

Confined Space Safety

Part II—Entry And Rescue Programs

The hazards of confined spaces must be fully understood by employees, management and businesses. This need is unfortunately demonstrated by the high number of fatalities involving confined space entry, many of them involving multiple employees. According to the Bureau of Labor Statistics (BLS), an average of 92 fatalities occurred annually between 1998 and 2000. The National Institute of Occupational Safety and Health (NIOSH) estimates that over half were employees attempting to rescue injured co-workers.

This Risk Management Bulletin reviews the necessary program elements and rescue program associated with a confined space entry. General information on hazards and controls are outlined in Risk Management Bulletin #153, *Confined Space Safety—Entry Hazards and Controls*.

The variability of the hazards and the complexities of implementing effective controls underscores the importance of a written and fully implemented confined space entry program. Elements of a confined space entry program include:

- Identification and evaluation of hazards
- Classification of confined spaces
- Duties of entrant, attendant and entry supervisor
- Procedures for entry, including work practices, atmospheric monitoring, and personal protective equipment
- Permits

- Training
- Rescue and emergency procedures

Case Study

The body of a worker was found in a gasoline delivery manhole measuring 36 inches in diameter by six feet deep. This was a permit required confined space. The victim had been working in the manhole without any protection and asphyxiated after inhaling gasoline vapors. The employer did not conduct or provide (1) a written permit required confined space program; (2) a hazard evaluation; (3) adequate training; and (4) protective equipment or clothing.

What is a Confined Space?

Confined spaces exist in almost all industries and may include: vessels, silos, boilers, pits, chemical storerooms, tunnels, vaults and shafts. Possible hazards include engulfment, entrapment and hazardous atmospheric conditions that would not normally occur in an open work area.

By definition, a **confined space** is:

- Large enough and so configured that a worker can enter and perform work, and
- Not designed for continuous worker occupancy, and
- A space with limited or restricted means of entry and exit

Confined spaces are further defined and classified as permit or non-permit required confined spaces.

Permit Required Confined Space

Confined spaces that are classified as permit-requiring has **one or more** of the following characteristics:

The Experienced
Workers'
Compensation
Specialist

- Contains (or has the potential to contain) a hazardous atmosphere
- Contains any material that has potential for engulfment or entrapment of an entrant.
- Has inwardly converging/tapering walls or floors that can trap or asphyxiate an employee
- Contains recognized serious safety/health hazards

Non-Permit Required Confined Space

Non-permit confined spaces have no actual or potential safety and health hazards capable of causing death or serious physical harm. This may be due to the general characteristics of the space or elimination of any hazards. Additionally, there must be no actual or potential for atmospheric hazard. However, there must be documentation of the classification process. If new hazards develop, further evaluation of this confined space must be completed. A regular assessment of non-permit required confined spaces may be necessary to ensure the absence of safety and health hazards.

Key Personnel

A permit-required confined space should never be conducted without a permit and other individuals available to perform specific functions. The *authorized entrant* is the only person allowed to enter the confined space. An *attendant* must be stationed outside the confined space and monitor the entry. The *entry supervisor* determines whether entry conditions are acceptable and oversees entry operations.

Entry Permits

An entry permit is a document prepared by the employer that is used as a checklist to record the completion of all steps necessary to prepare for safe entry and work in a confined space. This permit must be signed by the entry supervisor and posted near the confined space entry for entrants to verify that pre-entry procedures have successfully been completed.

Duration of permit should not exceed time required to perform job task. The entry supervisor should cancel a permit when the job is completed. Entry permits may extend to a subsequent shift as long as the permit specifically calls for this. Once a permit is closed it cannot be reused for subsequent entries. Permit should be kept on file for one year and must be reviewed annually to assess for adequacy of controlling hazards.

Entry Permit Information:

- Permit space to be entered
- Purpose of entry
- Date & authorized duration of permit
- Authorized entrants
- Authorized attendants
- Name & signature of entry supervisor
- Hazards of the permit space to be entered
- Isolation of hazard control measures
- Acceptable entry conditions
- Results of initial & periodic atmospheric monitoring
- Rescue & emergency services
- Communications procedures
- Equipment required for entry & rescue operations (e.g. PPE, testing, communication, rescue equipment)
- Other necessary information and other required permits (e.g. hot work permit)

Training and Education

Employee training is a critical part of an effective confined space program. Employees must know the hazards and controls, permit process and rescue procedures. Remember, most confined space fatalities were the result of failed rescue attempts.

All employees involved directly or indirectly with confined space entry must be properly trained prior to initial work assignment. Retraining must occur when:

- Job duties change,
- Changes occur in permit-space program,
- New hazards are introduced, and
- Job performance indicates deficiencies

Confined Space Training Elements

- Atmospheric monitoring and ventilation
- Communication
- Emergency, self-rescue, and rescue operations
- Hazard communication– MSDS
- Hazard recognition and control.
- Injury and Illness Prevention Program
- Permit system
- Personal protective equipment, first aid, and CPR.
- Signs, symptoms, and the consequences of exposures.

These additional elements should be added if necessary.

- Respiratory protection
- Electrical safety
- General housekeeping
- Hot work
- Lockout/tagout
- Equipment-specific issues
- Fall protection
- Noise

Rescue

Two-thirds of all confined space fatalities occur among would-be rescuers. Rescue teams may have only a few minutes to remove an entrant from a confined space. If rescue takes longer, brain damage or death is likely. All confined spaces should be assumed to be deadly during a rescue.

You should decide whether you will perform rescues using your own employees or whether you will use an outside rescue service. Because of the extreme danger, some local fire departments are equipped and trained to perform this service. However, because of the extreme danger, many fire departments are not equipped to perform rescues. This is especially true in many rural areas and areas serviced by volunteer fire departments. Before deciding to utilize a local fire department, it is useful to contact them in advance to identify services available.

If you elect to perform rescues internally, designated employees must have appropriate training and rescue equipment immediately available.

Emergency response procedures should be in place for:

- Summoning rescue and emergency services,
- Rescuing entrants from permit spaces,
- Providing necessary emergency services to rescued employees,
- Preventing unauthorized personnel from attempting a rescue.

Rescue team training must be completed annually and include the following training elements.

- Types of rescue
- Recognition of permit space hazards
- Control of permit space hazards
- Use of atmospheric monitoring equipment
- Use and maintenance of PPE.
- Use and maintenance of rescue

Some fire departments may assist with rescue training. This coordination is useful since it allows

fire personnel to become familiar with the location, confined space configuration, access, and potentially hazardous atmospheres.

Types of Rescue

There are three types of rescue:

- **Self-rescue** is the preferred plan as the entrant is able to recognize hazards including their own symptoms of exposure and does not involve another entrant.
- **Non-entry** rescue involves the use of equipment including a harness and a mechanical device that must be used to retrieve personnel from vertical type permit spaces more than 5 feet deep.
- **Entry rescue** involves rescuers entering the space. An entry rescue plan needs to be developed ahead of time in the event of an emergency when a non-entry rescue plan is not appropriate.

Onsite emergency personnel must be qualified through knowledge of and experience working with all hazards associated with rescue and confined space entry operations. Rescuers must receive specific training for their role as emergency responders.

Typical Rescue Equipment

Rescue equipment for non-entry and entry type rescues may involve all of the following: tri-pod, davit, winch, harness, retractable lanyard and body board. Additional equipment may include self-contained breathing apparatus (SCBA) or supplied air respirator with an escape cylinder, other personal protective equipment, air monitoring devices, non-sparking flashlights and basic and advanced medical aid equipment.

Communications

Employees, vendors and other persons must be informed via danger signs or other means of the existence and location of confined spaces.

Furthermore, the dangers of each confined space must be fully communicated to employees and others who have business in the area. Contractors must be informed of permit spaces and follow the requirements of the employer.

For further information and assistance contact your Zenith Safety and Health Consultant.

Zenith provides workplace safety resources at: TheZenith.com

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