



Department of
Health and Safety

Confined Space Management

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1.0 Preamble

Memorial has implemented workplace procedures to prevent unauthorized and unsafe confined space entry to guide the actions of those who are required to enter confined spaces to perform work.

2.0 Introduction

- 2.1 A confined space is any space that has the following characteristics:
- It is large enough so that an employee can enter and perform assigned work;
 - It has limited or restricted means for entry or exit; and
 - Is not designed for continuous employee occupancy.
- 2.2 A confined space is one that, by design, has limited openings for entry and exit, unfavourable natural ventilation which could contain or produce hazardous atmospheres, and is not intended for continuous employee occupancy.
- 2.3 Entry into confined spaces may occur during construction activities or for the purposes of inspection, repair, or maintenance. The atmospheric hazards (oxygen deficiency, oxygen displacement, flammable mixtures, and toxic gases) and physical hazards (mechanical, electrical, hydraulic energy, engulfment) associated with confined spaces present risks of injury and death. Biological hazards and environmental conditions can make confined space work undesirable, uncomfortable, and difficult.
- 2.4 To ensure safety, a Confined Space Management Program is essential. The need for entries into confined spaces must be minimized by design. All necessary entries shall proceed via an entry permit system which identifies space-specific hazards and controls, safety equipment, cautious work procedures, qualified personnel, and the rescue plan. Managers, supervisors, and workers must be trained about confined spaces and must maintain their skills.
- 2.5 Confined-space openings are limited primarily by size and location. Openings may be small in size and may be difficult to move through easily. However, in some cases, openings may be very large; for example, open-topped spaces such as pits or excavations. Entrance and exit may be required from top, bottom, or side. In some cases, having to access the work area by a fixed ladder may constitute limited or restricted entry or exit. Size or location may make rescue efforts difficult.
- 2.6 Most confined spaces are not designed for employees to enter and work on a routine basis. They may be designed to store a product, enclose materials and processes, or transport products or substances. Because they are not designed for continuous occupancy, frequently they will not have good ventilation or lighting. Therefore, occasional employee entry for inspection, maintenance, repair,

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cleanup, or similar tasks can be difficult and dangerous. The danger associated with entry may come from chemical or physical hazards within the space.

3.0 Definitions

3.1 Acceptable Environmental Conditions: the conditions that must exist for the employee to safely enter and perform work within a confined space.

3.2 ACGIH: American Conference of Governmental Industrial Hygienists, an organization devoted to the administrative and technical aspects of occupational and environmental health.

3.3 Air Quality Tester: a trained person who performs the requisite pre-entry and ongoing atmospheric testing and monitoring for safe confined space entries.

3.4 Atmosphere: refers to the gases, vapours, mists, fumes, and dusts within a confined space. (See hazardous atmosphere)

3.5 Atmospheric Testing: pre-entry testing by a competent person with a calibrated direct reading instrument to measure (in sequence) oxygen content, flammable gases and vapours, and toxic air contaminants.

3.6 Atmospheric Monitoring: continuous monitoring with a calibrated direct-reading instrument to verify acceptable atmospheric conditions for entrants. Alarm conditions pre-empt an entry. Re-entry is not permitted until the cause of the alarm is identified and corrected and the confined space has been reevaluated and the entry permit is reissued.

3.7 Attendant: a person trained in external rescue procedures who remains in communication with those inside the confined space for the purpose of rendering assistance or effecting rescue. Attendants shall be first aid and CPR qualified.

3.8 Competent Person: a person qualified to evaluate confined space hazards, perform atmospheric tests, and/or evaluate the results.

3.9 Confined Space: a space in which, because of its construction, location, contents, or work activity, the accumulation of gas, vapour, dust, or fume or the creation of an oxygen deficient atmosphere may occur. Examples of confined spaces include storage tanks, process vessels, pits, silos, boilers, reaction vessels, ventilation and exhaust ducts, sewers, underground utility vaults, pipelines and trenches deeper than 1.2 metres (4 feet). Confined space entry is any action that results if any part of the entrant breaks the plane of any opening into a confined space.

3.10 Emergency Response: a plan that establishes guidelines for handling foreseeable confined space incidents or accidents.

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3.11 Enclosed Space: a space other than a confined space which is enclosed by walls and ceiling such as a service tunnel or room where workers may find otherwise ordinary hazards aggravated or intensified. Enclosed spaces may become confined spaces because of atmospheric hazards. Enclosed spaces shall have space-specific safe entry procedures by permit based upon hazard evaluations at the time of entry.

3.12 Entrant: a trained person authorized by the entry supervisor to enter a confined space.

3.13 Entry Permit: the written authorization from an entry supervisor for entry into a confined space for a stated purpose during a given time which certifies that all potential hazards have been evaluated and are controlled. The entry supervisor and the entrants shall review and sign the entry permit prior to the confined space entry.

3.14 Entry Supervisor: a supervisor who is responsible for authorizing entry into a confined space and for ensuring that safe procedures are followed for such entries. An entry supervisor must be a competent person. The entry supervisor must ensure there is a space-specific emergency response/rescue plan and must sign the entry permit once all potential hazards have been evaluated and are controlled.

3.15 Hazardous Atmosphere: an atmosphere presenting a potential for death, disablement, injury, or acute illness from one or more of the following causes:

- The presence of less than 19.5 percent or more than 23 percent oxygen by volume;
- The presence of a flammable gas, vapour, or mist in excess of 10 percent of its lower explosive limit (LEL);
- A concentration of airborne combustible dust that obscures vision at a distance of five feet or less;
- A concentration of any toxic, corrosive, or asphyxiant substance above the permissible exposure limit (PEL) or above the numerical limit given for the substance in the current ACGIH TLV booklet;
- Any other condition that is known to present a safety or acute health hazard or is immediately dangerous to life or health (IDLH).

4.0 Permit-required: a confined space or enclosed space for which an entry permit is required is one that is:

- Large enough and configured so that an employee can bodily enter and perform assigned work;
- Has limited means of entry or exit;
- Is not designed for continuous employee occupancy; and
- Has one or more of the following characteristics:
 1. Contains or has the potential to contain a hazardous atmosphere;
 2. Contains a material that might engulf an entrant; has an internal configuration (such as inwardly converging walls or a floor that slopes downward and tapers to

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a smaller cross-section) that could cause the entrapment or asphyxiation of an entrant;

3. Has any other recognized serious safety or health hazards (e.g., physical hazards, biological hazards, chemical hazards, environmental extremes).

5.0 Retrieval system: the equipment (including retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for external rescue of persons from confined spaces. Routine entries involve entries into spaces which, from historical data, generally do not exhibit changes in physical or atmospheric characteristics over time.

6.0 Confined Space Management Program

6.1 A Confined Space Management Program shall be established at University workplaces (i.e., the main campus, research stations/facilities, Sir Wilfred Grenfell College, etc.) that have confined spaces.

6.2 The following elements of Memorial's Confined Space Management Program will be documented by the Office of Safety and Environmental Services and made available online on the Facilities Management website:

- An inventory of all confined spaces and reasons why they must be entered. All confined spaces will be conspicuously posted with a sign reading either "DANGER, PERMIT-REQUIRED CONFINED SPACE, or NO UNAUTHORIZED ENTRY". This inventory will be coordinated by the Office of Safety and Environmental Services and will be maintained and updated on an annual basis.
- Identification of all potential hazards associated with each confined space; e.g., atmospheric hazards (oxygen deficient or enriched atmospheres, toxic or irritating atmospheres); physical hazards (mechanical equipment or electrically energized equipment, powder, heat, cold, noise, engulfment, radiation); biological hazards (insects, rodents); and chemical hazards (fire, explosion, gases, liquids, hazardous substances).
- Space-specific procedures for confined space entry preparation (isolation, lockout/tagout, purging, ventilation, and ensuring that equipment is in a zero energy state).
- The space-specific emergency response/rescue plan.
- Mandatory use of the written entry permit system.
- Listing of equipment available for safe confined space entries (e.g.; direct-reading air testing instrument, ventilation equipment, traffic control barriers,

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personal protective clothing and equipment, respiratory protection, intrinsically safe tools, radios, rescue gear, etc.).

- Lists of employees who have been trained for active roles in confined space entries as entry supervisors, air quality testers, attendants, entrants, and rescue team personnel.
- Procedures for atmospheric testing and the evaluation of the confined space to ensure acceptable environmental conditions.
- Description of confined space training initiatives and training frequencies.
- Procedures for entries by contractors into University confined spaces.

7.0 Confined Space Training

7.1 Employees who are assigned duties as entry supervisors, air quality testers, attendants, entrants, and rescue team personnel will be provided formal confined space entry and rescue training covering:

- Recognition of confined spaces
- Confined space hazards and controls
- Correct use of personal protective equipment
- Standard first aid and CPR (for attendants and rescue team personnel)
- Space preparation procedures (lockout/tagout, isolation, hot work procedures)
- Safe work practices for confined spaces
- The entry permit system
- Atmospheric testing, monitoring, evaluation, and interpretation
- Confined space entry equipment (tripod and hoist, ventilator, rescue gear)
- Emergency entry and exit procedures and communication signals
- Emergency response/rescue planning
- Activation of the emergency response plan
- Entry and rescue rehearsals designed to promote familiarity and competence
- Basic Fire Safety Analysis and Fire Fighting (Hot Work Permit)
- WHMIS, PEL, TLV, STEL, Ceiling

7.2 Training frequency will be determined by the Department of Health & Safety based upon the needs and experience of the confined space entry personnel.

8.0 Rescue Planning

8.1 A written space-specific rescue plan shall be a prerequisite for all confined space entries.

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(This plan may call for an external rescue by attendants or for an internal rescue by a standby rescue team equipped with SCBA's).

- 8.2 The space-specific rescue plan shall be reviewed at a pre-entry meeting, and the written plan shall be described on the Confined Space Entry Advance Notice Form.
- 8.3 The Department of Health & Safety shall be notified in advance of all routine entries and nonroutine entries (i.e., location, date, time, purpose of entry, and names of entry supervisor and air quality tester, rescue plans).
- 8.4 The entry supervisor shall alert any personnel in the vicinity of a confined space about the date, time, and the purpose of a planned entry.
- 8.5 A pre-entry meeting of the entry and rescue team shall be mandatory to discuss team member responsibilities, safe work procedures, and the space-specific emergency response/rescue plan.
- 8.6 Entrants shall terminate a confined space entry immediately upon a signal from the attendant or upon an alarm condition from atmospheric monitoring. Re-entry shall not be permitted until the cause of the alarm is identified and corrected and the confined space is re-evaluated. (See atmospheric testing).

9.0 Atmospheric Testing

- 9.1 Atmospheric testing from outside the space with a field-checked, direct-reading instrument shall be a prerequisite for confined space entries. Air quality tests shall be performed by a competent person trained to perform and interpret such tests. The internal atmosphere of the confined space shall be tested in the following order: oxygen content, flammable gases and vapours, and suspected toxic air contaminants. The likelihood of contaminant interferences shall be assessed.
- 9.2 Air quality tests shall be performed before ventilation is commenced to determine precautions necessary for purging, ventilating, and for respiratory protection. A pressure demand, supplied-air breathing apparatus or SCBA shall be worn by an entrant when the atmosphere in a confined space cannot be made safe to breathe through ventilation. The Office of Safety & Environmental Services shall be notified immediately about all planned entries that require entrants to wear SCBA's.
- 9.3 Pre-entry test results must be satisfactory to the entry supervisor and all entrants in order for an entry to proceed. The air quality test results shall be recorded on the confined space entry permit.

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- 9.4 Atmospheric monitoring shall be performed continuously during entry operations.
- 9.5 Atmospheric testing and monitoring equipment shall be CSA approved, equipped with danger signalling features, and shall be factory calibrated in accordance with the manufacturer's instructions. Field checks shall be performed immediately prior to confined space entries. Instrument specific calibration and field check data shall be recorded and maintained for a minimum of seven years.

10.0 Confined Space Entry Permits (See 4.0)

- 10.1 Entry into a permit-required confined space shall be by entry permit only. The entry permit shall be signed immediately prior to entry by the entry supervisor and by all entrants. The permit shall be displayed at the job site for the duration of the entry.
- 10.2 The entry supervisor shall issue a confined space entry permit to:
- Identify the permit-required confined space
 - Identify the time and duration of an entry
 - Authorize the confined space work to be done (including that of contractors hired directly by the University)
 - Appoint entrants, attendants, and rescue team personnel
 - Confirm that existing and potential confined space hazards have been evaluated
 - Identify controls for foreseeable hazards and to specify acceptable environmental conditions for safe entry
 - Identify required safety equipment, personal protective clothing, and safe work procedures
 - Ensure pre-entry atmospheric testing results and ventilation requirements are recorded
 - Specify continuous atmospheric monitoring during entry
 - Communicate the space-specific rescue plan as a prerequisite of entry

Legislative reference: OH&S regulation Part XXVII 511, 512, 513, 514, 515, 516.

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