

# Confined Space Entry

## Millersville University - Office Of Environmental Health & Safety Scope & Application

The Confined Space Entry (CSE) program applies to the safe working practices for entering and working in confined spaces. A confined space is a space large enough for a person to physically gain entry, but with limited means of egress, and is a space not designed for continuous occupancy. These spaces may also contain a variety of hazards which may cause injury or death.

This program specifically outlines the definitions, procedures and training requirements to be utilized by Millersville University employees to prevent accident which may cause injury or death, when entering or working in a confined space. It is the duty of each employee to become familiar with the contents of this program and ensure compliance with its procedures. Heads of departments shall ensure that employees under their supervision comply with this procedure and follow confined space entry safety protocols. Heads of departments shall ensure that employees under their supervision receive training in the contents of this program and ensure records of this training are maintained.

The CSE program applies to all employees, contractors, or other individuals whose job duties require them to work directly in confined spaces.

### Purpose

The purpose of this program is to establish procedures for safe working practices and for safe entry of confined spaces.

### Definitions

**Attendant:** Employees stationed outside one or more confined space entry points to monitor the Authorized Entrant and who performs all Attendant duties.

**Authorized Entrant:** An employee authorized by the University to enter a confined space.

**Confined Space:** A space that is large enough and so configured that a person can bodily enter and perform assigned work and has limited or restricted means of entry and exit and is not designed for continuous occupancy. Examples of confined spaces include storage tanks, sub-cellars, bins, boilers, septic tanks, sewers, utility tunnels, chimneys, ducts, and wells. A confined space can also be open topped, especially if it is four feet or more in depth.

**Confined Space Qualified:** A confined space qualified person is an employee who has had confined space training and is familiar with:

- the recognition of hazards associated with entry into confined spaces
- procedures for use of entry permits
- atmospheric testing techniques and methods
- interpretation of atmospheric test results
- ventilation methods and equipment
- use of personal protective equipment
- safe work practices
- rescue techniques and equipment
  - use of respirators

**Entry:** The action by which a person passes through an opening into a confined space.

**Entry Permit:** A written document provided by the University to control entry into a permit required confined space.

**Entry Supervisor:** A person responsible for determining if acceptable entry conditions are present at a permit required confined space, for authorizing and overseeing entry operations, and for terminating entry operations.

**Hazardous Atmosphere:** An atmosphere that may expose an employee to risk of death, incapacitation, impairment of ability to self-rescue, injury or acute illness from either:

- Flammable gases, vapors or mists
- Airborne combustible dust
- Insufficient oxygen concentration (below 19.5% oxygen) or excessive oxygen concentration (above 23.5% oxygen).
- Atmospheric concentrations of a chemical or other agent for which there is a dose or permissible exposure limit
- Any Immediately Dangerous to Life and Health (IDLH) atmosphere

**Immediately Dangerous to Life and Health (IDLH) Atmosphere:** Maximum concentration of a contaminant from which a person could escape within 30 minutes without any escape-impairing symptoms or irreversible health effects.

**MSA Passport:** The confined space entry testing device also referred to as a combustible gas meter. This instrument is used to test the atmosphere in the confined space prior to, and during entry.

**Non-Permit Required Confined Space:** A confined space, which is completely free of hazards and can be so proven without entering the space. The entrant must be a qualified person and would be able to work alone with no safety attendant required. A confined space can only be designated a non-permit required confined space by the Office of Environmental Health and Safety.

**Permit Required Confined Space:** A confined space that has one or more of the following characteristics:

- contains, or has the potential to contain, a hazardous atmosphere
- contains a material that has the potential for engulfing an entrant
- has an internal layout such that someone entering could be trapped or asphyxiated by inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section
- contains any other recognized serious safety or health hazard.

**Testing:** The process by which the hazards that may confront entrants into confined spaces are identified and evaluated.

### **General Procedures**

Only authorized employees shall perform confined space entry procedures

### **Permit-required Confined Space Entry Procedure**

**All entries into permit-required confined spaces on campus must follow this procedure.**

Those entering a permit-required confined space must complete the CSE Permit form and follow the checklist on the form, to ensure necessary precautions have been taken, prior to entry. Entry Supervisors are required to authorize a permit and the Supervisor or Authorized Entrant must complete the form, prior to entry. Keep copies of the permit form in the FM or IT departments.

### **Duties of Authorized Entry Supervisors**

Know the hazards that may be faced during entry.

Verify by checking that the permit is complete, that testing and monitoring has been performed, that all procedures and equipment specified by the permit are in place, operational, and being used properly, before endorsing the permit and allowing entry.

After procedures are complete, terminate the permit.

Verify that rescue services are available and there is a means for summoning them.

Make sure unauthorized individuals are removed from the area.

If the responsibility for entry operation is transferred to other individuals, make sure the safety of the entry operations remain consistent with the procedures listed in the permit.

## **Duties of Authorized Entrants**

Know the hazards that may be faced during entry.

Know how to properly use the equipment necessary for safe entry.

Communicate with the Attendant as necessary about the status of the work being performed, any problems encountered, and the need to evacuate the space (or perform an Entry Rescue).

Alert the Attendant and exit the space immediately if:

- An order to evacuate is given by the Attendant or Supervisor
- The Entrant recognizes a warning sign or symptom of exposure to a dangerous situation
- The Entrant detects a prohibited condition
- The alarm sounds on the air monitoring device

## **Duties of the Attendant**

Know the hazards that may be faced during entry.

Know how to properly use the equipment necessary for safe entry and rescue.

Know the early warning signs and symptoms of exposure to hazardous contaminants that the Attendant may display. Know how to act quickly and properly.

Remain in contact (visual and voice) with the Attendant at all times. Do not move away from the space or leave the space unattended.

Communicate with the Entrant to monitor the status of the work, and the Entrant's condition.

Monitor activities inside and outside the space to make sure it is safe to continue entry operations and it is safe for the Entrant to remain in the space.

Monitor all equipment to make sure it is operational during the entry procedure.

Summon rescue and emergency services as soon as the Attendant determines the Entrant may need rescue or immediate extraction from the space.

Perform all steps necessary to conduct an Entry Rescue, if necessary.

Prevent unauthorized individuals from approaching and entering the work space. Contact the Supervisor, the EHS office, or University Police if an unauthorized individual refuses to leave the space.

Stay focused on the Attendant duties and tasks, do not become distracted.

### **Pre-Entry Procedures**

Complete the pre-entry checklist and permit form

- The Entry Supervisor must authorize the permit (the entry) and sign off on the permit form.
- Cancel the permit after the CSE operations are complete

Provide the necessary safety equipment to perform permit-required confined space entry. This equipment shall include, but not be limited to the following:

- The permit and checklist form
- Calibrated testing and monitoring equipment (the MSA Passport)
- Ventilation equipment (fan, motor, blower, tubing, electrical extension cords)
- Communication equipment (walkie talkie)
- Personal protective equipment as necessary (gloves, hardhat, eye protection, hearing protection respiratory protection)
- Lighting equipment (explosion proof and intrinsically safe)
- Barriers, warning signs to protect opening
- Manhole cover lifting device
- Ladders
- Rescue equipment (tripod, winch, lanyards, fall arrestor, etc.)

### **Isolate and Secure the Confined Space and the Environment**

De-power all electrical equipment, lock out and tag out, release any stored energy.

Close all valves, lock and tag

Place appropriate barricades and warning signs around the entrance to the space (to prevent pedestrians from falling in)

Isolate and secure any other known hazard inside or feeding to the confined space, prior to entry

### **Perform Initial Atmospheric Monitoring**

Safely remove the cover (manhole) to the confined space.

Make sure the MSA` Passport testing device is calibrated and operating properly. Put the instrument through it's start up and internal calibration procedures. If the instrument is not working properly do not enter the confined space. Contact the EHS office for assistance.

Test the atmosphere using the instrument and the extension probe. Move the probe around inside the space so that it reaches all levels (i.e., face of the opening, one foot down, two feet down, three feet down, etc.). Hold the probe at each level for a minimum of one minute to obtain an accurate reading.

If the confined space entry meter should alarm do not enter the space. Allow the meter to clear itself in clean air then re-test. If the instrument alarms again, call EHS.

Carefully watch the readings at each level. Write down the readings on the checklist for each contaminant (Combustibles/LEL, CO, H<sub>2</sub>S, oxygen). If the readings begin to increase (or decrease) towards unsafe levels, contact the EHS office before entering.

If there are suspected hazards which the MSA` Passport will not sample for, contact the EHS office prior to entry. The EHS office will provide additional sampling devices, techniques and methods as necessary.

### **Ventilate the Confined Space as Required**

If a hazardous atmosphere has been identified entry will not be permitted until the space has been ventilated and the hazard removed and controlled.

Direct the mechanical ventilation into the immediate area where the employee will be working

Provide continuous forced air ventilation to the space until the hazard has been eliminated

Maintain the mechanical ventilation in the space until all employees have exited.

The air supply for the forced mechanical ventilation must be from a clean source.

Locate the blower and motor at least 5 feet from the opening

Lower the supply air hose (duct) no more than 25% of the depth of the hole.

Purge the air in the space for at least 10 minutes prior to entry.

Locate the air intake of the blower away from sources of vehicle exhaust

Retest the atmosphere to make sure the hazard has been eliminated and the mechanical ventilation has been successful at controlling the hazard. Employees may not enter the space until the atmosphere has been retested.

## **Designate Confined Space Entry Roles**

Designate who will be the Authorized Supervisor, Authorized Entrant, Attendant, and any other persons assisting in the entry. Make sure everyone understands their responsibilities and roles.

## **Develop and Implement Emergency and Rescue Procedures**

Emergency rescue (retrieval) systems are required for any permit-required confined space entry.

Authorized Entrants shall wear appropriate harnesses/lanyards connected to a fall arresting device and mechanical winch, attached to a tripod placed over the manhole (entrance to the space).

Make sure the retrieval line (cable) is attached to the harness above the Entrant's head at the upper part of the back, shoulder level.

Attendants must make sure the cable is properly connected to the Entrants harness, check the fall arresting device and winch to make sure it is operating properly, check to make sure the tripod is sturdy and well positioned above the space, and all other measures necessary to ensure retrieval of the Entrant in an emergency.

The Attendant must wear a harness with the lanyard attached to the tripod as a secondary means of protection (to prevent the Attendant from falling into the space during rescue operations).

The Attendant must ensure warning signs and barricades are posted around the confined space and only authorized individuals are near the entrance.

The Attendant must monitor the mechanical ventilation system (if it is operating and ventilating atmosphere in the space).

The Entrant carries the MSA Passport on their body to continuously monitor the air while they are in the confined space. If at any time while inside the confined space, the MSA Passport instrument alarms, the Attendant must leave the space immediately. Contact the EHS office and determine how a hazardous atmosphere developed (or returned to) in the space.

The Attendant remains in visual and voice contact with the Entrant at all times.

## **Entry Rescue**

If at any point an Entry Rescue becomes necessary, follow these procedures:

- Immediately remove the Attendant from the space using the winch, harness, and tripod assembly.
- Contact emergency personnel by calling 911
- Immediately perform emergency CPR if necessary on the victim.
- Contact the EHS, IT and FM supervisors and offices to report the rescue
- Move a safe distance away from the confined space if possible
- Make sure no other person, or pedestrian goes near the confined space

## **Post-Entry Procedures**

Once work is completed, remove any equipment (ladders, temporary lighting, tools, etc.) and carefully replace the manhole cover.

Take down the rescue equipment, barricades, warning signs, and testing equipment and properly store it for future use.

The Authorized Supervisor will sign off on the permit that the confined space entry procedure has been terminated successfully.

Store the permit and any other records.

## **Confined Space Entry Pre-entry Checklist**

Use the CSE pre-entry checklist to determine if a space may be a permit-required confined space and to make sure all testing and precautions have been taken, prior to entry.

## **Confined Space Entry - Permit**

Use the CSE Permit if the testing and evaluation of the confined space indicates a hazard exists requiring the development of a permit and the implementation of control measures.

## **Facilities Management And Information Technology - Responsibilities**

Identify FM and IT employees who could be required to enter a confined space and ensure these employees receive training to become Entry Supervisors, Authorized Entrants or Attendants.

Identify Entry Supervisors and Authorized Entrants who will be responsible for ensuring permit-required confined space work practices are being followed and who are authorized to sign entry permits.



Designate a person in FM and IT who will have overall responsibility for the confined space entry program.

Ensure that only trained and authorized personnel enter confined spaces.

Ensure that contractors and contractor employees follow confined space entry procedures.

Ensure that all employees who are trained and authorized to enter confined spaces are physically able to do so.

Identify and post warning signs at all confined space entry operations on campus.

Purchase and maintain all necessary safety equipment for performing confined space entry procedures.

Immediately report any unsafe conditions to the EHS office.

Conduct an annual review of the confined space entry program to identify any change in reported hazards, and any injuries or near misses.

Maintain all entry permits for at least a period of one year.

Maintain other records (such as air monitoring results, calibration records) for at least three years.

### **Environmental Health & Safety - Responsibilities**

Review and update the confined space entry policy as necessary.

Conduct periodic audits of the confined space entry program, procedures, training records, etc.

Maintain all personnel training records, conduct CSE training as needed.

Conduct training for the use of the MSA Passport CSE instrument and help FM and IT maintain the instruments in operating condition.

Evaluate any unsafe or dangerous conditions, accidents, near misses, as necessary.

### **Permit Required Confined Space Entry Program**

A permit-required confined space entry program will be developed by FM, IT, and EHS. Copies of this program will be kept in each office and distributed to supervisors responsible for confined space entry procedures. The program will be reviewed on an annual basis and changed as necessary. The program will consist of:

- Measures necessary to prevent unauthorized entry into confined spaces
- Measures necessary to identify and evaluate the hazards in a confined space, prior to entry.
- Procedures and practices necessary for safe entry into confined spaces
- Equipment necessary for confined space entry
- Procedures for the preparation, issuance, use, and cancellation of entry permits
- Procedures for reclassifying spaces so they may be entered without a permit or an attendant.
- Designated responsibilities of personnel involved in confined space entry
- Procedures to coordinate entry procedures with contractors where both University and contractor employees must enter a confined space at the same time.
- Testing and monitoring procedures
- Rescue and emergency operation procedures
- Recordkeeping
- Training
- Periodic program evaluation procedures

## **Training**

All employees required to enter a confined space must first receive training in the proper methods for entering a confined space.. Employees must acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned to them during confined space entry. Training must be performed:

- Before the employee is first assigned confined space entry duties
- Before there is a chance to the assigned duties
- Whenever there is a change to the confined space entry procedures that present a hazard about which the employee has not previously been trained.
- Where there is reason to believe there are inadequacies in the employees knowledge or nose of these procedures.

All employees who use the MSA Passport confined space entry testing device must have completed training and demonstrated proficiency in using the instrument to test the air inside confined spaces prior to, and during entry.

Training will be provided by outside vendors and/or the EHS office.

The training program will comply with the minimum training requirements of the OSHA confined space entry standard (29 CFR 1910.146, Permit-required Confined Spaces for General Industry). The training will include hands on demonstrations of the necessary equipment used in confined space entry. The training program will consist of these minimum training elements:

- Recognition and awareness of confined spaces that may be found at Millersville University
- The Millersville University Confined Space Entry Policy

- The difference between permit-required and non-permit required confined spaces
- How to use the Pre-Entry Checklist
- How to complete a CSE Permit form
- The duties of Entrants, Attendants, and Supervisors
- How to recognize and identify hazards
- Proper warning signs and barricades at confined spaces
- How to remove the manhole cover safely
- How to use the MSA Passport air monitoring device including calibration
- Limitations and interferences encountered during air monitoring
- Early warning signs and symptoms of exposure to hazardous contaminants in confined spaces
- Commonly encountered contaminants and hazardous atmospheres inside confined spaces
- Lockout/Tagout procedures and other site entry advance preparations
- Understanding of the purpose and use of all CSE equipment
- Communication procedures
- Ventilation procedures
- Fall protection and extraction procedures
- Rescue procedures
- Personal protective equipment
- Unauthorized entry
- Contractor responsibilities
- Recordkeeping

## **Contractors**

When contractor employees are required to enter University confined spaces the following policies will apply

The contractor and their employees will comply with the stated requirements for confined space entry spelled out in the applicable state contract they have agreed to. Access to University confined spaces to perform contract work is only allowable if the contractor and their employees follow recognized safe confined space entry procedures and follow the OSHA rules and regulations (29 CFR 1910.146, Permit-required Confined Spaces for General Industry).

Facilities Management, Information Technology, or other University departments who have contracted with the company will inform the contractor and their employees of the presence, location, and nature of the University confined spaces they must enter. This will include a description of the confined space, the nature of the hazards posed by entering the confined space, history of the University's experience with the confined space, and what classifies it as a confined space.

Any questions regarding the necessity of using confined space entry procedures in University confined spaces, or technical questions regarding confined space entry equipment or procedures should be directed to the EHS office.

If more than one contractor, or contractor employees and University employees are working at the same time inside a confined space, procedures to coordinate entry operations must be implemented.

Any deviations from OSHA mandated and industry recognized safe entry procedures for confined spaces must be requested, before entry, through the Facilities Management or Information Technology departments and must be approved by the EHS office.

The contractor must implement their own confined space entry program, policies, and procedures in accordance with the OSHA standards.

Any hazards or problems encountered by contractor personnel during confined space entry procedures must be reported immediately to the FM or IT contact/project manager/project coordinator/QA person and the EHS office.

# Confined Space Entry - Pre-entry Checklist

Does the history of the confined space show that it to be free of atmospheric hazards from chemical contaminants or other sources such as vehicle exhaust, piping, tank or gas leaks, or sewer gasses? yes ( ) no ( )

Does your knowledge of the confined space indicate the area is likely to remain free of dangerous air contaminants while occupied? yes ( ) no ( )

Have you been trained in the operation and calibration of the confined space entry instrument (MSA Passport) to be used to test the atmosphere prior to and during entry?

yes ( ) no ( )

Has the MSA Passport testing instrument been calibrated within the past month?

yes ( ) no ( )

Did you test the atmosphere of the confined space prior to entry? yes ( ) no ( )

Record the readings from this testing:

Oxygen \_\_\_\_\_%

LEL \_\_\_\_\_%

CO \_\_\_\_\_ ppm

H<sub>2</sub>S \_\_\_\_\_ ppm

Did the atmosphere test as acceptable for each contaminant? yes ( ) no ( )

Did the MSA Passport alarm sound during the testing? yes ( ) no ( )

Will the atmosphere be continually monitored while the space is occupied? yes ( ) no ( )

Have all other hazard within the space been eliminated? yes ( ) no ( )

If any of the above questions have been answered "no" DO NOT ENTER THE SPACE. Contact your supervisor and the EHS office. This may be a permit-required confined space and will require a permit and corrective action before entry.

Contact University Police and the Millersville Fire Department in the event of an emergency by calling 911, 3-911, or 872-3433.

If there are no atmospheric hazards present and if the pre-entry tests show there is no dangerous air contaminant and/or oxygen deficiency within the space and there is no reason to believe that any is likely to develop, the space is non-permit required.

Job Location: \_\_\_\_\_

Authorized Entrant or Supervisor Signature: \_\_\_\_\_

Date: \_\_\_\_\_

# Permit-required Confined Space Entry - Permit

## Entry Information

Entry Date: \_\_\_\_\_

Termination Date: \_\_\_\_\_

Location and Description of Confined Space: \_\_\_\_\_

Description of the Work: \_\_\_\_\_

Number of Entrants Assigned: \_\_\_\_\_

Names of Entrants: \_\_\_\_\_

## Isolation Checklist

Lockout/Tagout Performed? yes ( ) no ( )

Lines and Pipes Isolated? yes ( ) no ( )

Electrical Power Controlled/Dissipated? yes ( ) no ( )

Signs and Barricades in Place? yes ( ) no ( )

Unauthorized Entrance Prevented? yes ( ) no ( )

## Pre-entry Checklist

Ventilation Performed? yes ( ) no ( )

Air Tested to Confirm Adequacy of Ventilation? yes ( ) no ( )

Ventilation Maintained During Entry? yes ( ) no ( )

Atmospheric Air Testing Performed? yes ( ) no ( )

Sample Results:

Oxygen \_\_\_\_\_%

LEL \_\_\_\_\_%

CO \_\_\_\_\_ ppm

H<sub>2</sub>S \_\_\_\_\_ ppm

Contaminant Levels Within Safe Limits? yes ( ) no ( )

Name of Air Testing Instrument Used \_\_\_\_\_

Instrument Recently Calibrated? yes ( ) no ( )

**Special Equipment Needed**

List Any Special Safety Equipment Needed to Perform the Entry or Job

Respirators? yes ( ) no ( )

Fire Suppression? yes ( ) no ( )

Lighting? yes ( ) no ( )

Body Protection? yes ( ) no ( )

Hearing Protection? yes ( ) no ( )

Eye Protection? yes ( ) no ( )

Other: \_\_\_\_\_

**Special Task Specific Hazards**

Welding? yes ( ) no ( )

Burning/Brazing/Other Hot Work? yes ( ) no ( )

Other: \_\_\_\_\_

**Special Precautions Taken To Minimize Hazards**

List Any Special Precautions Taken Because of Task Specific Hazards

\_\_\_\_\_

**Rescue/Emergency Procedures**

All rescue equipment in place and operational? yes ( ) no ( )

Communication equipment operational? yes ( ) no ( )

Attendants and Entrants know their responsibilities? yes ( ) no ( )



**Verification**

I verify that actions and conditions necessary for safe entry have been performed.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_