

CONFINED SPACE PROGRAM

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1.0 PURPOSE

Entry into a confined space represents a significant risk of serious injury or death to individuals not prepared for the hazards they may encounter. This program is designed to identify and control all hazards associated with entry into confined spaces.

Under no circumstances is anyone to enter a confined space under University of Waterloo control without adhering to this Confined Space Program.

2.0 SCOPE

The University of Waterloo Confined Space Program encompasses all confined and restricted spaces under University control. It includes University buildings, grounds, and off-campus sites including fieldwork.

2.1 CONFINED SPACES REQUIRING THE USE OF SUPPLIED AIR RESPIRATORS

A confined space that requires the use of supplied-air respiratory equipment to be rendered safe also requires approval from the Safety Office before an entry permit can be issued by a supervisor or manager.

3.0 DEFINITIONS

Acceptable atmospheric levels

The atmospheric concentration of any explosive, flammable gas or vapour that is less than:

- Ten-percent of its lower explosive limit, if performing “cold work”.
- One-percent of its lower explosive limit, if performing “hot work”.

The oxygen content of the atmosphere is at least 19.5% but not more than 23% by volume and the exposure to atmospheric contaminants does not exceed any applicable level set out in a regulation made under the Occupational Health and Safety Act.

Adequate

When used in relation to a procedure, plan, material, device, object or thing, it means that it is sufficient for both its intended and its actual use and sufficiently protects a worker from occupational illness or injury.

Adequately

Corresponds to the meaning of “adequate”, see above for more information.

Assessment

This refers to an assessment of hazards with respect to one or more confined spaces in a workplace.

Atmospheric hazards

The accumulation of flammable, combustible, or explosive agents. An oxygen content in the atmosphere that is less than 19.5% or more than 23% by volume, or the

accumulation of atmospheric contaminants, including gases, vapours, fumes, dust, or mists, that could:

- Result in acute health effects that pose an immediate threat to life.
- Interfere with a person's ability to escape unaided from a confined space.

Cold work

Work that is not capable of producing a source of ignition.

Confined space

A fully or partially enclosed space not designed or constructed for continuous human occupancy, and in which atmospheric hazards may occur because of its construction, location or contents or because of work that is done in it.

Hot work

Work that is capable of producing a source of ignition.

Plan

A plan for one or more confined spaces in a workplace.

Program

A program for one or more confined spaces in a workplace.

Purging

Refers to displacing contaminants from a confined space.

Related work

Work performed near a confined space in direct support of work inside the confined space.

4.0 ROLES AND RESPONSIBILITIES

4.1 SUPERVISOR/MANAGER

- Ensure that entrants and attendants to confined and restricted spaces receive appropriate training.
- Ensure all equipment is appropriate and available for entry to a confined or restricted space.
- Complete hazard assessments.
- Complete site-specific entry plans.
- Complete rescue plans.
- Complete entry permits.
- Maintain inventory of confined and restricted spaces.
- Identify confined spaces.
- Retain entry permits for 1 year from date of entry.

- Notify the Safety Office of any injury or incident involving a confined or restricted space.

4.2 WORKERS

- Attend all required training.
- Inspect all personal protective equipment prior to use.
- Inspect all life safety equipment prior to use.
- Ensure all equipment required for entry is on site prior to entry.
- Follow site-specific entry plan.
- Report to their supervisor if conditions are different from the entry plan.

4.3 SAFETY OFFICE

- Conduct a periodic review of the confined and restricted space program.
- Provide required safety training.
- Maintain records of safety training.
- Assist with hazard assessments.
- Assist with confined space plans.

5.0 PROCEDURES

To ensure compliance with the requirements of Ontario Regulation O. Reg. 632/05 - Confined Spaces. This program applies to any University worker or student whose duties require entry and work within confined spaces at the University. Contractors and subcontractors entering confined spaces at the University must also abide by the procedures established by this document.

The University of Waterloo's Confined Space Program consists of the following elements:

- | | |
|---------------------------|--------------|
| ▪ Recognition | ▪ Training |
| ▪ Hazard assessment | ▪ Records |
| ▪ Entry permits and plans | ▪ Procedures |
| ▪ Coordination document | |

5.1 RECOGNITION OF CONFINED SPACES

A space is only considered a confined space when it meets the following conditions:

- It is **not** designed and constructed for continuous human occupancy.
- It **is** possible to have an atmospheric hazard.

Examples of confined spaces on campus:

- Storage tanks
- Storm sewers
- Boilers
- Sanitary sewers
- Sewage sump pits
- Underground utility
- Vaults

When asking the question "is it possible to have an atmospheric hazard?" give consideration to the type of work. Consider the following situations for an underground electrical utility vault:

1. A worker is entering the vault to perform inspection work. Is this a confined space entry? The answer is no. The space meets the first part of the definition but does not meet the second part of the definition since no atmospheric hazard exists and the work will not generate a hazardous atmosphere.
2. Another worker enters the vault and is preparing to weld. Is this a confined space entry? In this case, the answer is yes. This is because welding is generating a hazardous atmosphere. Welding releases fumes and welding gasses may also displace oxygen, both of which contribute to creating a hazardous atmosphere.

It is important that each space is evaluated, hazard assessments are performed, and a site-specific entry plan is determined prior to each entry of a confined space.

Identify confined spaces with this sign:



5.2 HAZARD ASSESSMENT

Every confined space must be assessed for all hazards. Hazard assessments are critical to identifying existing or potential hazards associated with each confined space. The hazard assessment also includes work practices that may generate hazardous atmospheres. Once hazards have been assessed control measures must be determined to eliminate or control the hazards if elimination is not possible.

Hazardous energy must be controlled according to the University's Hazardous Energy Control Program.

5.2.1 ASSOCIATED HAZARDS

Hazards to be aware of include, but are not limited to:

- Oxygen deficiency/enrichment
- Flammable, combustible or explosive agents
- Toxic air contaminants, smoke, fume and dusts
- Residual chemicals
- Ignition hazards
- Moving parts
- Thermal stress to worker
- Engulfment
- Electrical
- Visibility
- Traffic (pedestrian and vehicular)
- Biological (animals, droppings, etc.)
- Residual pressure
- Access/egress

The supervisor must complete a hazard assessment, which must be incorporated into the relevant entry plan. The Safety Office can provide assistance with hazard assessments.

5.3 ENTRY PERMITS AND PLANS

5.3.1 ENTRY PERMIT

An entry permit must be completed for every confined space entry. The entry permit must be on-site during a confined space entry, but it does not need to be posted over the entrance. **Entry into a confined space without an entry permit is strictly forbidden.**

If the work to be conducted in the confined space involves hot work, such as welding, then a second permit, a Hot Work Permit, is required to be issued by a supervisor.

5.3.2 SPACE SPECIFIC ENTRY PLAN

Each confined space must be considered separately with a plan attached to the confined space entry permit. Supervisors are responsible for preparing plans for confined spaces that are under their control. The plan must incorporate the following elements:

- Work to be performed

- Co-ordination with outside contractors (if applicable)
- On-site rescue procedures
- Rescue equipment
- Communication methods
- Personal Protective Equipment
- University of Waterloo's Hazardous Energy Control Program and control of materials movement
- Attendants
- Means for entering and exiting
- Atmospheric testing
- Procedures for working in the presence of flammable or explosive substances
- Procedures for ventilating and purging a hazardous atmosphere

Supervisors shall complete a plan using a template prior to every entry. Contact the Safety Office for assistance with plans.

5.4 COORDINATION DOCUMENT

When a confined space entry involves more than one employer, provisions must be taken to ensure that all parties involved are aware of the hazards and whether the hazards were pre-existing or generated from the work performed by one or more of the parties involved.

A co-ordination document must be produced to ensure the safety of all workers. The co-ordination document intends to reduce duplication of certain legislated requirements such as the hazard assessment, specific entry plan, and entry permits.

A co-ordination document is not needed when only one employer is entering the confined space. For example, company EZ-Cleaners has been hired to clean and re-line a large sulfuric acid tank located on campus and no University personnel will be entering the tank. In this case, the co-ordination document is not necessary. However, the person or department that hired the contractor must ensure that the contractor is working in compliance with the confined spaces requirements. This is best achieved by asking for copies of the hazard assessment and entry plan that the contractor has developed.

When University personnel are performing entries with non-University personnel (including inspectors), a co-ordination document must be produced. There is a template to assist supervisors in this situation.

5.5 CONFINED SPACE ENTRY PROCEDURES

5.5.1 PRIOR TO ENTRY INTO ANY CONFINED SPACE

- All affected workers must review the relevant entry plan.
- Entry personnel and attendants must have received the University's general confined space training and entry plan-specific training.
- All hazards associated with the confined space must be identified (including hazards that may be generated by the work in the confined space) and recorded on the entry permit.
- Control measures for the identified hazards must be determined, implemented, and recorded on the entry permit.
- The rescue equipment identified in the relevant entry plan must be on site.
- The atmosphere must be tested for hazardous conditions. All instruments used to perform testing must be calibrated according to the manufacturer's specifications. Results of all testing must be recorded on the entry permit.

5.5.2 GENERAL ENTRY PROCEDURES

1. The supervisor responsible for the confined space issues a Confined Space Work Permit.
2. All personnel associated with the confined space entry and work, including the authorized entrant(s), attendant and supervisor, must review and thoroughly understand the correct procedures for safe entry, work and rescue. These individuals must be aware of all specific procedures for the particular confined space.
3. No one shall enter a confined space without having an attendant stationed outside at all times. The attendant prevents unauthorized entry into the confined space and gives his/her undivided attention to the worker(s) inside the space.
4. All required equipment and supplies for entry must be readily available at the confined space site and in good working condition. Particular care is required to ensure that the means of access to and egress from the confined space will not prevent or adversely affect the proper use of these items. Considerations include, but are not limited to:
 - Appropriate personal protective equipment; depending on the situation, this could include items such as hard hats, glasses, boots, hearing protection, gloves.
 - Properly calibrated and maintained air monitoring equipment.
 - Equipment such as barricades, ventilator/exhaust unit, flashlight and tools appropriate for the confined space work.

- Escape equipment, including harness, ropes, tripods, etc.
5. Establish the means of communication between the entrant(s) and the attendant while in the space - visual, verbal, portable radio or other. In addition, to enable a quick response in the event of a confined space emergency, the attendant must have a portable radio or phone and the emergency phone numbers.
 6. Establish a safe means of access to and egress from the confined space.
 7. Perform necessary lockout/tag out procedures to prevent the unexpected release of energy during equipment/system servicing or maintenance.
 8. Before anyone enters the space, the atmosphere must be tested for the following:
 - Oxygen levels (acceptable range is between 19.5% to 23% O₂)
 - Flammable and combustible gases and vapours (0% to 10% of Lower Explosive Limit (LEL) (cold work); 0% to 1% of LEL (hot work))
 - Other toxic materials as appropriate (including carbon monoxide, hydrogen sulfide, etc.).
 - Maximum Permissible Level of Carbon Monoxide: 25 ppm
 - Maximum Permissible Level of Hydrogen Sulfide: 5 ppm

If other toxic materials are suspected, contact the Safety Office for assistance.
 9. If a worker must enter the confined space in order to conduct proper air monitoring, appropriate respiratory equipment and other pertinent protective equipment must be worn until the actual air quality is determined. In these cases, the Safety Office must be contacted.
 10. Record the air monitoring results on the entry permit.
 - If air monitoring indicates that the confined space has unacceptable levels of oxygen, flammables or toxics, ventilate the area using a blower or similar ventilating unit for 15 minutes. Ensure the proper placement of the intake of the ventilation unit so that only fresh, uncontaminated air is introduced into the space (i.e. ensure nearby vehicle or equipment exhaust is not collected).
 - After this ventilating period, the qualified person shall then retest the air and record the results. If the atmosphere is acceptable, the entry may proceed. If not, ventilate space again and retest until the atmosphere is acceptable.
 11. Continue to ventilate for the duration of work in the confined space.
 12. Workers entering the confined space shall wear or carry an air-monitoring device with an alarm to provide early warning of changing conditions.
 13. Entrants should perform a visual inspection of the confined space to determine whether there are physical hazards of which the entrants should be aware - rusty or missing ladder rungs, deep water, slippery surfaces, trip hazards, etc. If there

is a possibility of a fall of greater than 3 m. an appropriate fall arrest device must be used that will prevent a vertical free fall of greater than 1.5 m.

14. Once the potential hazards in the space have been identified and the entrants take all necessary steps to protect themselves, the supervisor signs the permit and the entry can commence.
15. Wherever possible, entry into a confined space should only be performed during regular working hours. If an entry is required after hours, it is still necessary to have the entry permit authorized by the supervisor.
16. Post the permit and any other required documents at the entry to the confined space.

5.5.3 GENERAL WORK PROCEDURES

- If conditions deviate from the permissible levels or if an equipment alarm goes off, everyone is to leave the space immediately.
- If a confined space worker feels that atmospheric conditions have changed or if he/she begins to feel overcome for any reason, even if the air monitoring equipment alarm does not sound, leave the space immediately.
- After leaving the space for a significant period of time (1 hour), it is necessary to retest prior to re-entry into the space. If conditions have changed, rendering the space unfit for human occupancy, the space must be ventilated and re-tested until the atmosphere is acceptable.
- The attendant must monitor the worker inside the space and be able to respond quickly in the event of an emergency. If a confined space worker begins to behave in a strange or uncharacteristic manner, the attendant orders the worker out of the space.
- In the event of a confined space emergency, the attendant may attempt a rescue using the prearranged method of retrieval designated by the specific emergency procedures for that space.
- In the event of an unconscious entrant, the attendant will call 911.
- The attendant does not enter the space.
- If the work goes beyond the time limit listed on the original permit, the site supervisor must revise the permit.

Once work is completed in the confined space the permit must be returned to the supervisor and kept on record for one year.

6.0 TRAINING

6.1 GENERAL TRAINING

All workers (University staff and contractors) that enter a confined space on campus must complete the University's general Confined Space Awareness training or provide documentation of training. To arrange training please contact the Safety Office at safety@uwaterloo.ca or extension 33587.

6.2 PLAN-SPECIFIC TRAINING

Workers must also attend specific training sessions for each confined space. Specific training requirements are identified in the relevant plan for each confined space. The supervisors of the entrants and attendants will usually deliver this training.

7.0 RECORD KEEPING

All documents must be retained for at least one year after they are created and at least the two most recent records of each document must be retained. Responsibility for maintaining records is as follows.

7.1 SUPERVISORS/MANAGERS

Must retain:

- Co-ordination document (if applicable)
- Hazard assessment
- Entry permit (includes on-site rescue equipment inspection records and air testing results)
- Site-specific plan (must include on-site rescue procedures)
- Site-specific training records

During a confined space entry, the entry permit must be kept on-site.

7.2 SAFETY OFFICE

The Safety Office will maintain records of all workers that have completed Waterloo's general confined space entry training.