

Confined Space Procedure

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Office of the Chief Risk Officer

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Version Control Table

Version Number	Owner	Approver	Change Summary	Status
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1. Document Background

Purpose and scope of document

The Confined Space Procedure (hereafter “the procedure”) serves to outline the University of Ottawa (also known as “uOttawa”) procedure for performing confined space entry (CSE) on uOttawa premises.

The procedure applies to work performed at uOttawa or under the supervision/control of a uOttawa employee and is extended to serve as a reference for stakeholders at uOttawa.

The procedure does not outline all the independent requirements and potential risks or challenges specific to any project, workspace, or situation, but rather is intended to serve as a framework to build a fit-for-purpose approach for managing the applicable risks. Specific workplaces, projects, and areas may have additional safety needs that should be accounted for above and beyond the guidance provided in the procedure.

Terms and definitions

Refer to the [OHS Glossary](#) for the OHS terms and definitions that apply to documents within the OHS management system.

Additional terms and definitions specific to this procedure are listed below.

“Acceptable Atmospheric Levels” –

- An atmospheric concentration of any explosive or flammable gas or vapour that is:
 - Less than 25% of its lower explosive limit (LEL) for inspection work
 - Less than 10% of its LEL for cold work (work that does not produce sparks or other sources of ignition)
 - Less than 5% of its LEL for hot work (spark producing work or other sources of ignition because of the work to be performed)
- Exposure to atmospheric contaminants that does not exceed any applicable level set out in a regulation made under the *Occupational Health and Safety Act* or any other regulation that is more stringent
- Atmosphere is continuously monitored
- Oxygen content of the atmosphere is at least 19.5% but not more than 23% by volume

“Attendant” – an assigned individual who is stationed outside and near the entrance of a confined space and monitors the safety of the entrant(s)

“Confined Space” – a fully or partially enclosed space

- that is not both designed and constructed for continuous human occupancy; and
- in which atmospheric hazards may occur because of its construction, location, or contents, or because of the work that is done in it

“Confined Space Rescue Team (CSRT)” – all specified persons trained in rescue procedures and in using any necessary equipment required during confined space rescue, as well as in first aid and CPR training.

“Confined Space Entry Supervisor” – in context of this program, is a “competent person” who is responsible for coordinating confined space entry and verifying the CSE Permit prior to entry into a confined space.

“Entrant” – person entering the confined space for any reason.

“Entry” – action by which a person, or part of a person, passes through the plane of the opening into a confined space and includes ensuing work activities. Entry is considered to occur as soon as any part of the entrant’s body breaks the plane of an opening into the confined space.

“Lead employer” – employer who contracts for the services of one or more other employers or independent contractors in relation to one or more confined spaces that are located in the lead employer’s own workplace or in another employer’s workplace.

“Purging” – removing contaminants inside the confined space by displacement with air to achieve acceptable atmospheric levels. For example, if a confined space originally contained a toxic gas, air would be blown into the space to reduce the concentration of the toxic gas to below the appropriate atmospheric exposure level.

“Ventilation” – continuous provision of fresh air into the confined space by mechanical means to maintain acceptable atmospheric levels. It must be continued while work is being carried out within the space to maintain an acceptable oxygen concentration, to provide protection in case of accidental release of chemicals, to remove contaminants generated by the work performed, and/or to cool the enclosure.

Responsibilities

Responsibilities for several roles, including contractor, student, supervisor and worker, are detailed in [Administrative Procedure 14-1](#) (Internal Responsibility Procedure for Health and Safety Issues).

In addition to the roles and responsibilities outlined in Procedure 14-1, additional responsibilities specific to this procedure include:

Confined Space Entry Supervisor

- Complete work planning and hazard identification and risk assessment (HIRA). If a HIRA has already been completed, the assessment shall be retrieved and reviewed for accuracy prior to work
- Complete CSE Plan and CSE Permit and provide to uOttawa contact for approval.
- Assign an attendant to be stationed outside or near the entrance to a confined space and fulfill the corresponding attendant duties under [O.Reg. 632/05](#) as well as those outlined in this document

- Appoint a competent worker to perform adequate atmospheric tests as often as necessary before and during a CSE, to ensure that acceptable atmospheric levels are maintained in the confined space in accordance with the relevant CSE Permit
- Collect and document CSEs conducted by their staff

Worker/Entrant

- Receive the required CSE training
- Understand the hazards and entry plan associated with the confined space they will be entering
- Meet the requirements of the CSE Permit for each confined space (including pre-entry testing, inspections, rescue procedures, instructions from attendant, etc.)
- Complete the CSE Permit, documenting the precautions taken and the results of atmospheric testing
- Immediately notify their direct supervisor of any health and safety concerns
- Ensure that each entrance to a confined space is adequately secured against unauthorized entry, or has been provided with adequate barricades and warning signs regarding unauthorized entry, or both

Attendants

- Receive the required CSE training
- Always remain stationed outside, and near the entrance to, the confined space
- Do not enter the confined space at any time
- Remain in constant communication with the entrant, as agreed, in advance of entry
- Monitor the safety of the entrant and conduct no other duty or activity
- Provide assistance to entrant (without entering the confined space)
- Summon the rescue team, should the need arise
- Keep a record of the CSE Permit of those persons who enter and exit the space
- Prevent any unauthorized entry into the confined space while assigned as an attendant to a confined space

Contractors

Contractors and subcontractors are required to:

- Ensure their employees are competent and trained to complete CSE work
- Provide a copy of their CSE program (that meets or exceeds uOttawa CSE requirements)
- Comply with uOttawa procedures and safety requirements (e.g., CSE Permits, etc.)
- Participate in development and execution of the coordination document requirements

Rescuer(s)

- Ensure that the rescue procedure is ready for immediate implementation.
- Ensure that rescue equipment is set up and ready to affect a rescue.
- If required, initiate a rescue that follows the written rescue procedure.
- Assist in the investigation of an incident or accident.

Reference documents

- [General OHS Program Manual](#)
 - [Hazard Identification and Risk Assessment Procedure](#)
 - [OHS Incident Management Procedure](#)

2. Procedure

Procedural Steps

The following procedural steps **must be followed** when planning for or performing work that involves entry into a confined space:

1. Conduct a hazard identification and risk assessment (HIRA)
2. Complete a Confined Space Entry Permit
3. Prepare for confined space entry
4. Enter confined space and monitor atmospheric conditions
5. Maintain confined space documentation and records

Additional steps may be required, depending on the project or scope of work.

STEP 1 Conduct a hazard identification and risk assessment (HIRA)

Key activities

- Obtain and complete the [Hazard Identification and Risk Assessment form](#)
- Identify the work hazards present: this includes reviewing existing hazard identification and risk assessments (HIRA) and the standard procedures in place
- If the hazards of the specific work have not been previously assessed by completing a HIRA and/or imposing an equipment/activity-specific procedure (that includes the outcome of a HIRA), conduct a HIRA with reference to the [Hazard Identification and Risk Assessment Procedure](#)
- Review the current uOttawa Inventory of Confined Spaces as well as uOttawa List of Potentially Hazardous Spaces; if the work area is not identified, ensure that the workspace meets the threshold for confined space activities (refer to Appendix 1 for confined space assessment criteria)
- Identify requirements for CSE systems and devices
- Define appropriate measures to effectively eliminate or mitigate identified hazards and risks using the appropriate methodology

Contextual Details

Hazard Identification and Risk Assessment (HIRA)

Individuals who supervise projects and workspaces within uOttawa premises shall identify and evaluate current and potential confined spaces at the site through a preliminary qualitative survey.

The survey shall consult workers and the relevant committee(s) to identify additional hazards that may be present.

Based on the findings of the preliminary hazard survey, the confined space hazards shall be addressed by:

1. Identifying an existing assessment of the work hazards, reviewing the HIRA and associated standard procedure to mitigate the hazard risks; and
2. If an assessment or standard procedure does not exist already, conducting a HIRA, utilizing the HIRA process outlined in the [Hazard Identification and Risk Assessment Procedure](#)

Supervisors shall use the HIRA procedure outlined in the [Hazard Identification and Risk Assessment Procedure](#) to identify current and potential confined space hazards at the site of projects and workspaces within uOttawa premises.

Confined space deficiencies identified through initial and ongoing assessments shall be prioritized and appropriately addressed. Each confined space shall be engineered to support the mandatory rescue and fall protection systems. Ongoing assessments shall be conducted at least once a year or whenever the scope of work or physical workspace has changed significantly.

Confined space requirements identified during the assessment shall be documented and communicated to the appropriate parties. Documentation shall meet the requirements outlined in the [General OHS Program Manual](#).

STEP 2 Complete the Confined Space Entry Permit

Key activities

- Confirm the need for a Coordination Document and complete it, if required
- Complete the Confined Space Entry Permit and obtain supervisor approval

Contextual Details

Coordination Document

If more than one project team or employer are performing work within the same confined space at a time, a Coordination Document is required. A sample Coordination Document is provided in Appendix 2. Given the presence of more than one project team or employer, contractors may be involved as well.

With the exception of construction projects, the Coordination Document must be prepared by the "lead employer" (typically uOttawa).

Simultaneous confined space entries may only occur within the same day and timeframe if:

- There are sufficient Confined Space Rescue Team Members available for each of the confined space entries
- There is adequate rescue equipment available to be placed at each of the confined spaces during entry

Confined Space Entry Permit

Prior to entry, the CSE Permit shall be correctly and completely filled out. Each CSE Permit shall be given a unique CSE Permit number such as year/building identifier/confined space number.

For example, if entering confined space number 63 in the Power Plant in 2022 the corresponding CSE Permit number would be 22-CTE-63-01.

The entry supervisor shall verify and sign the CSE Permits. No entry into any confined space is permitted without a valid CSE Permit. Entry Permits must be readily available to every person who enters the confined space or performs related work during the time for which it applies (posted).

The plan, training records, on-site rescue procedures, rescue equipment inspection and air testing results documents should be readily available at the workplace.

Documentation must meet the requirements outlined in the [General OHS Program Manual](#).

STEP 3 Prepare for confined space entry (CSE)

Key activities

- Ensure personnel have appropriate CSE training
- Secure the work area with proper signage and equipment
- Assign an attendant to the confined space and establish communication standards
- Gather all equipment needed to enter the confined space
- Isolate the confined space from any potential hazards

Contextual Details

CSE Awareness and Training

Individuals working in confined spaces must adhere to the training requirements outlined in the [General OHS Program Manual](#), as well as the training requirements specific to confined spaces detailed in the table below.

Table 1: Confined space entry training requirements

Training	Personnel/Positions to be Trained
Basic Awareness of Confined Spaces	Entrant, Attendant, CSE Supervisor, Rescue Team
CSE Program and Hazards	Entrant, Attendant, CSE Supervisor, Rescue Team
CSE Plans	Entrant, Attendant, CSE Supervisor, Rescue Team
Facility Emergency Response Plan	Entrant, Attendant, CSE Supervisor, Rescue Team
Confined Space Emergency Procedures	Entrant, Attendant, CSE Supervisor, Rescue Team
First Aid and CPR	Rescue Team
Gas Testing	Entrant, Attendant, CSE Supervisor, Rescue Team

Training must be documented and kept on file. Training requirements and needs must be reviewed whenever there are changes in the confined space procedure or at least annually.

Securing the Area

Secure the work area by displaying noticeable caution signs and/or barricades to ensure that each entrance to a confined space is adequately secured against unauthorized entry to the work area where confined work is in progress. Post the CSE Permit numbers on all appropriate signage.

Every confined space will be identified by a unique number and a placard must be posted at the entry point to the confined space to warn workers of the confined space hazard. Communication corresponding to confined spaces will clearly indicate:



Figure 1: Sample signage for confined space work.

Confined Space Attendant and Communication

No worker shall enter a confined space without a trained attendant present outside of the confined space. The attendant shall be posted near entrance of confined space for duration of the work and shall be in constant communication with the entrant(s) while working in confined space. The attendant shall not enter the confined space unless relieved by a qualified person (i.e., another attendant) and entry can be safely performed.

Communication between attendant and entrant and attendant and rescue team must be established based on the specific confined space environment. The means of communication between the attendant and the entrant must be appropriate for the space, especially in areas with high background noise, or possible interference with radio or cell phone transmissions.

Possible methods of communication between the attendant and entrant may include:

- Verbal
- Mobile phone (if there are no ignition hazards in the confined space)
- Two-way radio
- Hand signals
- Rope tugs or tapping

The means of communication must be in place before proceeding to Step 3.

Isolation of Confined Space

Isolating the confined space reduces the hazards and risks identified in Step 1. Activities that isolate the confined space include, but are not limited to:

- Decontaminating the confined space
- Disconnecting pipes, valves, fittings, and connections carrying substances to a confined space, namely substances that would reasonably be considered as hazardous
- De-energizing equipment within the confined space
- Blanking or blinding
- Locking out and/or tagging out equipment

Additional isolation activities are detailed in Appendix 3.

Confined Space Entry Equipment

Prior to each confined space entry, the CSE supervisor will ensure that all necessary rescue equipment is at the confined space location and has been inspected, signed off, and is in good working order and otherwise appropriate for the entry. This may include harnesses and lifelines, hoist/retrieval systems, respiratory equipment (either air supplying or self-contained breathing apparatus (SCBA)), fall arrest, safety footwear, protective gloves, personal flotation devices and/or hard hats. A first aid kit will be included in rescue equipment. PPE requirements specific to the confined space must be assessed and determined in the HIRA (conducted in Step 1).

In addition to rescue equipment, standard entrance equipment listed in Appendix 4 will also be prepared, inspected, and tested where required.

STEP 4 Enter the confined space and monitor atmospheric conditions

Key activities

- Verify that atmospheric conditions within confined space are acceptable for entry
- Apply assisted breathing equipment (if necessary)
- Execute work within confined space
- Continuously monitor confined space for acceptable atmospheric conditions
- Evacuate work area (if necessary)

Contextual Details

Atmospheric Testing

Atmospheric testing shall be performed as often as necessary before and while a worker is in a confined space to ensure that acceptable atmospheric levels are maintained in the confined space in accordance with the relevant plan. General testing steps are listed below. Detailed steps (including hot work considerations) and information are provided in Appendix 5.

1. Conduct atmospheric testing
2. Record the values for each atmospheric parameter in the Confined Space Entry Permit

- If ventilation is required, atmospheric testing shall be performed after a 10-minute ventilation period and continuously during entry
 - If atmospheric conditions are found to be unacceptable, entry is not permitted until adequate control methods, such as ventilation, are implemented or installed to ensure acceptable levels
3. Implement necessary controls based on testing results
- If acceptable atmospheric levels are not possible, breathing air supply (either using supplied air system or SCBA) is required

No employee shall enter confined spaces where SCBA or supplied air source is required unless specifically trained in the use of SCBA or supplied air source and the appropriate emergency rescue procedures.

Work Execution

Entrants shall use the entry log to sign in when entering space and to sign out when exiting. Attendant shall be responsible for maintaining sign in/out log for the duration of the work. Atmospheric conditions shall be monitored continuously while in the confined space.

Continuous monitoring is required: when performing hot work; when there may be a flammable or explosive atmosphere; in an inert space; and/or where a toxic atmosphere is likely to be generated or present during the CSE, or as set out in the CSE Permit. Continuous monitoring will be accomplished using appropriate personal gas detectors worn by all entrants during CSE.

If, at any time, atmospheric conditions are found to be unacceptable, or the entrant experiences breathing difficulties, dizziness, irritation of the eyes, nose, throat and/or ringing in the ears, no matter what the reason, all personnel shall immediately exit the space. The CSE Permit must be cancelled, and no others shall enter the space until the incident has been reported and investigated. The investigation must include:

- A HIRA review and approval by the appropriate supervisor
- Evaluation of the conditions that led to a hazardous atmosphere developing
- Proposal of corrective actions
- Verification that atmospheric conditions have returned to acceptable levels through re-testing and ventilation
- The issuing of a new CSE Permit

In the event of a confined space emergency, the Confined Space Rescue Team (CSRT) shall be contacted (see “Emergency Procedures” below).

STEP 5 Close out CSE Permit and maintain confined space documents and records

Key activities

- Close out the CSE Permit
- Review activities conducted within the confined space
- Retain and distribute documentation

- Report and investigate any incidents

Contextual Details

Closing Out the CSE Permit

Following completion of the confined space entry work, secure the entry point(s) to the confined space and work area, and close out the CSE Permit by ensuring that all workers sign out on the Permit and the CSE supervisor signs off that the work is completed.

CSE Activity Review

Compile notes about the confined space, including hazards that were present that may not have been identified in the initial HIRA, obstacles that hindered work (inside the space and/or while attending to the space), and any other notable observations.

Documentation

The University of Ottawa must retain confined space entry documents (including the HIRA, assessment, entry plan, monitoring records, coordination document (if relevant), obstacles encountered, post-entry activity review) for the longer of: one year after the document(s) is created; or the period that is necessary to ensure that the two most recent records of each kind that relate to a particular space are retained.

Distribution of Documents

The coordination document and confined space program document must be made available to the Joint Health and Safety Committee (JHSC) and other employers, where applicable.

The HIRA form must be provided, upon request, to the JHSC.

Incident Reporting

If an incident occurs during work in the confined space, the incident must be:

- Managed promptly with reference to the [Emergency Procedures](#) section within this document
- Reported immediately, documented in the case management system, and investigated according to [Incident Management Procedure](#).

3. Emergency Procedures

Confined space rescue

No worker shall enter or remain in a confined space unless, in accordance with the relevant plan, **adequate** written on-site rescue procedures **that apply to the confined space** have been developed and are ready for immediate implementation. In situations involving confined space rescues on uOttawa premises, these steps inform members of the University of the proper procedure.

1. Attempt communication check and evacuation

If, at any time, any of the following conditions occur:

- a not-already identified hazard is identified;
- changes in the condition of the space;
- questionable action; or
- non-movement by the entrant inside the confined space,

the attendant will immediately perform a communication check. If there is no response or a questionable response, the attendant will order the entrant in the confined space to immediately evacuate the space. If possible, the entrant(s) will initiate self-rescue by climbing out of the confined space. If self-rescue is not possible, the attendant will activate the Confined Space Rescue Team (CSRT).

If an entrant must be retrieved by means other than a tripod/winch (i.e., vertical confined space entry), the attendant shall immediately activate the CSRT and call Protection Services at ext. 5411 (613-562-5411). The attendant must notify Protection Services that the Confined Space Rescue Team has been activated and describe the nature of the situation to Protection Services and whether civil authorities (911) are required for a confined space emergency (e.g., further medical care, transport to hospital, etc.). Rescue equipment must be set up and ready to effect a rescue, based on the written procedures for the specific space.

2. Request for the Confined Space Rescue Team (CSRT)

If the entrant is disabled due to a fall or impact, the attendant shall activate the CSRT and the entrant will not be removed from confined space until paramedics arrive unless the situation is immediately dangerous to life or health.

The CSRT will assume command of the situation and direct the rescue. The type of response and rescue procedure will depend on the nature of the accident/incident.

Under no circumstances shall the attendant enter space to perform or assist in the rescue.

Appendix 1: Confined Space Assessment Criteria

Based on [O.Reg 632/05](#), a “confined space” means a fully or partially enclosed space that satisfies both of the following conditions:

- That is not designed and constructed for continuous human occupancy, and
- In which atmospheric hazards may occur because of its construction, location, contents, or work performed in it

The criteria listed in the table can facilitate the evaluation of areas that may or may not be considered confined spaces:

Table 2: Criteria to identify confined spaces.

Is it designed and constructed for continuous human occupancy?	Is it possible to have an atmospheric hazard?	Is this a confined space?
Yes	Yes	No
Yes	No	No
No	Yes	Yes
No	No	No

Examples of confined spaces or hazardous confined spaces commonly identified in workplaces may include, but are not limited to:

- Maintenance holes
- Sewers
- Boilers
- Tunnels
- Pipelines
- Wells
- Fuel tanks
- Ballast tanks
- Storage tanks
- Tank cars and tank trucks
- Vats
- Process vessels
- Septic tanks
- Sewage lift stations
- Trenches
- Ventilation systems
- Utility vaults

Appendix 2: Sample Coordination Document

Confined Space Entry (CSE) Coordination Document

Lead Employer: _____

Date: _____

Lead Employer Contact: _____

Phone No.: _____

Contractor(s):

1. _____

4. _____

2. _____

5. _____

3. _____

6. _____

Location of Confined Space to be entered:

Confined Space No.: _____ CS Plan No.: _____

Lead Employer Responsibilities: To ensure that contractors are provided with information on hazards associated with the confined spaces as well as CSE Program requirements for the confined space entry being performed.

Contractor Responsibilities: To comply with the requirements of the applicable CSE regulation (e.g., O.Reg. 632/05) and the requirements of the lead employer. To ensure that all contractor workers are trained in the work to be performed and the relevant regulated confined space requirements. The contractor and contractor workers must be aware of the University of Ottawa CSE Program requirements.

Responsibility:	Lead Employer:	Contractor:
CSE Program**	X	X
Hazard assessment	X	
Written entry plan		
Training*	X	X
Personal Protective Equipment (PPE)*	X	X
CSE Permit		
Isolation of energy and control of material movement		
Attendants		
Entrance and Exit monitoring and recordkeeping		
Unauthorized entry prevention		
Written on-site rescue procedure and equipment		
Atmospheric testing		
Explosive and flammable substances		
Ventilation and atmospheric hazard purging		
Rescue plan		
Rescue team		
Documentation/Records*	X	X

* General training, personal protective equipment (PPE) and documentation/records are individual responsibilities of both the lead employer and contractor(s)

** Both lead employer and contractor are required to have a CSE Program in place

The signatures below indicate that the contractor(s) and lead employer acknowledged that the employer duties with respect to the above subject matters are performed in a way that protects the health and safety of all workers performing confined space entry (CSE) or CSE-related work at the University of Ottawa:

1. _____
Contractor signature

2. _____
Contractor signature

3. _____
Contractor signature

4. _____
Contractor signature

5. _____
Contractor signature

6. _____
Contractor signature

Lead employer signature

Appendix 3: Isolation Activities

Energy Isolation

Prior to the confined space entry, energy sources must be isolated and controlled to ensure that no material or contaminants enter the confined space through process lines, drains, vents, etc.

Lock Out and/or Tag Out Procedures

Workers must be protected against any hazard(s) associated with equipment or electrical energy inside the confined space by ensuring that such equipment is de-energized or otherwise controlled. Perform energy isolation in accordance with uOttawa [Lock Out/Tag Out Procedures](#).

Isolating Lines

“Blanking” is the insertion of a solid metal barrier, called a blank, between the flanges of two sections of pipe. A confined space extends to the blank. “Disconnecting” is the removal of a section of piping to ensure that no material can flow into the confined space. Note: care must be taken to ensure that high-pressure or toxic materials cannot pass across a disconnected space (e.g., high pressure steam can cross between sections of pipe if the removed piece is in line with the two sections of pipe). If blanking or disconnecting piping is not practical in the circumstances for technical reasons, the confined space must be adequately protected by other means against the release of hazardous substances into the confined space.

Other Measures

Other adequate measures for protecting against hazards associated with equipment or electrical energy may include a “double-block and bleed” system, or the creation of a properly engineered “freeze plug”. Unguarded equipment, and equipment with moving parts that may contribute to developing a hazard, will need to be de-energized or blocked to prevent movement. As an example, a properly guarded pump or fan need not be de-energized. On the other hand, the same equipment in a confined space in which flammable, combustible, or explosive agents might accumulate will require that the equipment be de-energized or designed so that it does not create an ignition spark.

Entrance Cover Removal

Wherever possible, unsafe conditions will be eliminated before removing an entrance cover. After removing an entrance cover to a vertical descent, the confined space opening will be guarded with a railing, temporary cover, or other temporary barrier to prevent accidental falls through the opening. Measures will also be put in place to protect entrants from objects falling into the space.

Appendix 4: Standard Entrance and Rescue Equipment

Equipment shall only be procured and/or used after verifying that the appropriate performance or standard criteria, such as CSA recognition, have been met. The recognized standard will depend on the equipment. The equipment below is listed for reference purposes only; depending on the CSE, not all equipment may necessarily be required, or other equipment may be needed.

Entrance Equipment

- Head protection
- Eye protection
- Hearing protection
- Gloves
- Approved safety harness
- Approved lifeline
- Foot protection
- Calibrated direct-reading monitor (with alarm) with sensors appropriate to confined space (O₂, CO, LEL, H₂S)
- Communication equipment
- Ventilation equipment
- Emergency escape respirator
- Portable lighting
- First aid kit
- Ladders of suitable length and construction
- Hand cleaners and paper towels
- Personal lifting device with winch
- Manhole cover lifting tool

Emergency Rescue Equipment

- Harnesses and lifelines
- Hoist/retrieval systems
- Other fall protection and restraint systems
- Self-contained breathing apparatus
- Safety footwear
- Protective gloves
- Personal flotation devices
- Hard hats
- First aid kit
- Other equipment, as applicable

Appendix 5: Atmospheric Testing Procedures

Atmospheric Testing

Requirements

Atmospheric testing is required when the relevant assessment determines that the confined space may contain atmospheric hazards. The results of testing and calibration information will be documented on the CSE Plan and the CSE Permit.

Where indicated by the HIRA and the CSE Plan, before confined space entry, the atmosphere will be tested with a calibrated instrument in good working order and in a manner that is appropriate for the hazard(s) identified in the relevant assessment.

When monitoring a confined space, the following steps must be followed:

- Test equipment function (i.e., battery test and all-level function)
- Ensure monitor warning alarms are set appropriately

Test for the following atmospheric hazards:

1. Oxygen content must be between 19.5% and 23.0%
2. Flammable gases and vapours:
 - Less than 25% LEL for inspection work
 - Less than 10% LEL for cold work (work that does not produce sparks or other sources of ignition)
 - Less than 5% LEL for hot work (spark producing work or other sources of ignition as a result of the work to be performed) and compliance with O.Reg.632/05 19(4) requirements
3. Potential toxic air contaminants must be less than limits established in O.Reg.833 (inference for ACGIH values are included therein) and O.Reg.490
 - The first test must be done near the entry point, with the probe placed approximately 5cm (2 inches) above the entry point
 - Insert the probe through an inspection port or another opening to take the atmospheric reading
 - If neither combustible nor toxic gases are present, remove the cover and then sample the atmosphere at several levels (heights)
 - Once the readings have been taken, they must be recorded on the Confined Space Entry Plan/Permit
 - If an explosive, oxygen-deficient, or toxic atmosphere is detected, entry into the confined space is not permitted. Hazard control measures, such as ventilation and purging, must be employed, and the space must be re-tested prior to entry

Hot Work

Precautions

In the case of an explosive or flammable gas or vapor, the space must be either:

- made safe by inerting with an inert gas and continuously monitoring the atmosphere, particularly with regard to oxygen concentration

- Workers must wear adequate respiratory protective equipment and equipment to allow persons outside the confined space to locate and rescue them, if necessary; or
- The following precautions must be taken:
 - The space is purged and continuously ventilated to maintain an atmosphere of less than 5% of the LEL
 - The space is purged and continuously ventilated to maintain an oxygen concentration ranging between 19.5% and 23%
 - The atmosphere in the confined space is continuously monitored
 - The CSE Permit includes adequate provisions for hot work and details the appropriate measures to be taken; and
 - An alarm and exit procedure are in place to provide adequate warning and allow safe escape if the levels in a) or b) above are not met. It is good practice to incorporate a safety factor that provides for adequate warning should the levels be approached

A completed University of Ottawa Hot Work Permit will be included with the CSE Permit, prior to authorizing the entry.