hazards that confined spaces present. Therefore, all permit required confined spaces are to be considered dangerous until proven otherwise. The process of determining the hazard, dealing with the hazard, and safe entry and exit from the space are, in short, what this training is all about.



Most permit required confined spaces are infrequently entered for inspection, cleaning, repair, or other routine tasks. Infrequent entry often time means a corresponding lack of readiness in respect to familiarity with required safety equipment, emergency rescue procedures, and the confined space itself.

This training will cover **COMPANY NAME** specific programs, procedures, and equipment. By applying the knowledge and skills covered by the

training, all **COMPANY NAME** Entry Supervisors, entrants, and attendants will continue to make safe confined space entries.

## **COMPANY NAME'S CONFINED SPACE ENTRY GUIDELINES**

**COMPANY NAME** has established a set of guidelines to be followed while making entry into permit required confined spaces. It was determined that these guidelines needed to be in a written form so permit required confined space procedures are consistent throughout the company.



The Entry Supervisor will coordinate the preparation of a space for entry and will use a confined space entry procedure for the preparation. The procedure will include the space hazards, atmospheric testing equipment, purge/flush/ventilation requirements, rescue equipment, entry support equipment and energy isolation procedures.

The Entry Supervisor will review the procedure and possible hazards that may exist in the space with the entrant(s) and attendant. The Entry Supervisor will double check that all the conditions on the entry permit have been satisfied and sign the permit.

After completion of the confined space entry, the Entry Supervisor shall perform a post-entry briefing with the entrant(s) and the attendant. Any problems will be documented on the permit and communicated to the Director of Facilities. The Entry Supervisor will then terminate the permit.

## **DEFINITIONS**

### ***Acceptable Entry Conditions***

The conditions that must exist in a permit required confined space to allow entry and to ensure that employees involved with a confined space entry can safely enter into and work in the space.

### ***Attendant***

A trained person stationed outside a permit required confined space who monitors the authorized entrants and who performs all attendants' duties assigned in the Permit Required Confined Space Program.

### ***Authorized Entrant***

A person who has been trained and authorized to enter a permit required confined space.

### ***Blanking or Blinding***

The absolute closure of a pipe, line or duct by the fastening of a solid plate (such as a blank or a blind) that completely covers the bore and is capable of withstanding the maximum pressure possible for that pipe, line or duct with no leakage beyond the plate.

### ***Combustible liquid***

A Liquid that has a flashpoint between 100 degrees F and 200 degrees F.

### ***Confined Space***

- A space that is large enough and configured such that a person and or persons can bodily enter and perform assigned work
- A space that has limited or restricted means for entry or exit. Examples are tanks, vessels, silos, storage bins, hoppers, vaults, pits, trenches, sewer manholes and excavations
- A space that is not designed for continuous occupancy



### ***Control***

Refers to the reduction of severity associated with a hazard or the incident associated with a hazard. This can be accomplished through such measures as forced air ventilation and closing and locking valves.

### ***Double Block and Bleed or Equivalent***

A method of isolation that provides positive, verifiable isolation and reduces the potential hazards from valve or single isolation device failure. Double block and bleed consists of two isolation valves in series, with a bleed valve directed to a safe location between them. Equivalent protection to a double block and bleed includes: blinds, break & offset, or spool removal and offset (line breaking typically required).

### ***Eliminate***

The process of completely removing the possibility of an occurrence of a specific hazard. This can be accomplished through such means as electrical lockout, double block and bleed, and removal of the hazard (i.e. engulfment)

### ***Emergency***

Any occurrence or event internal or external to the confined space that could endanger entrants including any failure of hazard control or monitoring equipment.

### ***Engulfment***

The surrounding and effective capture of a person by liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or purging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction or crushing.



### ***Entry***

The action by which a person passes through an opening into a confined space. Entry includes ensuing work activities in that space and is considered to have occurred when any part of the entrant's body breaks the plane of any opening in the space.

### ***Flammable liquid***

A liquid that has a flash point less than 100 degrees F.

### ***Hazardous Atmosphere***

- An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (escape un-aided

from a confined space) or an injury/illness from one or more of the following causes

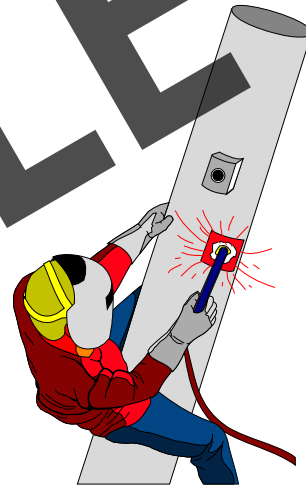
1. Flammable gas, vapor or mist in excess of 10 percent of its lower explosive limit.
2. Airborne combustible dust at a concentration that meets or exceeds its LEL. This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less
3. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.
4. Atmospheric concentration of any substance for which a dose or a permissible exposure limit (PEL) or a threshold limit value (TLV) is published and which could result in employee exposure in excess of the dose or PEL or TLV.
5. Any other atmospheric condition that is immediately dangerous to life or health.

### **Hot Work Permit**

A written authorization form that permits a person to perform spark or heat producing work (welding, grinding, cutting, etc.).

### **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 a person's ability to escape unaided from a permit space.



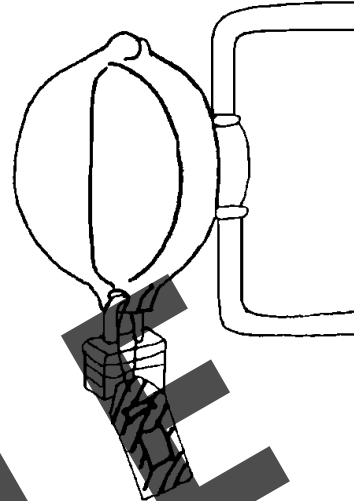
## ***Inerting***

Means the displacement of the atmosphere in a confined space by a non-combustible gas (such as nitrogen) to such an extent that the resulting atmosphere is non-combustible. Note: This process will produce an atmosphere that is IDLH.

## ***Isolation***

The process by which a confined space is removed from service and completely protected against the release of energy and material into the space by such means as:

1. Blanking or blinding
2. Misaligning or removing sections of lines, pipes or ducts.
3. A double block and bleed system.
4. Lockout of all energy sources.
5. Blocking or disconnecting all mechanical linkages.



## ***Line Breaking***

The intentional opening of a pipe, line, vessel or duct that is or has been carrying flammable, corrosive or toxic material, an inert gas or any fluid at a volume, temperature or pressure capable of causing injury.

## ***Non-Permit Confined Space***

A confined space that does not contain or, with respect to atmospheric hazards, has the potential to contain any hazard capable of causing death or serious physical harm.



## ***Oxygen Deficient Atmosphere***

An atmosphere containing less than 19.5 percent oxygen by volume.

## ***Oxygen Enriched Atmosphere***

An atmosphere containing more than 23.5 percent oxygen by volume.

## **Permit Required Confined Space**

A confined space that has one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere
2. Contains or has the potential to contain a material which could engulf an entrant
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section and/or
4. Contains any other recognized serious safety or health hazard



## **Permit System**

**COMPANY NAME** written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.



## **Prohibited Condition**

Any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

## **Reclassification**

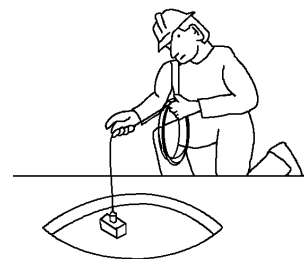
The process of changing the status of a permit required confined space to a non-permit required confined space through the elimination of all the hazards within the confined space.

## **Rescue Service**

The personnel designated to rescue employees from permit spaces.

## **Retrieval System**

The equipment (including a retrieval line, chest or full-body harness, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.



## **Testing**

The process by which the hazards that may confront entrants of a permit space are identified and evaluated.

## **DUTIES OF AUTHORIZED ENTRANTS**

Knowledge of the hazards that may be faced during entry, including information on the pathways that chemicals may follow to enter the body, signs or symptoms of exposure, and consequences of exposure is vital to the safety of those making entry. By reviewing the MSDS, entrants will have access to this information to better prepare themselves in the event of an emergency or unexpected situations.

Competency in the use of the following equipment is also essential for making safe entries:

1. 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 entry and exit
8. Rescue and emergency equipment

Communication with the attendant is an essential link to entrant safety. Establishing communication methods, prior to entry, will enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space, should the need arise.

The entrant needs to alert the attendant whenever:

1. The entrant recognizes any warning sign or symptom of exposure
2. A dangerous situation develops

3. The entrant detects a prohibited condition then leaves the confined space as quickly as possible

In addition to the situations just listed, exit from the space must occur if the order to evacuate is given, an alarm is noted or when the entrant begins to lack a "sense of well being." There is no objective definition to describe "sense of well being." It is subjective judgment based upon each person. In essence, each person is asking the question does this feel "right"? When in doubt - get out!

## DUTIES OF ATTENDANTS

Duties of the attendants are similar to those of the entrants. A knowledge of the hazards that may be faced during entry, including information on the pathways that chemicals may follow to enter the body, signs or symptoms of exposure, and consequences of the exposure.

Communication with authorized entrants occurs, as necessary, to monitor entrant status and to be continuously able to alert entrants of the need to evacuate the space. Attendants need also have an awareness of possible behavioral effects of hazard exposure in authorized entrants. The effects could include paralysis, paranoia, and the inability to think in a rational manner.

While remaining outside the confined space during entry operations, until relieved by another attendant, the attendant continuously maintains an accurate count of authorized entrants in the confined space and accurately identifies who those entrants are. The entrance to the space is NEVER left unattended until all entrants have exited the space and the entrance has been secured. All attendants must be listed on the initial permit.

Monitoring of activities inside and outside of the confined space is another important duty of attendants. This allows the attendant to determine if it is safe for entrants to remain in the space and order the authorized entrants to evacuate the space immediately when certain conditions become evident. These conditions include:

1. Detection of a prohibited condition
2. Detection of behavioral effects of hazard exposure in an authorized entrant
3. Detection of a situation outside the space that could endanger the authorized entrants

4. If the attendant cannot effectively and safely perform all of his/her required duties
5. If communication between the entrant and attendant is jeopardized in anyway

Additional duties include:

6. Summoning rescue and other emergency services as soon as the attendant determines the authorized entrants may need assistance
7. Warn the unauthorized persons that they must stay away from the permit space
8. Advise the unauthorized persons that they must exit immediately if they have entered the permit space and inform the authorized entrants and Entry Supervisor
9. Performing non-entry rescue as specified by the program
10. Performing no duties that may interfere with attendant's primary duty to monitor and protect the authorized entrants
11. Wear an orange safety vest at all times while performing attendant duties

## DUTIES OF THE ENTRY SUPERVISOR

The Entry Supervisor will find the specific confined space entry procedure in the Entry Procedure Manual. In addition, the Entry Supervisor will get a copy of the Confined Space Entry Permit.

The Entry Supervisor will read through the procedure and evaluate the needs. If necessary, the confined space will be purged, flushed and ventilated. The appropriate area will be checked off on the entry permit.



The Entry Supervisor will follow the procedures to isolate the confined space. If line breaking or other maintenance activities are required, the maintenance coordinator will be contacted. Each isolating technique will be documented on the entry permit. This also includes blocking off the area, if necessary.

After the space has been isolated, atmospheric testing will be conducted. All atmospheric readings must be documented on the entry permit.

The Entry Supervisor will be responsible for having the necessary entry support equipment brought to and set up at the confined space. All necessary items will be marked on the entry permit.

All confined space entrants and attendants will then be briefed by the Entry Supervisor on the hazards associated with the confined space. This will be accomplished by reading over the entry procedure, entry permit and any applicable MSDS. Then, each entrant and the on duty attendant will sign the entry permit.

The Entry Supervisor will take the entry procedure and entry permit and verify that all appropriate procedures have been:

1. Completed
2. Documented
3. All precautions are in place

Once the entry has been completed the Entry Supervisor will conduct a post entry debriefing with the entrants and attendants to discuss any problems that may have occurred during the entry. In addition, the Entry Supervisor will be responsible for having the space prepared prior to being restored to service.

Responsibilities and duties for Entry Supervisors include knowing the hazards that may be faced during entry, including information on the pathways that chemicals may follow to enter the body, signs or symptoms of over exposure, and consequences of the exposure.

The Entry Supervisor must verify that all appropriate check-offs have been made on the confined space entry permit and that all tests specified on the confined space procedure have been conducted. The Entry Supervisor must ensure that all confined space entry procedure conditions have been met prior to entry and authorization of the entry operation.



Once the entry operations covered by the entry permit have been completed, the Entry Supervisor will terminate the entry and cancel the permit. Termination and cancellation will also occur if the Entry Supervisor determines a condition that is not allowed under the entry permit arises in or near the permit space.

Additional duties include:

4. Verification that the means for summoning rescue services are operable
5. Removal of unauthorized personnel who enter or attempt to enter the confined space during entry operations

When entrants exit from a confined space, the entrants shall be debriefed regarding the confined space entry procedure that was followed. Modifications for subsequent entries will be noted and the procedure changed if warranted.

Any problems encountered during entry will be noted on the confined space entry permit during the debriefing. This will provide documentation for future entries and allow for effective entry to occur and provide a safer procedure for all involved.

## **PERMIT REQUIRED CONFINED SPACE ENTRY**

### ***Identification and Evaluation of Confined Spaces***

Each confined space at **COMPANY NAME** has been identified and evaluated for their associated hazards. A space specific Confined Space Entry Procedure will be developed for each permit-required confined space that has been entered within the past three years.

An Entry Supervisor must approve the procedure. The Entry Supervisor approves entry into confined spaces. The procedure must be available at the entry site and reviewed by all parties involved prior to entry. The procedure shall contain at a minimum:

1. Confined space hazards
2. Purge, flush and ventilation requirements
3. Atmosphere testing equipment and acceptable limits
4. Rescue equipment
5. Entry support equipment
6. Confined space isolation procedures

Entry into a confined space that does not have an associated Confined Space Entry Procedure is prohibited until a procedure is developed.

## **Access Control**

Inadvertent entry into confined spaces during periods when active work in the confined space is not taking place shall be controlled at all times by any or combination of the following:

1. Ensuring the attendant is positioned near the confined space entrance thereby providing surveillance against unauthorized entry
2. Barricading off the entrance to the space
3. Placing a sign in the entrance to the space reading:

**“DANGER - CONFINED SPACE - ENTER BY PERMIT ONLY”**

## **PERMIT SYSTEM**

Authorization to enter a confined space shall be made by an **COMPANY NAME** Confined Space Entry Permit and a Confined Space Entry Procedure. Authorization to enter a permit required confined space is given after all preparation conditions have been met and verified.

A qualified person authorized to act as an Entry Supervisor shall issue the permit. Each entrant and attendant shall read and then sign the confined space permit.

The Confined Space Entry Permit and Confined Space Entry Procedure will be posted near the entrance of the confined space along with all other necessary hazardous work permits such as a hot work permit.

All completed confined space entry permits shall be maintained by the originating department until the annual review of the confined space program. The review shall have the objective of determining any process weaknesses and making the necessary changes to ensure that personnel participating in entry operations are protected from confined space hazards.

A confined space entry permit is an agreement. Signing the permit indicates that all parties agree to the scope of work and conditions set by the permit. A point to remember is that a confined space entry permit is not a “stand-alone” permit. Other hazardous work performed in conjunction with the confined space entry requires an appropriate permit.

All permit-required confined space entries must follow the steps as outlined in the “Permit Required Confined Space Entry Procedures.”

## RECLASSIFICATION OF PERMIT SPACES

If it is possible to eliminate hazards within a permit required confined space, it may be possible to reclassify it to a non-permit required confined space. If you must enter the permit space to eliminate the hazards, it must be entered, as a permit required confined space. However, once the hazards are eliminated, the space can then be reclassified to a non-permit required confined space.

Reclassification can occur under the following conditions:

1. No atmospheric hazard (or potential atmospheric hazards) exists.
2. Hazards (such as electrical, slips, trips and falls, engulfment, etc.) associated with the confined space are eliminated prior to opening the space. Also, if the work inside the space will create a hazard (such as welding) then the space must remain permit required.

Certify the basis for determining all hazards is eliminated, with the date, location and the signature of the person making the determination using the Confined Space Reclassification Form. In addition, the certification must be posted at the confined space entrance. Only permit required confined spaces that contain dry material or no material can be considered for reclassification

The reclassification is only valid for the duration of the job. Once the work is completed, the space is considered to be a permit required confined space. If hazards arise within the reclassified space, each employee shall exit the space. The space shall then revert back to a permit-required confined space.

## PRE-ENTRY INSTRUCTION REQUIREMENTS

Training shall be provided so that all personnel, whose work falls under this procedure, acquire the understanding, knowledge and skills necessary for the safe performance of their roles. Contractor training shall be assured in accordance with **COMPANY NAME** contractor safety program. Training shall be provided to all affected personnel:

1. Before the worker is first assigned duties under this procedure
2. Before there is a change in assigned duties

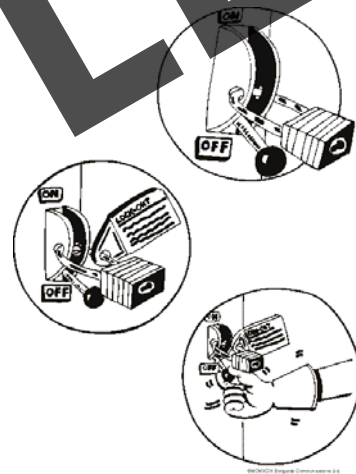
3. Whenever there is a change in confined space conditions that presents a hazard for which personnel have not previously received training
4. Whenever there is reason to believe that there are deviations from the confined space entry procedures or there are inadequacies in the person's knowledge or use of these procedures

**COMPANY NAME** shall certify that the training required above has been accomplished. The certification shall contain each student's name, the signatures of the trainers, the dates of training and the means used to verify the student's understanding and proficiency of the confined space program. Contractor certification shall be in accordance with **COMPANY NAME** contractor safety program.

## PRE-ENTRY PROCEDURES

### *Energy Isolation (Lockout/Tagout)*

The isolation procedures are specific for each type of permit required confined space. Permit required confined spaces should be completely isolated from all other systems by physical disconnection, double block and bleed, or blanking off all lines. In continuous systems, where complete isolation is not possible, such as sewers or utility tunnels, specific written safety procedures that are approved and enforced by **COMPANY NAME** will be used.



### *Space Evaluation*

Before entry into a permit-required confined space, a permit required confined space evaluation must be conducted, a permit must be properly prepared and issued and all necessary training must be conducted. General controls must be used to ensure safe entry. These include, but are not limited to:

1. All lines in and out of the confined space must be isolated. Examples include:
  - Internal coils, tubes, etc. are considered part of the confined space

➤ Jacket space on jacketed vessels is considered part of the confined space

1. All energy sources must be locked out in accordance with the **COMPANY NAME** Energy Isolation Program

2. The confined space shall be purged, flushed or ventilated according to the Confined Space Entry Procedure to control atmospheric hazards.

3. Forced air ventilation systems shall be used when either oxygen deficient or a hazardous atmosphere exists in the confined space. When using a forced air system:

4. No employee may enter the space until exposure to atmospheric hazards has been controlled by such means as ventilation or the proper personal protective equipment.

5. The ventilation must be in the immediate area where the employees are present and must continue until all employees have left the space.

6. The air must be from a clean source and must not increase the hazards in the space.

7. Power sources to ventilation equipment will be tagged to prevent inadvertent de-energizing.

8. Pedestrian, vehicle or other activities will be barricaded as necessary to protect entrants from external hazards.

9. All electrical equipment must be 12 volts or less or be protected by a ground fault circuit interrupter (GFCI) located outside the confined space.

10. Lighting equipment shall be provided to enable employees to see well enough to work safely and exit the space quickly in the event of an emergency.

11. Personal protective equipment shall be provided and its use required whenever feasible engineering and work practice controls do not protect the entrants.

12. Communication equipment will be provided when direct vocal contact is inhibited between the authorized entrant and attendant due to confined space restrictions of noise or physical barriers.



**SAMPLE**

13. Testing and monitoring equipment will be provided and testing and monitoring of the confined space will be performed to assure that acceptable entry conditions are being maintained during the course of entry operations.
14. Retrieval devices and lifelines will be provided when necessary and will be used as specified in **Section XV** of **COMPANY NAME's** Confined Space Entry Program.

## ATMOSPHERIC TESTING

Atmospheric sampling within the confined space must be performed to verify that acceptable entry conditions are met prior to and during entry. Sampling shall be conducted on either a periodic or continuous basis. The type of sampling will be dependent upon the type of space entered and the potential for hazardous atmospheric conditions to occur. For example, if the initial testing found no evidence of a flammable gas or vapor, monitoring frequency can be low. If a flammable gas or vapor is initially detected, frequent or continuous monitoring would be appropriate.

**COMPANY NAME** procedures require that all confined spaces undergo atmospheric testing and monitoring prior to entry. This will ensure the space atmosphere is not at IDLH conditions and are below PELs or TLVs.

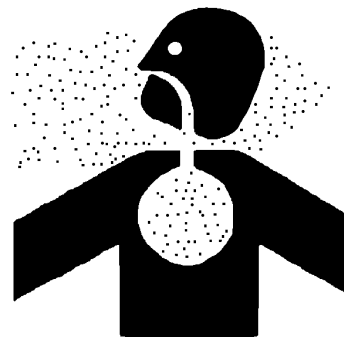
Oxygen Content must not be below 19.5% or above 23.5% by volume to enter. If this oxygen level is not present, no other testing shall be performed until the recommended levels can be obtained. Oxygen level should be monitored continuously.

Flammable Gas, Vapor or Mist must be below 10% of the lower explosive limit (LEL). This concentration for airborne combustible dust may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less.

The Atmospheric Concentration of any substance for which a dose, PEL or TLV that has been published and which could result in employee exposure must be monitored. The exposure must be kept below its action level by such means as ventilation or personal protective equipment.

## Toxic Atmospheres

If an injured entrant has an exposure to a substance, the MSDS or similar written information for that substance, must be given to the EMS personnel and the medical facility treating the exposed entrant. Toxins get into the body through what are called routes of entry. The most common route of entry (at the work-site) is through the respiratory system. Entry of the toxin through the respiratory system is comparatively rapid as is injection of the toxin under the skin. Absorption through the skin or entry through the digestive system (eating or drinking the toxin) is comparatively slower.



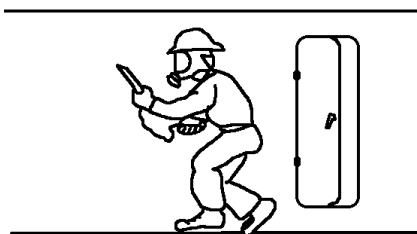
There are many different types of toxic materials that can be found in confined spaces. Generally, however, they can be classified into two main groups: asphyxiates and irritants.

Asphyxiates include carbon monoxide and nitrogen. Carbon monoxide renders the body incapable of utilizing oxygen. The body literally suffocates. Where nitrogen simply displaces the air so oxygen is not present for the body to absorb.

Irritants like  $\text{SO}_2$  (sulfur dioxide) and HCl (hydrochloric acid) pose mainly respiratory and skin hazards. They produce injury and death by causing the lungs to fill with fluid and the victim essentially drowns.

Essential to safe permit space operations is atmospheric monitoring. From the assignment of protective gear to limitations of work practices, the results of this testing will govern every phase of entry.

Continuous monitoring is required when it can be reasonably anticipated that the monitored substance can or will exceed this action level. No employee may enter the space until atmospheric hazards have been controlled throughout the space and reduced to levels below OSHA PELs (ACGIH TLVs) unless adequate and appropriate PPE is employed.



In addition to these tests being carried out using a calibrated direct-reading instrument, the confined space must not contain a hazardous atmosphere as defined in **Section IV** in the **COMPANY NAME** Confined Space Program. Temperature extremes within the confined space must be addressed by control measures such as ventilation or personal protective equipment

The need for periodic monitoring for permit required confined spaces must be evaluated and specified on the permit. The following can be used to make this decision:

1. Does the space have potential for contamination from outside?
2. Does the space have potential for contamination from work being conducted inside the space?
3. Does the space have self-contained piping with potential for contamination?

## VENTILATION

One of the hazard concerns, during confined space entries, is the atmosphere. It may contain an atmosphere depleted of or enriched in oxygen, flammable gases, or toxic gases.

The atmosphere in a confined space may be altered in many ways. In some cases chemical treatment can change the atmosphere. This usually is done in industrial vessels where entry is frequent. In other cases, flammable vapors in the atmosphere may be absorbed using activated carbon.

The most frequently used method of altering or replacing the atmosphere is through ventilation. Specific ventilation techniques vary according to the size and orientation of the space, the size of the exhaust opening, the types of vapors to be removed, and the source of the replacement air. Regardless of the ventilation techniques used, they all attempt to replace a contaminated atmosphere with one that is uncontaminated.



The type of ventilation is dependent upon two principles:

- (1) The effect of the contaminant's vapor density
- (2) Application of positive or negative pressure

When a space is ventilated by positive pressure, air is blown into the space thus pressurizing it. The increased pressure forces the contaminated atmosphere out and allows uncontaminated atmosphere in.

The scouring action of positive pressure ventilation also helps to eliminate dead spots where contamination levels may still be high. In many cases, tubes are attached to the output side of the fan, channeling the air to

where it is needed. This is very helpful when the airstreams need to bend, as in manhole ventilation, or when only one opening exists in the container.

Otherwise, the turbulence caused by inflowing and outflowing atmospheres disallows effective atmosphere exchange. By keeping the inflow and outflow gases separate, turbulence is essentially eliminated and efficiency is greatly increased.

Ventilation is needed when toxic gas levels are above OSHA's permissible exposure level, a flammable gas's concentration is greater than 10 percent of its lower explosive limit (LEL), or oxygen concentration is less than 19.5 percent or greater than 23.5 percent.

Ventilation does not have to be limited to the above-mentioned situations. Very hot environments can be ventilated with cooler air. Atmospheres that contain toxic gases may be ventilated even though the concentration is still below the PEL. Some sources suggest that ventilation is adequate when it exchanges the atmosphere in the space 30 times per hour with 12 changes being made prior to entry.

## CONFINED SPACE ENTRY RESCUE

The local City Fire Department is often the rescue service during confined space entry procedures. **COMPANY NAME** will inform the local City Fire Department of the hazards they may encounter when called on to perform rescue at the **COMPANY NAME** facility. Additionally, **COMPANY NAME** will provide the local City Fire Department with access to permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice operations. Prior to all permit required confined space entries, the local City Fire Department must be informed of the entry.



A question often asked is-- "can the attendant go into a confined space if the entrant has gone down due to an injury not associated with the hazards inside of the permit required confined space?" The answer is no. It is very difficult to differentiate between a problem that is caused by the space from one which is not.

However, the attendant may enter the space if:

1. There is zero doubt as to why the entrant has gone down
2. Has been trained as an entrant

3. The proper PPE is utilized
4. Has activated **COMPANY NAME**'s emergency protocol by dialing 911 for calling emergency assistance
5. Relief for the attendant has arrived prior to the attendant providing assistance

However, in most instances outside retrieval methods would be available. In the event of a confined space emergency, the attendant activates the rescue response service by calling 911.

## RETRIEVAL RESCUE METHODS

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a confined space unless retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. All entrants entering into a permit required confined space must wear a harness to help facilitate retrieval. Retrieval systems shall meet the following requirements.



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, or above the entrant's head.

The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the confined space in such a manner that rescue can begin when the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit required confined spaces greater than five feet in depth.

## OUTSIDE CONTRACTORS

Permit-required confined space entries involving a **COMPANY NAME** approved outside contractor shall be pre-planned and coordinated by the contractor's job site supervisor and the **COMPANY NAME** designated Entry Supervisor. Prior to entry, the Entry Supervisor and the contractor's job site supervisor will exchange information and discuss the confined space entry.

Specific procedures will be implemented if contractors will occupy the same permit required confined space as **COMPANY NAME** employees.

These procedures will be established so that employees of one employer do not endanger the employees of any other employer. Information provided to the contractor's job site supervisor will include and is not be limited to:

1. A copy of the **COMPANY NAME** Confined Space Entry Program
2. Specific information on the confined space to be entered (space specific confined space entry procedures), Material Safety Data Sheets and any other necessary information relevant to the confined space entry
3. Information regarding the **COMPANY NAME** emergency summoning procedures
4. All contractor employees must be trained with respect to their duties associated with the confined space entry. Any employee who has not been trained cannot be part of the confined space entry team
5. Upon completion, the entry shall be jointly terminated by the contractor's job site supervisor and the **COMPANY NAME** Entry Supervisor. At that time, the two parties shall discuss any problems or unusual situations that occurred relevant to the confined space entry
6. Any precautions or procedures that have been implemented for the protection of employees in or near the permit spaces where contractor will be working

SAMPLE