

Hampshire College

Confined Space Program

July 2012

In Compliance with the
OSHA 29 CFR 1910.126

Environmental Health & Safety
559-6620

Hampshire College
CONFINED SPACE PROGRAM

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HAMPSHIRE COLLEGE CONFINED SPACE PROGRAM

Including Provisions for Complying with 29 CFR 1910.146,
OSHA Permit Required Confined Space Standard

I. PURPOSE

- * To reduce hazards encountered by College employees when working in confined spaces.
- * To standardize a procedure for investigating potential hazards in confined spaces.
- * To establish clear definitions and promote awareness of potential hazards of working in confined spaces.
- * To standardize the College's system for working in confined spaces.

II. CONFINED SPACES ON CAMPUS

Spaces are considered "confined" because their configurations hinder the activities of employees who must enter, work in, and exit them. A confined space has limited or restricted means for entry or exit, and it is not designed for continuous employee occupancy. Confined spaces include, but are not limited to, underground vaults, tanks, storage bins, manholes, pits, silos, process vessels, and pipelines.

Crawlspaces: Beneath all buildings in Enfield and Greenwich; Library room B-3; Admissions, Human Resources (R.Stiles House); Lebron-Wiggins-Pran Cultural Center
Elevators: Adele Simmons Hall, Cole Science Center, Franklin Patterson Hall and Johnson Library

Manholes: Electrical, Telephone, Sewer and Storm Drain (There are 4-foot, 8-foot, and 10-foot deep manholes throughout campus and one 37-foot manhole outside the Cole Science Center)

Facilities & Grounds maintains a list of all confined spaces on campus and ensures that spaces are identified by signs. Manholes are identified on the campus fiber map, maintained by the Director of Information Technology.

Departments in the program include Facilities and Grounds and Information Technology.

III. PERMIT REQUIRED CONFINED SPACE RESTRICTION

Confined Spaces that require an entry permit, as defined by OSHA regulations 29 CFR 1910.145, cannot be entered by College employees. Entry permits are needed when (1) there is an atmospheric hazard that cannot be controlled

by continuous forced air ventilation, or (2) when there is a hazard other than an atmospheric hazard that cannot be eliminated before entry.

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

B. CONFINED SPACE HAZARDS

- * High temperature; either high atmospheric temperature in the space or very hot objects (uninsulated live steam lines for example).
- * Engulfment (such as by rising water, sewage, or landslide).

- * Entrapment (spaces that narrow or have obstructions that might cause a person to become stuck).

- * Exposed electrical voltages more than 120 volts.

V. EQUIPMENT

Hampshire College has an Industrial Scientific M40 Multi-Gas Monitor for testing confined spaces. Basic instructions for the meter are included at the end of this Program (Appendix B). The meter is:

- * Stored in the main office at Facilities & Grounds.
- * Only available to employees trained under this Program.
- * Signed out including: employee name, date, time, and location of use.
- * Calibrated during each calendar month by Environmental Health & Safety.

The M40 meter is a four-gas meter, oxygen, flammable gas, carbon monoxide, and hydrogen sulfide.

Barriers and air blowers are kept at Facilities & Grounds. The retrieval tripod is kept in the Plumbing Shop at Kerminsky House.

VI. PROCEDURES FOR WORKING IN CONFINED SPACES

Only employees who have completed training for this Program are authorized to work in confined spaces. **An attendant is required for all work in confined spaces.**

A. INSPECTION AND ENTRY PROCEDURE

1. Pick-up test equipment and the *Inspection & Ventilation Record* (Appendix A) at Facilities and Grounds. Bump test the meter and fill in the sign-out sheet before taking the equipment.

2. Complete the following pre-entry procedure.

- * Eliminate any condition that may make it hazardous to remove the entrance cover.
- * Erect pedestrian and/or vehicular barriers as needed.
- * 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.

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

Should the test equipment sound a warning alarm during entry all employees must exit the space immediately and identify the cause of the change in condition. Site inspection by the Supervisor and a new INSPECTION AND VENTILATION RECORD is necessary for reentry.

4. For all vertical entries, the retrieval system (tripod and harness) must be used.

5. A communication system for summoning emergency assistance must be available.

6. The INSPECTION AND VENTILATION RECORD is maintained at the site and is made available to all entrants. All entrants must be noted in the Entrants Log in Section 1. Any changes in conditions or emergencies should be recorded.

7. If a hazardous atmosphere is not detected, and no other hazards are found or anticipated, Section 1 of the INSPECTION AND VENTILATION RECORD can be completed and signed by the authorized employee and the space entered.

8. If a non-atmospheric hazard is detected, it must be eliminated or controlled before entry. Lockout/Tagout procedures should be used if appropriate. Consideration should be given to potential hazards such as the use of hazardous chemicals or the possibility of engulfment. If the non-atmospheric hazard cannot be eliminated, **the space cannot be entered**. Completing the required work from outside of the space or obtaining a contractor for entry is required.

9. 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 setup and the atmosphere retested. 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

a. If forced ventilation or other techniques (purging, inerting, etc.) do not result in a non-hazardous atmosphere **the space cannot be entered**. Tasks that can be accomplished from outside the space may be undertaken if they can be done safely. Contract personnel may enter the space according to the contractor entry procedure below.

b. If forced ventilation creates a non-hazardous atmosphere the space may be entered with the following conditions:

- Section 2 of the INSPECTION AND VENTILATION RECORD should be completed.
- Supervisor is notified of the need for forced ventilation.
- The retrieval tripod must be used.
- All employees must leave the confined space before the ventilation system is turned-off.
- At the completion of the entry, Section 3 of the RECORD is completed and given to the supervisor.

B. 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, and
- notifies entrants to leave the space if conditions become hazardous or if entrants show signs of overexposure to hazardous conditions.

VII. CONTRACTOR ENTRY

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

1. Any written contract 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. Contractors must supply their own equipment and make their entry record or permit available upon request.
3. The 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, and
 - procedures in use to control any potential hazards.
4. **College employees are not allowed to enter the space if it is a Confined Space that requires a permit.**

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

VIII. TRAINING

Employees will be trained:

- at the start of this Program,
- after that time, before starting work for new and transferred employees,
- if the annual review finds the need for additional training, or
- 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 Hampshire College Confined Space Program and the OSHA Permit-Required Confined Space Standard,
- how to complete the Instrument Log, and the INSPECTION AND VENTILATION RECORD,
- how to use the atmospheric test equipment, and
- how to use other program equipment (barriers, communication equipment etc., escape respirator).

IX. RECORDS

While the entry is underway, the INSPECTION AND VENTILATION RECORD will be kept at the work site and made available to all employees entering the confined space. After completion of the entry these documents will be completed and given to the supervisor for review.

Completed RECORDS will be maintained in a file in the Environmental Health & Safety Office. The Sign-Out Log will be kept with the multi-gas meter at Facilities & Grounds. Instrument calibration records are kept by EH&S.

All RECORDS 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 Office.

X. ANNUAL PROGRAM REVIEW

Once a year, the Director of Facilities & Grounds and the Director of Environmental Health & Safety will review the Confined Space Entry Program. The review will include at least the following procedures:

- reviewing all of the filed RECORDS for the past year for completeness and adherence to the written Program,
- determining the need for Program modification or training programs,
- determining the need for new equipment, and
- determining whether additional spaces should be classified as confined spaces or whether identified spaces can be removed from the Program.

HAMPSHIRE COLLEGE CONFINED SPACE PROGRAM INSPECTION AND VENTILATION RECORD							
SECTION 1: INSPECTION							
LOCATION OF SPACE: _____				DATE: _____		TIME: _____	
PURPOSE FOR ENTRY: _____							
ENTRANTS LOG:							
	Name	Time In	Time Out	ATTENDANT: Name	In	Out	
VERIFY METER WORKS BY PERFORMING A BUMP TEST WITH CALIBRATION GAS PRIOR TO EACH USE				BUMP TEST RESULTS: PASS <input type="checkbox"/> FAIL <input type="checkbox"/>			
VISUAL INSPECTION: <input type="checkbox"/> PASS <input type="checkbox"/> ACTION NEEDED: _____				TEST RESULTS:			
				O2 19.5 <input type="checkbox"/> 23.0			
				LFL <10% <input type="checkbox"/>			
EQUIPMENT IN PLACE:				CO <35ppm <input type="checkbox"/>			
<input type="checkbox"/> RETRIEVAL SYSTEM (all vertical entries)				H2S <10ppm <input type="checkbox"/>			
<input type="checkbox"/> BARRIERS							
Other Control Measures:							
<input type="checkbox"/> NO HAZARDS IDENTIFIED OR ANTICIPATED AND REQUIRED EQUIPMENT IN PLACE							
Signed: _____							
SECTION 2: VENTILATION REQUIRED SPACES							
				INTRODUCED HAZARDS: (circle) Y or N		FAILED AIR TEST: (circle) Y or N	
<input type="checkbox"/> SEWER <input type="checkbox"/> MANHOLE <input type="checkbox"/> CRAWLSPACE <input type="checkbox"/> OTHER: _____		<input type="checkbox"/> HOT WORK <input type="checkbox"/> OTHER: _____		<input type="checkbox"/> CHEMICAL USE <input type="checkbox"/> OTHER: _____		RETEST RESULTS:	
						O2 19.5 <input type="checkbox"/> 23.0	
						LFL <10% <input type="checkbox"/>	
						CO <35ppm <input type="checkbox"/>	
						H2S <10ppm <input type="checkbox"/>	
EQUIPMENT IN PLACE: <input type="checkbox"/> VENTILATION <input type="checkbox"/> SUPERVISOR NOTIFIED OF NEED FOR FORCED VENTILATION							
<input type="checkbox"/> MONITOR ALARM IF METER SOUNDS WARNING, EXIT THE SPACE IMMEDIATELY. IDENTIFY THE CAUSE OF THE CHANGE IN CONDITION. SUPERVISOR MUST BE NOTIFIED AND SPACE MUST BE RE-TESTED. A NEW INSPECTION AND VENTILATION RECORD MUST BE COMPLETED.							
SECTION 3: TASK COMPLETED							
TIME: _____		PROBLEMS ENCOUNTERED: <input type="checkbox"/> NONE <input type="checkbox"/> DESCRIBE: _____					
Supervisor Signature: _____							

INSPECTION AND VENTILATION RECORD INSTRUCTIONS

HOW TO USE THE RECORD: (SEE THE WRITTEN CONFINED SPACE PROGRAM FOR FULL DETAILS)

- ONLY TRAINED EMPLOYEES ARE ALLOWED TO ENTER AND ATTEND CONFINED SPACES.
- ATMOSPHERIC MONITORING IS REQUIRED AT ALL TIMES.
- AN ATTENDANT IS NECESSARY FOR ALL CONFINED SPACE ENTRIES.
- IMMEDIATELY EXIT IF THE MONITOR ALARM SOUNDS, YOU FEEL DISTRESS OR OTHER CHANGES IN PHYSICAL CONDITION, CONDITIONS IN THE SPACE CHANGE POSING ANY ADDITIONAL HAZARD.

SECTION 1:

1. Record the: Location, Purpose of Entry, Date and Time, Attendant, and Entrants.
2. Eliminate any condition that may make it hazardous to remove the entrance cover.
3. Erect pedestrian or vehicular barriers as needed.
4. Open the cover.
5. Without entering the space, make a visual inspection for potential hazards. Record results and note any control measures in place.
6. Without entering the space, test for atmospheric hazards using the test meter and record the results on all four sensors.
7. If a hazardous atmosphere is not detected, and no other hazards are found or anticipated, the record can be signed in Section 1 and work can begin.

Use SECTION 2 IF:

- VENTILATION IS NECESSARY; a hazardous atmosphere is detected which can be made non-hazardous by ventilation,
 - INTRODUCED HAZARDS; hazards are to be introduced to the space such as hot work [welding, brazing, etc.] or the use of hazardous chemicals, or
 - SEWERS; any work in a sewer pit.
1. Supervisor should be aware of the situation.
 2. Ventilation must be maintained while the entrant is in the space [all employees must leave the space before the ventilation system is turned off].
 3. The meter must be kept at the site to monitor the confined space continuously. Any alarm must be investigated.

NOTE: IF HAZARDOUS ATMOSPHERES CANNOT BE CONTROLLED BY VENTILATION OR IF NON-ATMOSPHERIC HAZARDS CANNOT BE ELIMINATED OR CONTROLLED, THE CONFINED SPACE IS PERMIT REQUIRED AND COLLEGE EMPLOYEES CANNOT ENTER.

METER:

- See the INSTRUCTION MANUAL in the carrying case for complete details on the M40 MULTI-GAS MONITOR.
- Any time the ALARM sounds, exit the space immediately.
- LOW BATTERY is indicated by a periodic tone. You have only 10 minutes of battery time left.

**Hampshire College
Industrial Scientific M40 Multi-Gas Monitor
Basic Operating Instructions**

Manufacturer's instructions are available at Environmental Health and Safety. Only trained individuals can use this equipment. Be sure to sign it out.

1. Turn the meter on - **push the "mode" button** (inner left) for 1 second
 - The display will do a self-test (you will see some symbols and numbers flash).
 - Next, the display will show a 20-second countdown.
 - When the countdown is complete, the meter will automatically go into normal gas detection mode. The main display screen will look something like this:

0 CO
0 H2S
20.9 O2
0 LEL

- The lower left corner 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).
2. At this point, the meter is working, but zeroing the sensors is recommended:
 - **Press the "up arrow" button**, (outer right), once.
 - You will see a symbol like this: \emptyset **Press the "enter" button** (inner right).
 - While it is zeroing, the display will show a clock icon and the full span of the oxygen sensor.
 - When it's done zeroing, you'll see the calibration icon (which looks like a gas cylinder with a hose) and the "enter key" icon (which looks like an arrow pointing down and to the left) - EH&S calibrates the meter each month.
 - **Push the "mode" button** (inner left) once to return to normal gas detection mode.
 3. The meter has an internal pump attached. Test the space before entry by attaching tubing to the pump and lowering it into the space – Allow at least 2 seconds per foot of tubing.
 4. Enter the space only after determining it is safe – the meter must be carried at all times while in the space.
 5. If the alarm goes off at any time while you are in a confined space, EXIT IMMEDIATELY.
 6. To turn the meter off, **press and hold the "mode" button for 5 seconds**. You will see a flashing "H," meaning hold. The unit will beep 5 times, and then shut off.