



Middlebury College Confined Space Program

1.0 Scope

This procedure applies to all Middlebury College employees and contractors who are engaged in entry to confined spaces. This program is written to comply with OSHA 29 CFR 1910.146 "Permit-required confined spaces" which establishes requirements for the safety entry into a confined space.

2.0 Responsibilities

Supervisors

- 1) Understand and ensure full implementation and compliance with the Confined Space Entry Program as it applies to employees and contractors.
- 2) Ensure employees enter confined spaces only when they are trained and certified to do so. All entries must be performed within the guidelines of this program.
- 3) Ensure that emergency off shift and unscheduled entries are conducted in full compliance with this policy.
- 4) Ensure that confined spaces within your department are identified and that procedures are developed for entry.
- 5) Plan routine entries during normal work hours, not off shift.
- 6) Ensure that approvals for entry permits are only issued by Permit Required Confined Space (PRCS) trained employees.

Facilities Services

- 1) Maintain all confined space monitoring equipment.
- 2) Develop, update and maintain a list of confined spaces.
- 3) Follow all aspects of this policy when performing off shift emergency entries.

Team Members

- 1) Conduct confined space entry only when certified to do so.
- 2) Inform your supervisor of any health condition that may compromise your health or safety by entering a confined space.
- 3) Perform pre-entry inspections of confined space entry equipment before entering the confined space.
- 4) Maintain equipment, as required.
- 5) Abide by all Middlebury College policies and procedures, including entry by permit, atmospheric pre-testing, and presence of a trained standby person while in the confined space. Establish continued communications, at a minimum.
- 6) Secure a permit prior to entering a confined space.
- 7) Off shift emergency entry by trained Facilities personnel must be in full accordance with the details of this policy.



Environmental Health and Safety

- 1) Develop and maintain the program required by OSHA Standard(s).
- 2) Provide guidance on the interpretation of the standard.
- 3) Provide training to ensure compliance with the standard.
- 4) Audit compliance with the program.

Contractors

- 1) Demonstrate understanding of confined space and other requirements per OSHA Standards.
- 2) Provide confined space equipment in good condition and in compliance with OSHA Standard(s).
- 3) Ensure all contractors performing work are trained in Confined Space Entry
- 3) Ensure entry into confined spaces follows all OSHA and Middlebury requirements.

3.0 Definitions

Carbon monoxide (CO):

A colorless, odorless gas that, when in high concentration, can cause unconsciousness with little or no warning. As CO concentrations rise, the harmful effects also rise.

Confined Space:

A space that, by design, has limited openings for entry and exit, has unfavorable natural ventilation that could contain or produce dangerous air contaminant levels, and is not intended for continuous employee occupancy.

Because air may not move in and out of confined spaces freely due to the design, the atmosphere inside a confined space can be very different from the atmosphere outside. Deadly gases may be trapped inside, particularly if the space is used to store or process chemicals or organic substances that may decompose. There may not be enough oxygen inside the confined space to support life, or the air could be so oxygen-rich that it is likely to increase the chance of fire or explosion if an ignition source is present.

Most confined spaces are not designed for workers to enter and work in on a routine basis. They are designed to store a product, enclose materials and processes, or transport products or substances. Therefore, occasional worker entry for inspection, maintenance, repairs, cleanup, or similar tasks may pose potential hazards, such as chemical and physical hazards for which precautions must be taken.

Confined spaces include, but are not limited to, manholes, storage tanks, silos, boilers, incinerators, elevator pits, trenches, sewers, air handler, ventilation and exhaust ducts, tunnels, vats, degreasers, underground communication/utility vaults, and pipelines.

CPR:

Cardiopulmonary Resuscitation



Hot Work:

Any work involving burning, welding, riveting, or similar fire or heat producing operations, as well as work that produces a source of ignition such as drilling, abrasive blasting, and space heating.

Hydrogen Sulfide (H₂S):

An easily detectable gas which, at low concentrations, has an odor similar to rotten eggs. H₂S desensitizes the olfactory sense; therefore, to those people who have been exposed to it for extended periods of time, the gas may seem to have dissipated even though the concentration may have remained constant or even increased. Low concentrations cause eye irritation, while slightly higher concentrations may cause upper respiratory tract irritation. If exposure is prolonged, pulmonary edema or asphyxiation may occur. The danger increases when high concentrations go undetected.

Isolation:

The process by which a confined space is removed from service and completely protected against the inadvertent release of potentially hazardous material. The following methods are commonly used to isolate a confined space:

- Blanking off (skillet type metal blank between flanges)
- Removal or misalignment of sections of all lines and pipes
- Bleed system
- Electrical lockout of all sources of power
- Blocking or disconnecting all mechanical linkages

LEL (Lower Explosive Limit) or LFL (Lower Flammable Limit):

The minimum concentration of a combustible gas, vapor or mist in air which will propagate flame on contact with an ignition source. Below the LEL there is insufficient fuel to support combustion. Concentrations between the LEL and the Upper Explosive Limit (UEL) are considered flammable.

Lockout/Tagout (LOTO):

The placement of a lock or tag on the energy isolating device in accordance with an established procedure, indicating that the energy isolating device shall not be operated until removal of the lock or tag. Refer to Middlebury College Lockout Tagout Program.

Methane:

Presents a multiple atmospheric hazard, depending on their concentration. Methane, is an odorless substance that is non toxic and is harmless at some concentrations. Methane, however, can displace all or part of the atmosphere in a confined space; and the hazards presented by such displacement can vary greatly, depending on the degree of displacement. With only 10% displacement, methane produces an atmosphere which, while adequate for respiration, can explode violently. By contrast, with 90% displacement, methane will not burn or explode, but it will asphyxiate an unprotected worker within about 5 minutes.



Oxygen deficient atmosphere:

Contains less than 19.5% oxygen by volume. Oxygen deficiency can occur even after an area has been purged of toxic gases. The gases may emanate from porous walls and sludge. Undetected leaks, organic decomposition, bacterial action, combustion, and cleaning processes can lead to the displacement of oxygen by other gasses, causing the atmosphere to become toxic. As other gas level(s) increase, oxygen levels decrease, creating the potential for injury and fatality. Oxygen can also be absorbed by the wall of areas being repaired or cleaned, causing further oxygen deficiency. The importance of monitoring for adequate oxygen levels is as critical as sampling for the presence of other gasses. Failure to monitor properly may result in an undetected increase in toxic gasses or a reduction in oxygen.

Oxygen enriched atmosphere:

Contains more than 25% oxygen by volume. The presence of too much oxygen in a confined space can be fatal in certain situations. In the correct concentration, oxygen, fuel, and an ignition source can result in explosion or fire. When oxygen rises above its normal level of 21%, the flammability range of combustible gases increase. To avoid the possibility of oxygen enrichment explosions, confined areas shall not be purged with oxygen in place of air. Proper procedures for blanking of oxygen lines, where applicable, shall be followed.

Respirator:

An approved device that has been designed to protect the wearer from inhalation of hazardous atmospheres. Refer to Middlebury College's Respiratory Protection Program.

SCBA:

Self-contained breathing apparatus

Standby person (or attendant):

A person trained in emergency rescue procedures, who is stationed outside the confined space, monitors the authorized entrants inside the confined space, and is in communication with those authorized entrants. The standby person also ensures non authorized personnel do not enter the confined space. The standby person DOES NOT enter the confined space. In case of an emergency the fire department shall be notified.

UEL (Upper Explosive Limit):

The maximum concentration of a combustible gas, vapor or mist in air which will propagate flame on contact with an ignition source. Above the UEL, the mixture is too "rich" to support combustion so ignition is not possible. Concentrations between the Lower Explosive Limit (LEL) and the UEL are considered flammable.

4.0 Procedures

4.1 Identification of Confined Spaces

All confined spaces within site boundaries shall be identified. Procedures about how to control the identified confined spaces and any potential hazards shall be identified. Middlebury College Facilities



Services department maintains a current list of confined spaces.

4.2 Training

Anyone requesting entrance into a confined space must be able to show that they have received the proper/required training for confined space entry.

- College employees engaged in confined space entry will follow the policy and training requirements set forth in this document.
- Outside contractors must have a written statement or proof from their employer that they have been trained in entry and rescue procedures, contractors must also be able to demonstrate understanding in Confined Space regulations. A certificate of training or written note on company letterhead confirming training by a company official would be sufficient. Middlebury College does not provide training or equipment to outside contractors except in special circumstances.

"Process to retrieve" training is also required of the standby person stationed outside the confined space. Training shall include summoning rescue or other emergency services and proper use of equipment used to communicate and retrieve.

4.3 Campus Emergency Response

The Middlebury College Emergency Response Team (ERT) is the designated emergency response for confined space rescue entries. Confined space entry and rescue procedures shall be part of their annual training. Team members are trained and certified in CPR, First Aid and Respiratory Protection.

To contact the ERT for confined space emergencies the standby person will notify Middlebury College's Public Safety Department via portable radio and request an emergency response to the location of the confined space emergency. This may require a rescue entry on the part of the ERT. 911 may also be called if direct communication to the College is unavailable.

Upon Public Safety receiving a request to notify the ERT for a confined space emergency, they will notify and direct them to the location of the emergency. Public Safety will then notify the Facilities Manager and EH&S of the emergency and location. Middlebury Regional EMS, Middlebury Police and Fire Departments should also be notified.

4.4 Entry

Confined space entry is by permit only. All confined spaces shall be evaluated using the permit prior to entering.

- Permits may be obtained from Facilities Services.
- Permits are good only for the duration of the task.
- Prior to entering a confined space, potential hazards shall be identified. Hazards shall be evaluated with the respect to their scope and magnitude, likelihood of a hazard occurrence, consequences of that occurrence, potential for changing conditions, strategies for controlling the hazards, and potential emergency response requirements.



- Pre-entry atmospheric monitoring and visual evaluation will be done prior to entering a confined space, if applicable. Corrective action will be required to correct the unsafe condition.
- Any condition making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
- When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
- No entry is permitted when the confined space atmosphere levels are unsafe without proper Personal Protective Equipment (PPE), or when an area is flooded. Water must be pumped out first.
- Before an employee enters the space, the internal atmosphere shall be tested. A calibrated direct-reading instrument shall be used, for the following contaminants:
 1. Oxygen content (below 19.5% or above 23.5%)
 2. Flammable gases and vapors, (in excess of 10% of LFL) and
 3. Potential toxic air contaminants (H₂S)(in excess of its dose or (PEL) limit.
- If a hazardous atmosphere is detected during entry:
 1. Each employee shall leave the space immediately
 2. The space shall be evaluated to determine how the hazardous atmosphere developed; and
 3. Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
- As required by the permit, each authorized entrant shall be equipped with: a 2-way radio (not needed if standby person is in audible & visual contact with entrant), retrieval harness, safety shoes, hard hat, safety glasses, personal air monitor and coveralls/outer work clothes. In addition, a tri-od with at least a 50' length of cable for a retrieval line will be set up. The entrant shall be hooked up to this retrieval line at all times. A trained stand-by person is required for all confined space entries.
- It is suggested that only one person enter a confined space at one time. However, if more than one needs to enter at one time it should be so stated in the permit. The second entrant shall also wear the same protective equipment described above. Because of the possibility of entanglement and the difficulty of setting up two retrieval systems at the same time, only one entrant will be required to be hooked up to a retrieval line. Both are required to wear harnesses.
- A life line shall be on site in the event the retrieval line is unavailable.
- The personal air monitors will be worn by each of the entrants (if possible), but at least by one entrant. External air monitors attended by the standby person will also be available.
- The stand-by person shall not enter the confined space (breaking the plane of the opening) at any time. They are responsible for space monitoring, staying in radio/or visual communication, summoning help if needed, securing the area, and retrieving the entrant (retrieval system only) if required.
- Off shift entries when response time is of critical importance, a trained facilities employee may issue a confined space permit when approved by a trained supervisor. Such an entry must be in compliance with this policy.



- Permits will be located with the Facilities Services department.
- All routine entries shall be done during business hours. No routine entries are to be done on weekend or holidays unless special provisions are made and approved by department manager.

4.5 Confined Space Permit

All entries into a confined space require a permit. Additional provisions for emergency situations are noted in the Entry section of this policy. Refer to the Confined Space Permit (Appendix A) for additional entry requirements.

Potentially hazardous environments requires continuous monitoring while the confined space is occupied.

Only emergency unplanned entries are permitted off shift, when the safety of the campus, its employees, or students are in jeopardy. All conditions of this policy shall be maintained at all times. Stand-by assistance can be obtained from any trained certified personnel.

The permit must be completed (at job site) indicating members of the crew and results of the air monitoring test. The permit shall then be posted outside the confined space (in a weather proof envelope).

Upon completion of the job, the permit shall be kept on file in the department for 12 months.

Any problems with equipment should be immediately reported to Facilities Services or EH&S.

4.6 Confined Space Rescue

OSHA Confined Space regulations mandate that employees understand the hazards of working in confined spaces; are properly trained and equipped to handle those hazards; and have access to a fully equipped rescue team in the event of a problem.

The Middlebury College Emergency Response Team (ERT) was established for the purpose of providing emergency rescue capabilities for employees engaged in confined space or other activities consistent with their training and expertise, and to comply with VOSHA regulation 29 CFR 1910.146.

Each member will be expected to maintain current certification in CPR and appropriate training in First Aid.

ERT Trainings will include how to:

- * Recognize confined space hazards.
- * Communicate in a confined space.
- * Use personal protective equipment in rescues, including enrollment into the college Respiratory Protection Program in order to wear a SCBA



- * Perform rescue techniques geared to the confined spaces in our workplace.
- * Know when to perform self-rescue in a confined space

5.0 References

VOSHA 29 CFR 1910.146 "Permit Required Confined Space"
VOSHA 29 CFR 1910.147 "The Control of Hazardous Energy"
VOSHA 29 CFR 1910.331 - 1910.335 "Electrical Safety Related Work Practices"



APPENDIX A

CONFINED SPACE ENTRY PERMIT

(Sample permit only, obtain actual permit from Facilities Services)

EMERGENCY CALL 5911

DATE: _____ TIME: _____
 Shift ISSUED: _____ Hazardous Entry? Yes () No ()
 PERMIT EXPIRES: _____ LOCATION: _____
 POTENTIAL HAZARD(S): _____
 REASON FOR ENTRY: _____

SPECIAL REQUIREMENTS

ITEM	YES	NO
PRCS Trained		
Atmospheric Testing		
Lockout/De-energize		
Lines Blinded or Blanked		
Purged-Flush and Vent		
Ventilation		
Area Secured		
Escape Harness		
Tripod External Rescue		
Life Lines		
Fire Extinguishers		
Protective Clothing		
Respiratory Protection		

TEST TO BE TAKEN (PRIOR TO ENTRY)

Instrument Type: _____ Calibration Date: _____
 % of Oxygen (19.5 - 23.5) _____ % of LEL _____
 Other Contaminants (PPM) _____
 Person Conducting Test _____
 Authorized Entrant(s) _____
 Standby Person _____

Comments:

PERMIT MUST BE POSTED IN THE VICINITY OF THE CONFINED SPACE.
 PERMIT MUST BE RETURNED TO DEPARTMENT BY EXPIRATION DATE/TIME

CREW CHIEF: _____
 (THE UNDERSIGNED ACKNOWLEDGES UNDERSTANDING OF PERMIT
 CONDITIONS)