Mount Holyoke College

Confined Space Program

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In Compliance with the
OSHA 29 CFR 1910.126

Environmental Health, Safety & Sustainability
413-538-2529

Mount Holyoke College
CONFINED SPACE PROGRAM

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CONFINED SPACE PROGRAM

I. PURPOSE

This Program is designed to identify and control potential hazards of working in confined spaces on campus by establishing procedures for confined space entry in compliance with 29 CFR 1910.146, OSHA Permit Required Confined Space Standard.

II. DEFINITIONS

A **Confined Space** is a space that has all of the following characteristics:

- is large enough and so configured that a person can bodily enter and perform assigned work
- is limited or restricted in its means of entry or egress
- is not designed for continuous occupancy

A **Permit Required Confined Space** is 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 with the potential to engulf someone who enters the space
- has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section
- contains any other recognized serious safety or health hazard, examples include:
    - fall hazards
    - unguarded machinery
    - extreme hot or cold
    - live steam pipes
    - gas lines
    - electrical hazards
    - combustion sources
    - hazards introduced to the space (e.g., welding, chemical use)

Entry means any part of the entrant's body breaking the plane of an opening into a confined space.

III. CONFINED SPACES ON CAMPUS/AUTHORIZED EMPLOYEES

A. Non-Permit Required Spaces

A Non-Permit required confined space is a confined space that does not contain, or have the potential to contain, any hazard capable of causing death or serious physical harm. Examples may include interiors of HVAC units, certain air plenums, attics, and some building crawl spaces.

Entry into Non-Permit required spaces requires atmospheric testing prior to and during entry to ensure the space is, and remains, free of atmospheric hazards. General work safety practices must be adhered to including presence of an attendant and use of barriers to ensure the safety of others in the area.

Areas that have been classified as Non-Permit may be reclassified as Permit-Required if hazards are being introduced to the space (e.g., welding, chemical use), or unusual conditions have changed the hazards of the space (e.g., toxic atmosphere, water infiltration).

B. Permit Required Confined Spaces

Entry into Permit Required Confined Spaces requires that a valid Entry Permit be in place. Requirements for Entry Permits are detailed in section VII.

Examples of Permit Required confined spaces on campus include:

Boilers: waterside and fireside
Hot water tanks at the Central Heating Plant and in campus buildings
Manholes: any space accessed by lifting a manhole cover
Mechanical Crawl Spaces: e.g., Carr, Kendade Shattuck, Williston Library, Mary Lyon, Pratt, Torrey and Betty Shabazz
Elevator Pits and Shafts
Certain Attics: e.g., Dwight

Facilities Management maintains a list of all Permit Required confined spaces on campus and ensures that spaces are identified by signs or, in the case of manholes, on a map posted at the Otto Kohler Building and the Central Heating Plant.

C. Authorized Employees

Only employees who have been trained under the confined space program may enter any confined space or serve in any other capacity in support of entry (e.g., attendant, entry supervisor). Trained employees in the following Facilities Management trades are authorized to participate in entries: Plumbing, HVAC, Electrical, Central Heating Plant.

The following Facilities Management employees are authorized as Entry Supervisors: Associate Director and Chief Engineer, Plumbing Supervisor, Electrical Supervisor, HVAC and Central Heating Supervisor, or his/her designee. The Entry Supervisor cannot be an entrant or attendant.

IV. IDENTIFYING PERMIT REQUIRED CONFINED SPACE HAZARDS

A. Hazardous Atmosphere

The following parameters are used to define a "Hazardous Atmosphere."

Atmospheric oxygen concentration below 19.5 percent or above 23.0 percent.

At 16% most people will show signs of respiratory distress, light-headedness, mental confusion. Above 23% the risk of fire and explosion increases rapidly.

Flammable gas, vapor, or mist more than 10 percent of its LEL.

LEL is the Lower Explosion Limit (also sometimes known as the Lower Flammability Limit, LFL). It is the lowest concentration in air at which ignition can occur. The UEL is the Upper Explosion Limit above which ignition will not occur. The flammable range is the range between the LEL and UEL.

Carbon Monoxide more than 35 parts per million.

Carbon monoxide is the most common cause of chemical poisoning deaths. It is a chemical asphyxiant that prevents blood from transporting oxygen. The alarm level of 35 ppm is the 8-hour time weighted average OSHA Permissible Exposure Limit.

Hydrogen sulfide more than 10 parts per million.

Hydrogen sulfide is toxic and explosive. The LEL is 4% and the UEL is 44%. The 8-hour OSHA Permissible Exposure Limit is 10 ppm. The Immediately Dangerous to Life and Health (IDLH) concentration is 300 ppm. Hydrogen sulfide has a distinct odor that can be detected at 0.0002 ppm. The toxic effects are, however, on the nervous system; the nerve responsible for smell quickly becomes fatigued, therefore, odor, or lack of odor, should not be used as a warning sign. Eye and nasal irritation are more persistent.

Airborne combustible dust at a concentration that meets or exceeds its LEL

(approximately a dust that obscures vision at a distance of 5 feet or less).

B. Other Confined Space Hazards

- engulfment including potential for rising water, sewage, or landslide
- configuration/entrapment (spaces that narrow or have obstructions that might cause a person to become stuck)
- fall hazards of 6 feet or more

- unguarded machinery or mechanical hazards such as rotating or moving mechanical parts
- extreme temperatures including either high or low atmospheric temperature in the space or hot objects in the space
- live steam lines
- gas lines with valves or other devices that could release gas if they fail
- electrical hazards including exposed electrical voltages more than 120 volts
- combustion sources due to potential for combustion gases
- introduced hazards such as welding or chemical use

V. EQUIPMENT

Two GasAlert MaxXTII four gas (oxygen, flammable gas, carbon monoxide, and hydrogen sulfide) meters are available for testing confined spaces. Basic instructions for the meter are included at the end of this Program. The meters are:

- stored at Central Heating Plant
- only available to employees trained under this Program
- signed out including: employee name, date, time, and location of use
- maintained by the Central Heating Plant Engineers

Barriers, air blower, retrieval tripod and other confined space equipment are also kept at the Central Heating Plant.

Kendade mechanical room is equipped with escape breathing apparatus, for use to immediately exit the area should the refrigerant release alarm sound. These respirators are inspected and maintained by Facilities Management.

VI. PROCEDURES FOR WORKING IN A <u>NON-PERMIT REQUIRED</u> CONFINED SPACE

Only employees who have completed training for this Program are authorized to enter a confined space or serve as an attendant. **An attendant is required for all work in non-permit required confined spaces.**

A. Pre -Entry

1. Pick-up test equipment and *a Confined Space Entry Permit* at the Central Heating Plant. Prior to using, perform a bump test on the meter by inserting the meter into the bay of the MicroDock II docking station and pushing the “Bump Check” button. A passed bump test is indicated when the docking station’s screen displays a “✓” next to each sensor (O2, CO, H2S, LEL) and alarm (AUD, VIS) tested. A failed bump test is

designated by an "×" mark next to the failed sensor or alarm function. If the bump test fails, the meter requires calibration or repair and cannot be used. Record the bump test and removal of the test equipment on the *Instrument Log*.

2. Complete the following pre-entry tasks

- Identify the Entry Supervisor (see Section IIIC) and complete Section 1 of the Entry Permit
- gather required equipment
- erect pedestrian and/or vehicular barriers as needed
- eliminate any condition that makes it hazardous to open the space
- open the space
- without entering the space, make a visual inspection for potential hazards
- without entering the space, test for atmospheric hazards using the test meter and record the results
- ensure communication system for summoning emergency assistance is available
- complete Section 2 of the entry permit

3. Rescue Services Notification

During regular office hours, prior to entry, the Entry Supervisor must notify the Facilities Management Office of the entry location and estimated entry time and duration of entry. The Office will notify South Hadley Fire District #2. After hours, the Entry Supervisor is responsible for notifying South Hadley Fire District #2.

4. Determine if the space is a Non-Permit Required Space or needs to be reclassified. If any level of atmospheric contaminant is detected or any other hazard is detected, the space must be reclassified as a Permit Required Confined Space.

B. Entry

An attendant must be present for all work in confined spaces, Permit and Non-Permit required.

Assuming the space remains classified as Non-Permit Required, enter the space continuing to do atmospheric testing while in the space and complete the needed task. If atmospheric or other hazards develop while in the space, exit immediately and reclassify as Permit Required.

The entry must be terminated and the space immediately evacuated if atmospheric or other hazards develop during entry. The space must then be reclassified as Permit Required and a new permit process initiated.

C. Entry Termination

After the necessary work is complete, remove all tools, exit the space, and secure the entry point from unauthorized entry.

VII. PROCEDURES FOR WORKING IN A PERMIT REQUIRED CONFINED SPACE

Only employees who have completed training for this Program are authorized to enter a confined space or serve as an attendant. **An attendant is required for all work in permit required confined spaces.**

A. Pre-Entry

1. Pick-up test equipment and *a Confined Space Entry Permit* at the Central Heating Plant. Prior to using, perform a bump test on the meter by inserting the meter into the bay of the MicroDock II docking station and pushing the "Bump Check" button. A passed bump test is indicated when the docking station's screen displays a "✓" next to each sensor (O2, CO, H2S, LEL) and alarm (AUD, VIS) tested. A failed bump test is designated by an "✗" mark next to the failed sensor or alarm function. If the bump test fails, the meter requires calibration or repair and cannot be used. Record the bump test and removal of the test equipment on the *Instrument Log*.

2. Complete the following pre-entry tasks

- identify the Entry Supervisor (see Section IIIC) and complete Section 1 of the Entry Permit
- gather required equipment
- erect pedestrian and/or vehicular barriers as needed
- eliminate any condition that makes it hazardous to enter the space
- open the cover or other closure device
- without entering the space, make a visual inspection for potential hazards
- without entering the space, test for atmospheric hazards using the test meter and record the results
- implement controls, such as lockout/tagout to isolate identified hazards
- obtain a Hot Works Permit if applicable
- if the space is a sewer pit, a hazard will be introduced (e.g., hot work operations, or chemical use), or a hazardous atmosphere is detected, a forced ventilation system must be set up
    - care must be taken to insure that the air intake to the ventilation system is safe from contamination and that the ventilation is directed toward the employee's work area in the confined space

    - if ventilation is required, set up ventilation and retest atmosphere (acceptable results must be sustained for at least 10 minutes prior to entry)
- for all vertical entries, the retrieval system (tripod and harness) must be used
- for all boiler entries, anklets must be used
- ensure a communication system for summoning emergency assistance is available
- complete Section 2 and 3 of the Entry Permit
- entry supervisor reviews

3. Rescue Services Notification

During regular office hours, prior to entry, the Entry Supervisor must notify the Facilities Management Office of the entry location and estimated entry time and duration of entry. The Office will notify South Hadley Fire District #2. After hours, the Entry Supervisor is responsible for notifying South Hadley Fire District #2.

B. Entry Permit

After Section 2 and 3 of the Entry Permit is complete, the Entry Supervisor reviews the permit information and site conditions and either issues an Entry Permit, Section 4, or determines that additional testing or precautions are needed and supervises those efforts. If the Entry Supervisor determines that the space cannot be safely entered, the Entry Permit is denied and the space cannot be entered.

C. Entry

For all entries, the meter must be carried in to the confined space by one of the entrants, or operated remotely by the attendant during the entire entry.

Record all entrant entries and exits and changes in attendant in Section 5 of the Entry Permit. The Entry Permit must remain on-site throughout the entry.

Should the test equipment sound a warning alarm during entry, all employees must exit the space immediately and the entry is terminated. Record the Termination for Cause in Section 6 of the Entry Permit. Prior to reentry a new Entry Permit must be issued restarting all entry procedures.

If additional action is needed to control hazards once the space is entered, take that action immediately upon entry.

The escape respirator must be carried into the Kendade mechanical crawl space.

D. Entry Termination

After the necessary work is complete, remove all tools, exit the space, and secure the entry point from unauthorized entry.

If the space is being ventilated, all employees must leave the confined space before the ventilation system is turned-off.

Complete Section 6 of the Entry Permit and give the Permit to the Entry Supervisor for review.

E. Duties of the Attendant

- maintains an accurate count and identification of authorized entrants in the space
- remains outside the space during entry until relieved by another attendant
- monitors conditions inside and outside the space
- maintains communication with entrants
- notifies entrants to leave the space if conditions become hazardous or if entrants show signs of overexposure to hazardous conditions
- calls for emergency personnel or other support if needed

VIII. EMERGENCY PROCEDURES

The College has an agreement with South Hadley Fire District #2 for emergency rescue services. Should rescue services be required or other health emergency occur, immediately contact Campus Police (ext. 1911 from a campus phone, 413-538-2304 from a cell phone) to request services.

IX. CONTRACTOR ENTRY

If Mount Holyoke College hires a contractor for work in a confined space the following tasks should be performed.

1. All contracts for work to be done in a space identified by the College as a confined space will include the explicit requirement that the work be done according to a confined space program meeting the requirements of 29 CFR 1910.146.

2. The College must tell the contractor of any known hazards in the space and provide the contact information for South Hadley Fire District #2 so that the contractor can give pre-entry notification and call for emergency services if needed.

3. Contractors must supply their own equipment and make their entry record or permit available upon request.

4. The College supervisor for that work area will inform the contractor of:

- any known hazards in the space
- results of any testing done to detect these hazards
- recommended procedures in use to control any potential hazards

5. If both College employees and a contractor will be entering a space, College procedures will be used for College employee entry and contractor procedures will be used for contractor employee entry. An attendant may be shared if s/he is aware of College emergency notification procedures.

X. TRAINING

Employees will be trained:

- at the start of this Program
- after that time for new and transferred employees before entering a confined space or serving in any other capacity under this program
- if program review finds the need for additional training
- when changes in the Program, test equipment, or list of confined spaces warrant additional training

The training program will consist of:

- the hazards associated with working in confined spaces
- a review of the Mount Holyoke College Confined Space Program and the OSHA Permit-Required Confined Space Standard
- how to complete the Instrument Log and Confined Space Entry Permit
- how to use the atmospheric test equipment
- how to use other program equipment (barriers, communication equipment etc., escape respirator)
- procedures for confined space entry
- emergency procedures

XI. RECORDS

The Entry Permit will be kept at the work site. After completion of the entry these documents will be completed and given to the Entry Supervisor for review.

Completed Permits for the current year will be maintained in a folder at the Central Heating Plant. The Instrument Log will be maintained at the Central Heating Plant and kept on a clipboard mounted near the test equipment. Instrument calibration and bump test records are maintained by the Central Heating Plant Engineers and kept using the Fleet Manager II software that came with the test equipment. The Instrument Log will be reviewed annually and completed logs will be filed in the labeled folder at the Central Heating Plant.

All Permits, Instrument Logs, and other program records will be kept for at least one year after their annual review.

Training records will be kept in the Environmental Health, Safety & Sustainability Office.

XII. ANNUAL PROGRAM REVIEW

Once a year, the Facilities Management Associate Director (or his designee) will review the Confined Space Entry Program. The review will include at least the following procedures:

- reviewing the records for the past year for completeness and adherence to the written Program
- determining the need for Program modification or training
- determining the need for new equipment
- determining whether additional spaces should be classified as Permit Required Confined Spaces or whether identified spaces can be removed from the Program

GasAlert MaxXTII Multi-Gas Monitor
Basic Operating Instructions

Manufacturer's instructions are available at the Central Heating Plant. Manufacturer's instructions should be read before using the monitor for the first time.

1. Prior to removing the meter from the Central Heating Plant, perform a Bump Test by inserting the meter into the bay of the MicroDock II docking station and pushing the "Bump Check" button. The test passes when the docking station's screen displays a "✓" next to each sensor (O2, CO, H2S, LEL) and alarm (AUD, VIS) tested. The test fails if an "×" mark is displayed next to any sensor or alarm function. If it doesn't pass, the meter must be calibrated or repaired before use.

2. To activate the detector, press C in a safe area free from hazardous gases.
   - The display will indicate a battery and audible/visual startup test
   - in cold weather the pump may indicate a 'warm up' cycle
3. The pump will prompt the Force Block Test by displaying BLOCK INLET

   - using your finger, block the inlet or end of the hose
   - when prompted UNBLOCK INLET, remove your finger
   - the display should then read PUMP OK
   - if the pump is not operating properly, it will say PUMP FAILURE and turn off.
4. Alarm Setpoints will now display and the detector performs a self-test. Upon a successful test, SELF TEST OK will display. If unsuccessful, ERROR will display and the machine will shut down.
5. If the previous calibration failed, the display will show LAST CAL FAILED. The calibration due date will then be displayed. If any sensor is past the calibration due date, the display will read CAL DUE NOW. The meter should not be used until a successful calibration is performed.
6. If the detector passes all the startup tests, the detector enters normal operation and displays ambient gas reading. If a sensor fails after startup, ERR will be displayed and the meter should not be used.

7. The lower center of the display will show a battery icon indicating battery life - (the meter will beep periodically to warn you when there is only 10 minutes of battery life remaining – EXIT THE SPACE)

8. The meter has an internal pump attached. Test the space before entry by attaching tubing to the pump and lowering tubing into the space – Allow at least 2 seconds per foot of tubing

9. Enter the space only after determining it is safe – the meter must be carried at all times while in the space

10. If an alarm goes off at any time while you are in a confined space, EXIT IMMEDIATELY

To turn the meter off, press and hold the C until the OFF countdown is complete and the LCD display turns off.