

<b>Calvin College Confined Space Entry Program</b>		<b>Revision 1</b>	
Prepared by: Saša Vuksanovic	Date: 10/7/10	Approved by:	Date:

### 1.0 POLICY

It is the policy of Calvin College to comply with Permit-Required Confined Spaces 1910.146 and MIOSHA Confined Space Entry, Part 90.

### 2.0 PURPOSE

The purpose of the Confined Space Entry program is to establish safe work practices utilized during all activities in confined spaces, and to provide training for Calvin employees according to their responsibilities in order to prevent injuries and illnesses that can occur.

### 3.0 DEFINITIONS

- **Confined Space**  
Space that has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy.
- **Entry**  
Means the action by which a person passes through an opening into a permit-required confined space.  
Is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.
- **Authorized Entrant**  
Those Persons who have completed the training and are authorized to enter permit spaces.  
They are assigned specific duties and responsibilities that they must perform when they work in the permit space.
- **Attendant**  
An attendant is an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's assigned duties.
- **Entry Supervisor**  
Person responsible for determining:
  - If acceptable entry conditions are present at a permit space where entry is planned
  - Authorizing entry and overseeing entry operations
  - Terminating entry as required by Parts 90 and 490 C.F.R. 1910.146
- **Entry Permit**  
Means the written or printed document that is provided by the employer to allow and control entry into a permit space.

### 4.0 RESPONSIBILITIES

- **Authorized Entrants**
  - Know the hazards that may be faced during entry.
  - Properly use equipment.
  - Properly follow the procedures for Alternate Entry.
  - Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert them of the need to evacuate.

- Exit from the permit space as quickly as possible when:
  - The entrant recognizes any warning sign or symptom of exposure to dangerous situation.
  - The entrant detects a prohibited condition.
  - An evacuation alarm is activated or whenever an order to evacuate is given by the attendant or entry supervisor.
- Alert the attendant when:
  - The entrant recognizes any warning signs or symptoms of exposure to a dangerous situation.
  - The entrant detects a prohibited condition.
- Attendants
  - Know the hazards that may be faced during entry.
  - Are aware of possible behavioral effects of hazard exposure in authorized entrants.
  - Continuously maintain an accurate count of authorized entrants in the permit space.
  - Remain outside the permit space during entry operations until relieved by another attendant.
  - Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space.
  - Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space.
  - Perform non-entry rescues as specified by Calvin's rescue procedures.
  - Orders the entrants to evacuate the permit space immediately under any of the following conditions:
    - If the attendant detects a prohibited condition.
    - If the attendant detects the behavioral effects of hazard exposure in an authorized entrant.
    - If the attendant detects a situation outside of the space that could endanger the authorized entrants.
    - If the attendant cannot effectively and safely perform all the duties required.
  - Summon rescue and other emergency services as soon as the attendant determines the authorized entrants may need assistance to escape from permit space hazards.
  - Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:
    - Warn the unauthorized persons that they must stay away from the permit space.
    - Advise the unauthorized persons that they must exit immediately if they have entered.
    - Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
- Entry Supervisors
  - Knows the hazards that may be faced during entry.
  - Verifies and checks the following:
    - Appropriate entries have been made on the permit.
    - All tests specified by the permit have been conducted.
    - All procedures and equipment are in place before endorsing the permit and allowing entry to begin.

- Ensures that determinations and supporting data from required tests are documented and are made available to each employee who enters the permit space.
- Terminates the entry and cancels the permit as required by the standard.
- Verifies that rescue services are available and that the means for summoning them are operable.
- Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
- Ensures that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.
- Calvin College's Director of Physical Plant, Director of Mechanical Maintenance, and EHS Officer are the Entry Supervisors responsible for authorizing entry and issuing entry permits for work in permit required spaces.

## **5.0 TRAINING PROGRAM**

- Every employee at Calvin College who faces the risk of confined space entry is provided with training so that each designated employee acquires the understanding, knowledge and skills necessary for the safe performance of the duties assigned to them.
- Calvin's criteria for determining which employee must receive confined space entry permit are based on the following:
  - Training/Authorization level of the employee.
  - Particular assigned tasks of all departments.
- Classroom and hands-on training are used in training employees.
- New employees are trained before their initial assignments.
- Entry Supervisors ensure that all new employees are trained.
- Upon successful completion of the Calvin College permit-required confined space entry training, each participant will receive a certificate. (Appendix B)

## **6.0 EQUIPMENT**

- To ensure the safety and health of Calvin College employees, college provides appropriate equipment to all employees who work in or near permit spaces.
- Part 90 and 490 C.F.R. 1910.146 requires each authorized entrant to use chest or full body harness, with a retrieval line attached at any point of body which will ensure successful removal of entrant.
- Wristlets may be used instead of full body or chest harness when proven to be safer or a more effective alternative.
- All equipment must be in excellent working condition.
- The following equipment is provided at no cost to employees, maintained properly, and used properly by employees:
  - Testing and monitoring equipment.
  - Ventilating equipment.
  - Communications equipment.
  - Personal protective equipment.
  - Lighting equipment.
  - Barriers and shields.
  - Rescue and emergency equipment.
  - Ingress and egress equipment such as ladders.

## 7.0 EMERGENCY PROCEDURES & RESCUE

- If a hazard arises within the confined space, personnel in the space will immediately exit and contact the Entry Supervisor and the EHS Office. The Entry Supervisor, with assistance from the EHS Office, will re-evaluate the space to determine the appropriate course of action.
- Personnel will immediately leave the space when any of the gas monitor alarm points are activated.
- If at any time there is any questionable action or non-movement by the Authorized Entrant, the Attendant will make a verbal check. If there is no response or a questionable response, the worker in the space will be ordered to evacuate the space immediately.
- If possible, Authorized Entrants will initiate self-rescue by climbing out of the space.
- If self-rescue is not possible, the attendant will retrieve the entrant via the connected retrieval line. If the attendant is unable to retrieve the entrant via the lifeline, the attendant will call for emergency rescue services.
- If the entrant is disabled due to falling or impact, he/she will not be removed from the confined space unless there is immediate danger to his/her life.
- The attendant will not enter the space to perform rescue operations.

## 8.0 PROCEDURE

- Pre-Entry Evaluation
  - Before allowing authorized employees to enter a permit required space an evaluation of the space is conducted to determine if conditions are safe for entry.
  - Calvin College follows procedures outlined by Parts 90 and 490 C.F.R 1910.146 in evaluating permit space before each entry which require:
    - Testing of the internal atmosphere with a calibrated direct reading instrument. These instruments can detect oxygen content, flammable gases and vapors, and potential toxic air contaminants.
    - Periodic testing of the atmosphere of the space is done to ensure continuous ventilation in order to prevent accumulation of the hazardous atmosphere.
- Alternate Entry
  - According to Part 90 and Permit-Required Confined Spaces Part 490 C.F.R. 1910.146, under certain conditions, an Authorized Entrant may use alternate entry procedures for entry into a permit space.
  - To qualify for Alternate Entry the following conditions must be met:
    - Complete Appendix C: Alternate Entry Procedure Checklist before entry.
    - Demonstrate and document that all hazards have been controlled or removed.
    - Demonstrate and document that only hazard posed is an actual or potential hazardous atmosphere by using calibrated instrument for oxygen, flammability and toxicity, historical data or MSDS.
    - Demonstrate and document that continuous forced air ventilation alone is sufficient to maintain the space safe.
    - Demonstrate that if ventilation stopped, the atmospheric hazard in the space would not quickly increase.
    - Not introduce any hazard into the space.
  - Procedures for Alternate Entry include the following:
    - Evaluate and eliminate any hazard to ensure that the cover to a confined space can be removed safely

- Guard openings to spaces to prevent persons or objects from falling into them.
  - Prior to entry, test the atmosphere with a calibrated, direct-read instrument for oxygen, flammability and toxicity.
  - Ensure no hazardous atmosphere will exist for the duration of the entry.
  - Use continuous air ventilation through the breathing zone from a clean source.
  - Assure safe atmospheric conditions by periodic or continuous testing and recording.
  - If a hazard is detected, the entry shall be terminated, and the space re-evaluated.
  - Train entrants on the hazards, equipment and safe work practices necessary to make the entry and all work performed during the entry safe.
  - Certify in writing that all above procedures have been implemented, identify the space, the date of entry and sign the certification.
- Safe Permit Space Entry Procedures
  - Procedures for preparing, issuing, and cancelling entry permits include the following:
    - Before entry is authorized, an entry permit must be completed.
    - Before entry begins, the entry supervisor identified on the permit shall sign the entry permit to authorize entry.
    - Before entry begins, a pre-entry briefing is held to review hazardous conditions, control methods and procedures.
    - The completed permit is posted at the entry portal so that the entrants can confirm the pre-entry preparations have been completed.
    - The entry supervisor shall terminate entry and cancel the entry permit when:
      - a) The entry operations covered by the entry permit have been completed.
      - b) Condition that is now allowed under the entry permit arises in or near the permit space.
  - EHS will retain canceled entry permits for at least 1 year.
- Multiple Employer Entry Procedures
  - When outside employers/contractors enter Calvin's campus to perform work in permit spaces, Calvin will coordinate entry and work operations and the contractor shall:
    - Comply with applicable MIOSHA standards.
    - Be aware of and have a copy of the Calvin College Confined Space Entry Program.
    - Have a written procedure that meets or exceeds Calvin College's program and submit a copy to the Director of Physical Plant or EHS officer one week prior to entry.
    - Train their personnel in the role each person will perform during the job.
    - Ensure a written entry permit procedure is utilized prior to and during work in the confined space.
    - Obtain access to the confined space prior to beginning work to develop a rescue plan.
    - Identify potentially hazardous material and/or condition prior to the start of work.
    - Have communications, rescue and monitoring equipment.
    - Report to the director of Physical Plant and EHS Officer if any problems or unusual conditions arise.

- Post-operations Procedures
  - Upon the completion of work in a permit space, the following procedures are followed:
    - When Alternate Entry procedures are followed, Appendix C must be completed by the Authorized Entrant and sent to the EHS office.
    - When an Entry Permit is issued by an Entry Supervisor, he/she determines the expiration date and time for that permit.
    - The duration of the permit can only be for the time required to accomplish the task for which the permit was issued.
    - Completed permits are sent to the EHS office.
- Review Procedures
  - EHS Officer uses the retained canceled permits from the past 12 months and revises the program as necessary.
  - Calvin College performs a single annual review covering all entries performed during a 12-month period.

**9.0 PROGRESSIVE DISCIPLINE**

- If any of the procedures outlined in this policy are not followed by the employees and/or contractors, Calvin College will take a disciplinary actions which may include:
  - Verbal warning
  - Written warning
  - Time off
  - Termination

**10.0 REVISIONS**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
1	12/15/2009	Reformatting of policy
Annual Review	10/7/10	Corrected formatting errors

**Appendix A Calvin College Permit-Required Confined Space Entry Permit**

1. **Permit Space to be entered:** Number: \_\_\_\_\_

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

2. **Purpose of Entry:**

\_\_\_\_\_

3. **Date of Entry:** \_\_\_\_\_

4. **Authorized Duration of Entry Permit:** \_\_\_\_\_

5. **Authorized Entrants:**

\_\_\_\_\_

\_\_\_\_\_

5. **Attendant(s):** \_\_\_\_\_

6. **Entry Authorization:** All actions and/or conditions for safe entry have been performed.

\_\_\_\_\_  
Printed name of Entry Supervisor

\_\_\_\_\_  
Signature of Entry supervisor

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

7. **This permit was canceled – By Whom:** \_\_\_\_\_

Time: \_\_\_\_\_

Why:  
\_\_\_\_\_

---

**8. Permit Space Hazards:**

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Lack of Oxygen          | <input type="checkbox"/> Combustible dust   | <input type="checkbox"/> Entrapment    |
| <input type="checkbox"/> Flammable gases /vapors | <input type="checkbox"/> Electrical hazards | <input type="checkbox"/> Configuration |
| <input type="checkbox"/> Hydrogen Sulfide        | <input type="checkbox"/> Temperature        | <input type="checkbox"/> Other: _____  |
| <input type="checkbox"/> Chemical hazards        | <input type="checkbox"/> Engulfment         | <input type="checkbox"/> Other: _____  |

**9. Measures used to isolate the permit space and to eliminate and control hazards before entry:**

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Forced Air Ventilation | <input type="checkbox"/> External Barricades                                | <input type="checkbox"/> Blanking, Blocking, Bleeding |
| <input type="checkbox"/> Lockout/Tag out        | <input type="checkbox"/> Departments affected<br>by work have been notified | <input type="checkbox"/> Low voltage lighting         |
| <input type="checkbox"/> Natural ventilation    | <input type="checkbox"/> Purge, Clean                                       | <input type="checkbox"/> Other: _____                 |

**10. Personal Protective Equipment (PPE) needed for entry:**

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Hard hat                 | <input type="checkbox"/> Eye protection          | <input type="checkbox"/> Hearing protection  |
| <input type="checkbox"/> Gloves                   | <input type="checkbox"/> Foot protection         | <input type="checkbox"/> Protective clothing |
| <input type="checkbox"/> Air purifying respirator | <input type="checkbox"/> Supplied air respirator | <input type="checkbox"/> SCBA                |

**11. Rescue Equipment needed for entry:**

Full body harness                       Tripod                       Winch  
 Retrieval line                       Davit Arm & Base                       Other: \_\_\_\_\_

**12. Communication devices:**

Two-way Nextel                       Audible voice                       Hardwire system  
 Walkie Talkie                       Visual contact                       Other: \_\_\_\_\_

**13. Rescue Procedures:**

Calvin College Rescue Team: Contact person \_\_\_\_\_ Phone: \_\_\_\_\_

\_\_\_\_\_

Grand Rapids Fire Department: Contact person \_\_\_\_\_ Phone: \_\_\_\_\_

\_\_\_\_\_

**14. Pre-Entry Briefing:**

Hazardous conditions                       Communication plan                       Contractors are briefed  
 mode, signs or symptoms, of exposure                       Rescue plan                       Other: \_\_\_\_\_

**15. Additional Permits needed:**

Hot work                       Other: \_\_\_\_\_                       Not required

**16. Air Monitoring Equipment:**

	Entrant's monitor	Attendant's monitor
Instrument used		
Model		
Serial number		
Last calibration date		

**17. Continuous Air Monitoring Requirements (record results at least every 30 minutes):**

Sampled for:	Permissible Entry Levels	Initial reading	30 min	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr
Oxygen	19.5 to 23.5%								
Flammable (LFL)	Under 10%								
Carbon Monoxide	Under 35 PPM								
Toxics	Under the PEL								
Hydrogen Sulfide	<sup>a</sup> 10PPM <sup>b</sup> 15PPM								
Other									

Other									
Other									
Other									

<sup>a</sup>Employee can work in the area for 8 hours at this concentration.

<sup>b</sup>Employee can work in this area up to 15 minutes at this concentration.

**NOTE:**

- **Entry shall be terminated if a condition that is not allowed under the entry permit arises in or near the permit space.**
- **This permit is to be kept at the job site.**
- **Return job site copy to EHOS office following job completion.**

**Appendix B    Confined Space Training Certificate for Calvin College**

*I understand the material presented and will follow all Calvin College policies and procedures regarding permit space entry.*

**Employee printed name:** \_\_\_\_\_

**Employee signature:** \_\_\_\_\_

**Date of training:** \_\_\_\_\_

**Signature of Trainer:** \_\_\_\_\_

## Appendix C

### Alternate Entry Procedure Checklist Calvin College

In order to enter a Permit-Required Confined Space using Alternate Entry Procedures, all hazards must be controlled or removed and any actual or potential hazardous atmosphere must be monitored by using a calibrated direct-read instrument for oxygen, flammability and toxicity. Continuous forced air ventilation alone must be sufficient to maintain the space safe for entry.

**If a hazard is detected during the Alternate Entry, the entry shall be terminated and the space re-evaluated.**

**Before** entry, the following checklist must be completed. If you answer “**yes**” to **all** the questions, and have completed the remainder of this form, you may enter the confined space. Answering “**no**” to **any** of the questions means you may not enter unless you use **Permit-Required Confined Space Entry Procedures**.

**Space to be entered:** \_\_\_\_\_

**Purpose of entry:** \_\_\_\_\_

**Location:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Pre-Entry Checklist:**

Question	Yes	No
1. Does a survey of the surrounding area show that it appears to be free of atmospheric hazards?		
2. Have you evaluated and eliminated any hazard to ensure that the cover to a confined space can be removed safely?		
3. Have electrical energy sources that could pose a hazard been de-energized and locked out?		
4. Is piping that could pose a hazard, drained and are all valves locked out and tagged?		
5. Are other sources of energy such as steam, hydraulic, air, or mechanical systems that could pose a hazard locked and tagged out?		
6. To the best of your knowledge will the area remain free of all other known hazards for the duration of the entry.		
7. Have you been trained on the hazards, equipment and safe work practices necessary to make the entry and all work performed during the entry safe?		
8. Are you trained to operate the air monitoring equipment?		
9. Are you trained and authorized to enter confined spaces?		
10. If continuous forced ventilation is indicated, is it in place, operating, and directed to the work area?		
11. Was the air monitoring equipment calibrated within 30 days?		
12. Did you test the atmosphere before entry and record the readings below?		
13. Is it true that the air monitoring equipment did not go into alarm during initial testing?		
14. Will the confined space atmosphere be monitored continuously during your entry?		
15. Is the opening guarded to prevent persons or objects from falling into the space?		

**Atmospheric Testing Record:**

Sampled for:	Permissible Entry Levels	Initial reading	30 min	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr
Oxygen	19.5 to 23.5%									
Flammable (LFL)	Under 10%									
Carbon Monoxide	Under 35 PPM									
Toxics	Under the PEL									
Other										
Other										

**If you have completed the above checklist and answered “yes” to all questions, you may authorize appropriately trained individuals to enter the confined space using Alternate Entry Procedures.**

**Entrants:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Entry was:

\_\_\_ Concluded normally

\_\_\_ Aborted due to problems listed: \_\_\_\_\_

This checklist is to be sent to the EHOS office when the job is completed.

## Appendix D

### Calvin College Manhole Entry Procedure

Note: This is a generic procedure for entry into all types of manholes on campus. Refer to the Confined Space Analysis binder for details about specific spaces.

1. Equipment needed
  - a. Portable ladder (some manholes do have permanent ladders)
  - b. Air monitor (calibrated within 30 days)
  - c. *Appendix D: Alternate Entry Procedure Checklist*
  - d. PPE as deemed necessary by entrant depending on what is being done inside the space.  
Generally the following PPE is worn
    - i. Hard hat
    - ii. Boots
    - iii. Safety glasses
    - iv. Gloves
  - e. Barricades
  - f. Ventilator and duct hose
2. Check surrounding area for hazards
  - a. Vehicle exhaust
  - b. Weather conditions
  - c. Traffic
3. Check atmosphere
  - a. At the opening before the lid is removed
  - b. Remove lid
  - c. Set up barricade
  - d. Lower the monitor into the manhole and wait for 30 seconds every 4 ft.
  - e. Do not allow the air monitor (or pump tubing) to touch the bottom or become wet
  - f. Record the readings for O<sub>2</sub>, H<sub>2</sub>S, CO and Toxics
4. If no hazardous atmosphere is detected proceed using the Alternate Entry Procedure
5. If a hazardous atmosphere is detected
  - a. Set up forced air ventilation and direct it into the work space
  - b. After enough time has passed to allow 4 air exchanges inside the space, check the atmosphere again by lowering the air monitor or pump tubing.
  - c. Record the readings for O<sub>2</sub>, H<sub>2</sub>S, CO and Toxics
  - d. If no hazardous atmosphere is detected proceed using the Alternate Entry Procedure while maintaining continuous ventilation
6. Record air monitor readings for O<sub>2</sub>, H<sub>2</sub>S, CO and Toxics every 30 minutes throughout the entry
7. Complete *Appendix D: Alternate Entry Procedure Checklist* and turn it into the EHS officer.