



## **SECTION 9–CONFINED SPACES**

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## 9.1 CONFINED SPACE ENTRY PROCEDURE

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### A. Introduction

Some workspaces at Harper College are considered "confined" because their configurations hinder the activities of any employees who must enter, work in, and exit from them. In many instances, employees who work in confined spaces also face increased risk of exposure to serious physical injury from hazards, such as entrapment, engulfment, and hazardous atmospheric conditions. Confinement itself may pose entrapment hazards, and work in confined spaces may keep employees closer to hazards, such as asphyxiating atmosphere, than they would be otherwise. For example, confinement, limited access, and restricted airflow can result in hazardous conditions that would not arise in an open workplace.

The term "permit required confined space" (i.e., permit space) refers to those spaces that meet the definition of a "confined space" and pose health or safety hazards, thereby requiring a permit for entry.

### B. References

Department of Labor, Occupational Health and Safety Administration (OSHA) 29 Code of Federal Regulations 1910.146, Illinois Department of Labor 820 ILCS 225 Health and Safety Act.

### C. Definition of Confined Space vs. Permit Required Confined Space

- **Confined Space (CS)** – all 3 of the following conditions must be met:
  1. Is large enough and so configured that an employee can bodily enter and perform assigned work and;
  2. Has limited or restricted means for entry or exit (examples: tanks, boilers, and pits) and;
  3. Is not designed for continuous employee occupancy.
- **Permit Required Confined Space (PRCS)** – an above CS and has **any one or more of the following**:
  1. Contains or has a potential to contain a hazardous atmosphere;
  2. Contains a material that has the potential for engulfing an entrant;
  3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section;
  4. Contains any other recognized serious safety or health hazard.

If the hazard can be eliminated, the PRCS may be downgraded to a non-permit CS.

### D. Confined Space Hazards

Every confined space must be evaluated for these four types of hazards. The three types of atmospheric hazards are often the most difficult to identify since they are normally invisible.

- **Oxygen-Deficient Atmospheres:** The normal atmosphere is composed of approximately 21% oxygen and 79% nitrogen. An atmosphere containing less than 19.5% oxygen shall be considered oxygen-deficient. The oxygen level inside a confined space may be decreased as the result of either consumption or displacement.



There are a number of processes which consume oxygen in a confined space. Oxygen is consumed during the combustion of flammable materials, such as in welding, cutting, or brazing. A more subtle consumption of oxygen occurs during bacterial action, as in the fermentation process. Oxygen can also be consumed during chemical reactions such as in the formation of rust on the exposed surfaces of a confined space. The number of people working in a confined space and the amount of physical activity can also influence oxygen consumption. Oxygen levels can also be reduced as the result of oxygen displacement by other gases.

- **Flammable Atmospheres:** Flammable atmospheres are generally the result of flammable gases, vapors, and/or dust mixed in certain concentrations with air, or an oxygen enriched atmosphere. Oxygen-enriched atmospheres are those atmospheres which contain an oxygen concentration greater than 22%. An oxygen-enriched atmosphere will cause flammable materials such as clothing and hair to burn violently when ignited.

Combustible gases or vapors can accumulate within a confined space when there is inadequate ventilation. Gases heavier than air will accumulate in the lower levels of a confined space. Therefore, it is especially important that atmospheric tests be conducted near the bottom of all confined spaces.

The work being conducted in a confined space can generate a flammable atmosphere. Work such as spray painting, coating, or using flammable solvents for cleaning can result in the formation of an explosive atmosphere.

Welding or cutting with oxyacetylene equipment can also be the cause of an explosion in a confined space and shall not be allowed without a hot work permit. Oxygen and acetylene hoses may have small leaks in them which could generate an explosive atmosphere and, therefore, should be removed when not in use. The atmosphere shall be tested continuously while any hot work is being conducted within the confined space.

- **Toxic Atmospheres:** Toxic Atmospheres may be present within a confined space as the result of one or more of the following:
  - **A Product Stored in the Confined Space**
    - When a product is stored in a confined space, the product can be absorbed by the walls and give off toxic vapors when removed or when cleaning the residual material. The product can also produce toxic vapor which will remain in the atmosphere due to poor ventilation.
  - **The Work Being Conducted in the Confined Space**
    - Toxic atmospheres can be generated as the result of work being conducted inside the confined space. Examples of such work include:
      - Welding or brazing with metals capable of producing toxic vapors, painting, scraping, sanding, etc. Many of the solvents used for cleaning and/or degreasing produce highly toxic vapors.
  - **Areas Adjacent to the Confined Space**
    - Toxic fumes produced by processes near the confined space may enter and accumulate in the confined space. For example, if the confined space is lower than the adjacent area and the toxic fume is heavier than air, the toxic fume may "settle" into the confined space.
- **Mechanical and Physical Hazards:**

Problems such as rotating or moving mechanical parts or energy sources can create hazards within a confined space. All rotating or moving equipment such as pumps, process lines, electrical sources, etc., within a confined space, must be identified. Physical factors such as heat, cold, noise, vibration, and fatigue can contribute to accidents. These factors must be evaluated for all confined spaces.



Excavations could present the possibility of engulfment. Employees shall be protected from cave-ins by sloping, benching, or shoring systems when the depth of the excavation is more than four feet, in accordance with 29 CFR 1926.652.

### **E. Profiling Confined Spaces**

An Inventory for Permit Required Confined Spaces (see Section 9.2) has been conducted. This inventory will be evaluated annually to review for existing or new Permit Required Confined Spaces on campus.

If new or existing Permit Required Confined Spaces are found, report it to the Manager of Environmental Health & Safety.

- Warning signs shall be posted:

**DANGER - PERMIT REQUIRED CONFINED SPACE**  
**Authorized Entrants Only**

### **F. Training and Education**

Training shall be conducted before the initial work assignment begins, training must be provided for all workers who are required to work in or around confined spaces. Additional training is required when (1) the job duties change, (2) there is a change in the permit space program or the permit space operation presents a new hazard, and (3) when an employee's job performance shows deficiencies.

Training will cover the following topics:

- What is a confined space, non-permit confined space and permit-required confined space;
- Hazards associated with confined spaces;
- Use of equipment and methodologies to determine hazards of a confined space
- How to recognize warning signs or symptoms of exposure to a dangerous situation;
- Why the policy was developed NOT TO ENTER PERMIT CONFINED SPACES.

### **G. No Entry by Harper Employees into Permit Required Confined Spaces**

If there is an occasion where entry into a Permit Required Confined Space by a Harper Employee is required, special training and written permit requirements MUST be followed. Entry into a Permit Required Confined Space can only be requested and coordinated by a supervisor with permission from the Manager of Environmental Health & Safety.

### **H. Contractors**

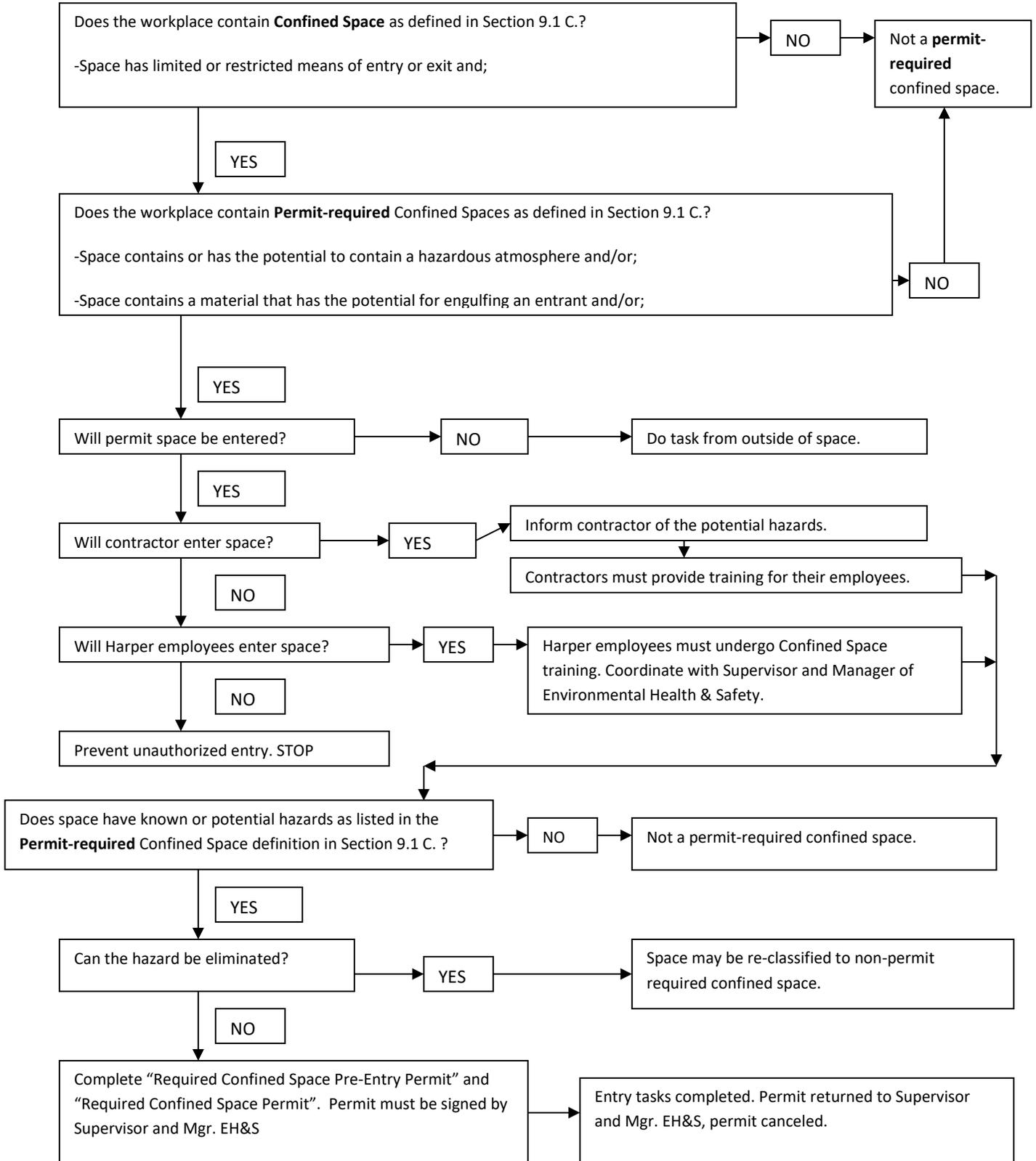
Contractors are required to follow the Harper College Confined Space Procedures, or they must use their own program that is equivalent. Contractors are required to ensure they have trained their employees on all procedures. Departments must inform outside contractors of the potential hazards that may be encountered during their work at Harper. This includes giving the contractor access to any information available on the confined spaces involved in their project. Similarly, the contractor must inform the Department of any changes made to a confined space in the course of their work. Any change, no matter how minor, would require a re-evaluation of the space before entry would again be allowed.

## 9.2 PERMIT REQUIRED CONFINED SPACE INVENTORY

SPECIFIC LOCATION	PRCS*		TESTING REQUIRED		ENTRANTS IDENTIFIED		TRAINING PROVIDED		AREA SUPERVISOR
	YES	NO	YES	NO	YES	NO	YES	NO	
Boilers - Facilities Management Bldg.	X		X			X		X	Utilites Supervisor
Tanks - Facilities Management Bldg.	X		X			X		X	Utilites Supervisor
Tanks "M" Bldg.	X		X			X		X	Utilites Supervisor
<p><b>Below are areas that need to be evaluated for Confined Space status. Depending on conditions and type of work being conducted the status may be "Permit Required" or "Non-Permit Required" Confined Space. Use the Flowchart in Section 9.3 to aid in decision.</b></p> <p><b>If still in question, see the Manager of Environmental Health &amp; Safety.</b></p>									
Manholes, sewers, pits, traps, etc. - all of campus									Building Maintenance Supervisor
Elevator pits all Buildings									Building Maintenance Supervisor
Excavations or trenches									Project Manager/Contractor
Fountain Pit									Utilites Supervisor

\*Permit Required Confined Space

# 9.3 CONFINED SPACE DECISION FLOW CHART



## 9.4 REQUIRED CONFINED SPACE PERMIT

Date and Time Issued: \_\_\_\_\_ Date and Time Expired: \_\_\_\_\_

Job Site: \_\_\_\_\_ Job Supervisor: \_\_\_\_\_

Equipment to be Worked on: \_\_\_\_\_ Work to be Performed: \_\_\_\_\_

Harper Supervisor: \_\_\_\_\_ Contractor: \_\_\_\_\_

1. Atmospheric Checks: Time \_\_\_\_\_ Oxygen \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ PPM  
Explosive \_\_\_\_\_% L. F. L. Toxic \_\_\_\_\_ PPM CO \_\_\_\_\_ PPM

2. Tester's Signature: \_\_\_\_\_ Instrument Used: \_\_\_\_\_

3. Source isolation (No Entry): **N/A Yes No**  
Lockout/Tagout - Pumps or lines blinded, disconnected, or blocked ( ) ( ) ( )

4. Ventilation Modification: **( ) ( ) ( )**  
Mechanical ( ) ( ) ( )  
Natural Ventilation Only ( ) ( ) ( )

5. Atmospheric check after isolation and ventilation:

- Oxygen: \_\_\_\_\_ % (19.5% to 23.5%)
- Explosive: \_\_\_\_\_ % L.F.L. (< 10.0%)
- CO: \_\_\_\_\_ PPM<35PPM (TWA for 8 hrs.)
- H<sub>2</sub>S: \_\_\_\_\_ PPM<10PPM (TWA for 8 hrs.)
- Time: \_\_\_\_\_

6. Communication Procedures: \_\_\_\_\_

7. Rescue Procedures: \_\_\_\_\_

8. Entry, standby, and back up persons:

- Name of Entry Person: \_\_\_\_\_
- Name of Standby Person: \_\_\_\_\_
- Name of Back up Person: \_\_\_\_\_

	<b>N/A</b>	<b>Yes</b>	<b>No</b>
Successfully completed required training?	( )	( )	( )
Is it current?	( )	( )	( )

9. Equipment: **( ) ( ) ( )**

Direct reading gas monitor-tested	( )	( )	( )
Safety harnesses and lifelines for entry and standby persons	( )	( )	( )
Hoisting equipment	( )	( )	( )
Powered communications	( )	( )	( )
SCBA's for entry and standby persons	( )	( )	( )
Protective clothing	( )	( )	( )
All electric equipment listed Class I, Division I, Group D	( )	( )	( )

10. Periodic Atmospheric Tests:



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Oxygen	_____ %	Time _____	Time _____	Time _____	Time _____
CO	_____ PPM	Time _____	Time _____	Time _____	Time _____
Explosive	_____ %	Time _____	Time _____	Time _____	Time _____
H2S	_____ PPM	Time _____	Time _____	Time _____	Time _____
Toxic	_____ %	Time _____	Time _____	Time _____	Time _____

*We have reviewed the work authorized by this permit and the information contained herein. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.*

Permit and Check List Prepared By: (Harper Employee or Contractor) \_\_\_\_\_

Reviewed By: (Harper Supervisor) \_\_\_\_\_

This permit is to be kept at the job site. Return job site copy to Manager of Environmental Health and Safety (EH&S) following job completion.