# University of Wisconsin-La Crosse
# Occupational Safety Policy

Subject: Confined Space Entry
Original: December 1994
Last Update: March 2024

## I. APPLICABLE DOCUMENTS

29 CFR Part 1910.146 "Permit-Required Confined Spaces"

## II. PURPOSE

This policy establishes the minimum requirements to be taken when it is required that persons enter UW-La Crosse (UWL) permit required confined spaces, which could include tanks, tunnels, pits, ducts, chambers, or utility manholes.

## III. DEFINITIONS

ACCEPTABLE ENTRY CONDITIONS - conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit required confined space can safely enter and perform work.

ATTENDANT - an individual stationed outside the permit required confined space who had specific training and monitors the authorized entrants inside the space.

AUTHORIZED ENTRANT - employee who is authorized to enter a permit required space.

BLINDED - absolute closure of a pipe, line, or duct by fastening across its bore a solid plate that completely covers the bore and can withstand the maximum upstream pressure.

CONFINED SPACE - a space that is large enough to bodily enter and perform work, has limited means of entry and egress; and is not designed for continuous employee occupancy.

ENGULFMENT - surrounding and effective capture of a person by a liquid or finely divided solid substance.

ENTRY - a person’s intentional passing through an opening into a permit required confined space.

ENTRY PERMIT - written or printed document to allow entry into a permit space.

ENTRY SUPERVISOR - person responsible for determining if acceptable conditions are present before entering a permit space, for authorizing entry, overseeing entry operations, and terminating entry.

HAZARDOUS ATMOSPHERE - an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or acute illness.

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH) - 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.

ISOLATION - process by which a permit space is removed from service and completely protected against the release of hazardous energy or material into the space.

LOWER EXPLOSIVE LIMIT (LEL) - the lowest concentration of gas or vapor, expressed in percent by volume in air that burns or explodes if an ignition source is present at room temperature.

LINE BREAKING - 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 death or serious physical harm.

OXYGEN DEFICIENT ATMOSPHERE - an atmosphere containing less than 19.5% oxygen.

OXYGEN ENRICHED ATMOSPHERE - an atmosphere containing more than 23.5 % oxygen.

PERMISSIBLE EXPOSURE LIMIT (PEL) – An Occupational Safety and Health Administration (OSHA) average airborne concentration of a hazardous material that must not be exceeded over a specified time limit.

PERMIT REQUIRED CONFINED SPACE - a confined space that has one or more of the following four characteristics: 1) contains or has a potential to contain a hazardous atmosphere; 2) contains a material that has the potential for engulfing an entrant; 3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or 4) contains any other recognized serious safety or health hazard.

PROHIBITED CONDITION - any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

RESCUE SERVICE - personnel designated to rescue employees from permit spaces.

RETRIEVAL SYSTEM - equipment used for a non-entry rescue of persons from permit spaces.

TESTING - process by which hazards that may affect entrants of a permit space are identified and evaluated.

THRESHOLD LIMIT VALUE (TLV) - The airborne concentration of a hazardous material that must not be exceeded over a specified time or instantaneously. This value is established by the American Conference of Governmental Industrial Hygienists (ACGIH).

## IV. PRACTICE

### A. Purpose

The purpose of this policy is to ensure the proper entry, work practices, and exit from confined spaces.

### B. Labeling Requirements

Where possible, each permit-required confined space should be labeled indicating that special precautions must be taken prior to entering the space. The signage for each space shall minimally read:

**DANGER**
**Confined Space**
**Enter by Permit Only**

Some variation will be allowed as long as the general message is clearly conveyed.

### C. Personnel Requirements and Responsibilities

The following are the requirements for each member of the entry team.

1. Attendant

    a. Know and recognize hazards that may be faced during entry.
    b. Be aware of behavioral effects of exposure to hazardous atmospheres.
    c. Maintain accurate counts and means to identify all entrants.
    d. Remain outside the space unless relieved by another qualified attendant.

e. Monitor activities inside and outside space.
f. Monitor status of entrants and initiate evacuation if:
    i.) prohibited conditions are detected;
    ii.) present situation may endanger the entrant; or
    iii.) attendant cannot effectively and safely perform duties.
g. Know proper method of summoning rescue services before entry.
h. Summon rescue services if needed.
i. Establish and maintain a means of communication, via radio or telephone.
j. Keep unauthorized persons out of entry space.
k. Perform non-entry vertical rescues using a winch.
l. Perform no other duties that may distract from the primary duties.

2. Authorized Entrant

a. Know and recognize hazards that may be faced during entry.
b. Obtain and properly use necessary personal protective equipment.
c. Communicate as necessary with the attendant.
d. Alert attendant when hazardous conditions are detected, identified, or suspected.
e. Exit the space immediately whenever:
    i.) ordered to do so by other members of the entry team;
    ii.) warning signs/symptoms are identified;
    iii.) prohibited conditions are identified; or
    iv.) evacuation alarm is activated.

3. Entry Supervisor

a. Know and recognize hazards that may be faced during entry.
b. Verify that all entries have been made on the permit.
c. Verify that tests are completed and procedures and equipment are in place.
d. Authorize entry to begin.
e. Cancel permit when job is complete or unacceptable conditions arise.
f. Know proper method of summoning rescue services before entry.
g. Ensure that responsibilities are safely and effectively transferred.
h. Ensure entrants have all necessary personal protective equipment.

**D. Atmospheric Requirements Prior to Entry**

Before entering, the following atmospheric conditions must be met:

1. Oxygen level between 19.5% and 23.5%.
2. Flammable gas, vapor, or mist below 10% of its LEL.
3. Airborne combustible dusts which exceed their lower flammable limit. This limit is approximated as a condition in which dust obscures vision at a distance of 5 feet.
4. Airborne hydrogen sulfide level below 10 parts per million (PPM).
5. Other potential toxic air contaminants shall not be present at levels that exceed PEL's, TLV's, or NIOSH recommended exposure limits (REL's).

Entry into a permit-required space shall not be allowed if monitoring indicates deficiency in any of these categories. Respirators are not to be used to allow entry into deficient atmospheres. To achieve and maintain a safe atmosphere, it may become necessary to take some action to render the space safe for human occupancy. This may include:

1. Isolation - precautions taken to prevent release of material and/or energy into the space. This can be achieved through blinding, blanking, disconnecting, lockout/tagout, or other means.

2. Ventilation - purging, inerting, flushing, or otherwise ventilating the space with fresh air. The fresh air will displace the contaminated air allowing for safe entry. This is usually best accomplished by mechanically ventilating the space.

3. Verification - conditions within the permit space must remain acceptable throughout the duration of entry. UWL will require continuous monitoring of permit spaces for oxygen, lower explosive limit, hydrogen sulfide, carbon monoxide, and potentially other airborne hazardous materials identified through hazard assessment. These other hazardous materials can exist in the space prior to entry or be introduced into the entry space by the entry team. Verification may also be accomplished by using instruments other than a four-gas meter, process knowledge, or procedure knowledge.

4. Separation - where there is a possibility of external hazards, the space may require barricades to protect the entrants from falling objects or from unauthorized entry.

**E. Evaluation of the Hazards**

Before granting entry, the entry supervisor should be aware of the following possible hazards specific to a particular permit-required confined space.

1. Oxygen deficiency
2. Combustible, flammable, or explosive atmospheres
3. Toxic gases or vapors
4. Physical hazards:
    a. engulfment
    b internal configuration
    c. moving parts or machinery
5. Residual chemicals
6. Hazards introduced into space
7. Physical hazards such as electricity and steam

**Note:** Before entry hazardous atmospheric conditions must be rendered harmless. Residual and physical hazards can be minimized by applying lockout/tagout and/or personal protective equipment. The entry supervisor is encouraged to contact Environmental Health and Safety (EH&S) for assistance with evaluating hazards.

**F. Personal Protective Equipment (PPE)**

When physical, chemical, and/or biological hazards exist the space should be rendered safe for entry without the use of PPE. If this is not possible, the entry supervisor should outfit the entrants with the appropriate gear. Contact EH&S for assistance with PPE selection, use, and training.

**G. Monitoring**

Prior to entry each permit space must be sampled for the following atmospheric conditions in the <u>listed order:</u>

1. Oxygen level (must be between 19.5% and 23.5%).
2. Lower Explosive Limit (LEL) (cannot exceed 10%).
3. Hydrogen sulfide (cannot exceed 10 ppm).
4. Other toxic gas levels.

**Note:** Oxygen level is sampled first because most combustible gas meters are oxygen dependent. Monitoring in an oxygen deficient atmosphere may result in erroneous lower explosive limit readings. Combustible gases are sampled next because the threat of fire or explosion is immediate and life threatening.

Four-gas (oxygen, LEL, hydrogen sulfide, and carbon monoxide) meters are available in the EH&S office and the Heating Plant. EH&S calibrates equipment every six months and trains personnel on equipment use and limitations. The Attendant, Authorized Entrant, or Entry Supervisor will conduct continuous monitoring for oxygen, LEL and hydrogen sulfide throughout the entry.

**H. Communication**

Each entry team is required to establish and maintain communication with its members during the course of work. In instances where distance or surrounding noise prohibit visual or audible communication, two-way radios or other communication methods must be used. Two-way radio or telephone communication must be readily available to the attendant for emergencies. The entry team is responsible for establishing and maintaining a means for ongoing and immediate emergency communications.

## I. Multiple Entrants

Multiple entrants may enter using the same attendant as long as the following conditions are met.

1. All entrants are working on the same project.
2. Visual or audible contact is maintained between entrants and attendant.

Communication equipment only needs to be given to one entrant. However, if the entrants are at distances greater than what would allow for clear communication, the equipment will be provided to multiple entrants. This decision must be made by the entry supervisor before the commencement of work.

## J. Authorization for Entry

Prior to entry, the entry team is required to notify their supervisor(s) as to the location, time of entry, and number of personnel entering the permit-required space. The entry team must notify their supervisor when entry activities are complete.

## K. Confined Space Permit Procedures

The confined space entry permit, included as Appendix A, is required for entering any permit-required confined space. To authorize a permit, the entry supervisor and this person's administrative supervisor must first confirm that work cannot be accomplished without entering the space. If work requires entry, a permit will be completed by the entry supervisor. EH&S is available for assistance in assessing entry hazards and best entry practices. Permits are only valid up to eight (8) hours.

If entry is authorized the completed permit will be kept at the entry location and made accessible to the entry team.

## L. Working in Streets

Work in confined spaces with entry from a street may proceed as long as the following conditions are met.

1. An entry teams vehicle beacon light and/or four-way hazard flashers shall be activated upon arrival at the entry location.
2. An entry team vehicle shall be parked in such a manner to not obstruct traffic, yet provide protection for the entry team.
3. Parked vehicle(s) that are left running shall be parked to prevent exhaust from entering the confined space.
4. Traffic safety vests shall be worn.
5. Traffic safety cones shall be placed around the entry team vehicle and manhole.
6. A flag-person may need to be added to the entry team if traffic flow is inhibited. Contact University Police for assistance or guidance. The flag-person will not be the attendant.

## M. Training Requirements for Confined Space Entry

Training shall be provided to all members of a permit required confined space entry team. Each employee will be trained in all aspects of entry responsibility, including those of the attendant, entrant, and entry supervisor.

Initial training will be provided by EH&S. Refresher training will be performed by the employee's supervisor or EH&S. Refresher training must be conducted when there is a change in permit space operations that presents a new hazard. In addition, whenever the employer has reason to believe either that there are deviations from the permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.

## N. Confined Space Rescue

Permit required confined space entry teams shall not enter a permit required confined space that would necessitate a time-sensitive rescue. Time-sensitive or "emergency" rescues require rescue within minutes to prevent a fatality or fatalities. Examples of time-sensitive or "emergency" rescues include oxygen-deficient atmospheres, toxic atmospheres, flammable or explosive atmospheres, engulfment, moving parts, and moving machinery. Work creating conditions that could require emergency rescue should be assessed and methods identified to prevent conditions requiring emergency rescue. The entry team shall acquire approval of their supervisor(s) and Environmental Health and Safety prior to entry into a permit required confined space that could require an emergency rescue. In such cases an emergency rescue plan must be developed, rescue personnel shall be at the site, and the rescue team and entry team trained on emergency rescue.

An example of a non-time-sensitive rescue would be a situation in which someone falls and breaks an ankle going into a confined space. In these types of circumstances there are sufficient oxygen levels and, therefore, the rescue is not as time-sensitive and can be conducted without the use of supplemental oxygen.

Full body harnesses are required for all vertical entries and most horizontal entries into permit required confined spaces unless the use of such equipment creates real hazards. For vertical entries the full body harness is attached to lifting equipment. A full body harness for horizontal entries aids in placement of an individual on a stretcher or rescue board.

**UWL does not have a fully equipped and trained confined space rescue team (CSRT) ready to respond in an emergency situation.** This lack of a CSRT creates the condition for not allowing UWL staff to enter permit required confined spaces that would require a time-sensitive or "emergency" rescue. The La Crosse Fire Department cannot be relied on to provide time-sensitive or "emergency" rescues.

**O. Contractor Coordination**

In instances where contractors are entering permit required confined spaces without UWL involvement/entry, the contractor is solely responsible for compliance with 29 CFR Part 1910.146.

In instances where UWL employees and contractors are serving as entrants to permit required confined spaces, the UWL Permit Required Confined Space Form will be used for entry. UWL and the contractor will collaborate on entry team duties and provision of required entry equipment. UWL will furnish air monitoring equipment.

# Appendix A
# UWL Confined Space Entry Permit

Confined space to be entered:_____

Space normally contains: _____

Specific hazards of space:_____

Work to be performed: _____

Permit valid on: ___/___/___ from ___:___ am/pm to ___:___ am/ pm **(Permits valid up to one day/work shift)**
(Date)

## CHECKLIST TO BE COMPLETED BY ENTRY TEAM

**NOTE: IF NO IS ANSWERED ON ANY QUESTIONS DO NOT ENTER CONFINED SPACE.** In such cases contact you supervisor and Environmental Health and Safety.

| | | | | |
|---|---|---|---|---|
| 1 . | Are lines to or through the confined space (which present a hazard during entry) drained, pressure released, blinded, locked/tagged out, and/or disconnected? | YES | NO | N/A |
| 2. | Are switches to mechanical equipment locked/tagged out? | YES | NO | N/A |
| 3. | Have hazardous chemicals been removed from the confined space and the walls rinsed? | YES | NO | N/A |
| 4. | Have initial tests been conducted to confirm that air in the confined space is safe for entry and is likely to remain free of dangerous air contaminants while occupied? | YES | NO | |
| 5. | Have hazardous gases been purged from the confined space and ventilation provided? | YES | NO | N/A |
| 6. | Are all members of the entry team aware of the hazards involved with entry into the space? | YES | NO | |
| 7. | Has the type and need for personal protective equipment (PPE) been reviewed? | YES | NO | |
| 8. | Have communication procedures between entrants and attendants been reviewed prior to entry? | YES | NO | |
| 9. | * Is the permit required confined space **free from hazards** that could require a time-sensitive, also referred to as an emergency rescue? | YES | NO | |

* Time-sensitive or emergency rescues require rescue within minutes to prevent a fatality or fatalities. Examples of emergency rescues include oxygen-deficient atmospheres, toxic atmospheres, flammable or explosive atmospheres, engulfment, moving parts, and moving machinery. The entry team shall acquire approval of their supervisor(s) and Environmental Health and Safety prior to entry into a permit required confined space that could require an emergency rescue. In such cases an emergency rescue plan must be developed, rescue personnel shall be at the site, and the rescue team and entry team trained on emergency rescue.

**NOTICE**: This permit must be made available to all members of the entry team. Upon completion of job return Permit originals or copies to Environmental Health and Safety.

Describe all problems encountered during entry: _____

_____

_____

**List the names of all those assigned to this job:**

Entry Supervisor: _____

Entry personnel: _____

Entry Attendants: _____

Equipment necessary for entry:

| | | | | | |
|---|---|---|---|---|---|
| X | Radio/Telephone* | ___ | Eye Protection | ___ | Protective Suit |
| X | Continuous Oxygen/LEL Meter* | ___ | Head Protection | ___ | Lighting |
| ___ | Fresh Air Ventilator | ___ | Gloves | ___ | Barriers/Shields |
| X | Full Body Harness** | ___ | Footwear | ___ | Ladder |
| ___ | Tripod Stand** | ___ | Other: _____ | | |

* - These items are required for all permit-required confined space entries.
** - Unless the use of such equipment creates real hazards, harness and frame is required for vertical entries and harness should be worn for horizontal entries to aid in placement of an individual on a stretcher or rescue board.

**ENTRY SUPERVISOR SHALL COMPLETE AIR SAMPLING.** Identical confined space meters are available in Heating Plant and through Environmental Health and Safety (EH&S).

## Contact Entry Team supervisor(s) and EH&S if air sampling detects levels exceeding specified limits. Confined space meters are set to alarm at specified limits.

Instrument used: _____ (Last calibrated): ___ / ___ / ___

Testing performed by _____ on _____/_____/_____ at _____:_____ AM / PM
(Date)

A) Oxygen Level (must be between 19.5% and 23.5%)
**Concentration: _____ %**

B) Flammable Vapor Content (cannot exceed 10% of the Lower Explosive Limit)
**Concentration: _____ %**

C) Toxic Vapor Concentration (cannot exceed the Permissible Exposure Limit)

| | | |
|---|---|---|
| **Concentration:** | Carbon Monoxide | _____ PPM (cannot exceed 35 ppm) |
| | Hydrogen Sulfide | _____ PPM (cannot exceed 10 ppm) |
| | Other: _____ | _____ PPM (contact EH&S) |
| | Other: _____ | _____ PPM (contact EH&S) |

By signing this permit the entry supervisor authorizes entry into the confined space, confirms that the work cannot be accomplished without entering the space and that all required actions have been taken to minimize or eliminate hazards.

Entry Supervisor Authorization: _____ (Print) _____ (Signature) _____ (Date)