

**UNIVERSITY OF OTTAWA: CONFINED SPACE ENTRY  
(CSE) PROGRAM**

**REVISION 3.0**



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## 1.0 PURPOSE

This procedure describes the Confined Space Entry (CSE) Program used by the University of Ottawa in the identified areas inventoried and identified in Appendix A. The Program requirements are established to:

1. Protect all workers performing CSE in the identified areas by ensuring a safe work environment is established and maintained prior to entering and while performing work in confined spaces;
2. Ensure compliance with requirements of the Confined Space Regulations made under the Ontario Occupational Health and Safety (OHS) Act, O.Reg 632/05 Confined Spaces; and
3. Provide measures and procedures to accomplish the aforementioned during the time period that the University of Ottawa Occupational Health and Safety Management system is formally modified and undergone document controls to include the approved CSE Program also compliant with O.Reg.632/05.

## 2.0 APPLICATION

All workers of the University of Ottawa performing work related to or in the confined spaces identified in Appendix A must follow this procedure. Contractors performing work on behalf of the University of Ottawa must meet the requirements of this Program. A list of the confined spaces at the University of Ottawa to which this procedure applies is found in Appendix A.

## 3.0 DEFINITIONS

“Acceptable Atmospheric Levels” –means:

- (a) atmospheric concentration of any explosive or flammable gas or vapour is less than:
  - (i) 25 per cent of its lower explosive limit, if paragraph 1 of subsection 19 (4) applies,
  - (ii) 10 per cent of its lower explosive limit, if paragraph 2 of subsection 19 (4) applies,
  - (iii) 5 per cent of its lower explosive limit, if paragraph 3 of subsection 19 (4) applies,
- (b) oxygen content of the atmosphere is at least 19.5 per cent (%) but not more than 23 per cent (%) by volume, and
- (c) exposure to atmospheric contaminants does not exceed any applicable level set out in a regulation made under the Occupational Health and Safety Act.

“Atmospheric hazards” – means,

- (a) accumulation of flammable, combustible or explosive agents,
- (b) an oxygen content in the atmosphere that is less than 19.5 % or more than 23 % by volume, or
- (c) the accumulation of atmospheric contaminants, including gases, vapours, fumes, dusts or mists, that could,
  - (i) result in acute health effects that pose an immediate threat to life, or
  - (ii) interfere with a person's ability to escape unaided from a confined space.

“Attendant” – an assigned individual that is stationed outside and near the entrance to a confined space and monitors the safety of the Entrant(s).

“Cold work” – work that cannot produce a source of ignition.

“Confined Space” - a fully or partially enclosed space,

- a) that is not both designed and constructed for continuous human occupancy, and
- b) 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 any necessary equipment required during confined space rescue, as well as First aid and CPR training.

“Competent Person” - person, who:

- a) is qualified due to knowledge, training, and experience to organize the work and its performance,
- b) is familiar with all legal requirements of the work, and
- c) has knowledge of any potential and actual dangers to H&S in the workplace.

A “competent person” is different from a “competent worker” or a person having “adequate knowledge, training, and experience”. There is an added responsibility of also having “to organize the work”, which is typically associated with supervisory responsibility.

“Competent worker”— in relation to specific work, means a worker who is qualified because of knowledge, training and experience to perform the work, is familiar with all legal requirements that apply to the work and has knowledge of any potential and actual dangers to H&S in the work

“Coordination Document” – document that is prepared by the “lead employer”; applies if the workers of more than one employer perform work in the same confined space or related work with respect to the same confined space; and ensures that the duties of employers under Confined Space Regulations (all sections except general training, personal protective equipment and records) are performed in a way that protects the health and safety of all workers who perform work in, or related work to, the 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 Permit” – written or printed document (prepared before every CSE) to allow and control entry into a confined space with the purpose of verifying communication to workers about the hazards identified and the controls in place,. Requires completion, verification, signature and posting, prior to any CSE.

“Entry Supervisor” – in context of this program for the University of Ottawa, is a “competent person” responsible for coordinating confined space entry and verifying the entry permit prior to entry into a confined space.

“Hazard Assessment” – written document that considers, with respect to each confined space, the hazards that may exist due to the design, construction, location, use or contents of the confined space; and the hazards that may develop while work is done inside the confined space.

“Hot work” – work that could produce a source of ignition, such as a spark or open flame.

“IDHL” – Immediately Dangerous to Life or Health. Any condition which poses an immediate threat to health or life of an entrant or would cause irreversible adverse health effects or would interfere with an individual’s ability to escape unaided from a confined space.

“JHSC” – Joint Health and Safety Committee, per section 9 of the OHS Act

“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.

“ORM” – Office of Risk Management

“Plan” – a specific set of measures and procedures to control hazards identified by the hazard assessment for that confined space to allow workers to enter and work in a specific confined space safely. The plan must include provisions for on-site rescue procedures, rescue equipment and methods of communication, in addition to the other provisions listed above.

“Program” – the written document that includes: a method for recognizing each confined space to which the program applies; a method for assessing the hazards to which workers may be exposed; a method for the development of CSE plans (which include on-site rescue procedures); a method for training workers; and an entry permit system. This document constitutes the University of Ottawa CSE Program.

“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.

“Related work” – work performed near a confined space in direct support of work inside the confined space.

“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.

## **4.0 RESPONSIBILITIES**

### **4.1 MANAGEMENT (SENIOR MANAGEMENT)**

- Management has the assigned responsibility to appoint only “competent persons” as supervisors and to ensure that the CSE Program is implemented and maintained.
- Management will ensure that the Program has appropriate assessments, plans, documentation, signage, procedures, training and auditing.

### **4.2 OFFICE OF RISK MANAGEMENT (ORM)**

- Responsible for coordinating the CSE Program for University of Ottawa
- Collaborate with Physical Resources to ensure all confined spaces are identified and

hazard warnings posted

- Audit program compliance periodically
- Maintain the CSE Program documents
- Report deficiencies in the Program to Management as soon as practically possible

#### **4.3 DEANS AND DIRECTORS LOCATED IN RESPECTIVE SECTORS**

- Ensure that Hazard Assessments for all identified confined spaces are completed
- Coordinate training for all University of Ottawa workers who will be entering confined spaces
- Ensure the Entry Plan(s) have been performed for all confined spaces
- Ensure unauthorized persons do not enter confined spaces. No person is authorized to enter a confined space without proper approval and training
- Ensure that each entrance to a confined space is adequately secured against unauthorized entry; or has been provided with adequate barricades, adequate warning signs regarding unauthorized entry, or both
- Responsible for keeping documentation of all CSE conducted by their staff

Ensure that workers in their area:

- Receive the required training prior to entering into a confined space
- Follow the requirements of the U of O CSE program
- Understand the hazards and entry plan associated with the confined space they will be entering
- Take all appropriate precautions to protect their health and safety prior to entry
- Work in compliance with the OHS Act & Regulations as well as requirements of the University of Ottawa

#### **4.4 CONFINED SPACE ENTRY SUPERVISOR (MAY BE THE SAME AS WORKPLACE PARTIES NAMED IN SECTION 4.3)**

- 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 under section 4.6 of this CSE Program
- Appoint a person with adequate knowledge, training and experience (“competent worker”) to perform adequate 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 plan. The appointed person in most cases will be the Attendant.
- Responsible for keeping documentation of all CSE conducted by their staff.

Ensure that the following are done for each entry:

- Entry does not occur unless absolutely necessary
- A hazard assessment has been reviewed for adequacy, signed and dated prior to CSE
- A written Plan has been developed and is available for the CSE
- Pre-entry testing and inspections are conducted according to the Plan
- The precautions and control measures identified in the Plan are in place and are being followed
- Other precautions not directly related to the CSE but required by the OHS Act & Regulations are being followed
- An entry permit is completed, complies with the corresponding Plan, posted at the entry to the CS and maintained by the Attendant throughout the entry, if necessary
- Signs CSE permit, prior to posting and CSE
- Workers are removed from the space and the adequacy of the safety procedures are reviewed if changes occur during the entry that affect the safety of the workers

#### **4.5 ENTRANTS, ATTENDANTS, RESCUE TEAM**

Workers will:

- Ensure that they know the hazards associated with the space
- Abide by all the requirements of the CSE plan for each confined space
- Receive the required CSE training
- Complete the permit documenting precautions taken and results of gas testing
- Communicate any OH&S concerns to their direct supervisor immediately



No person is authorized to enter a confined space without proper approval and training.

### **Attendant**

An assigned CSE Attendant must:

- not enter the confined space at any time
- remain stationed outside and near the entrance to the CS at all times
- remain in constant communication with the entrant, as agreed, in advance of entry
- monitor the safety of the Entrant
- provide assistance to Entrant
- summon the Rescue Team, should need arise
- keep a record of those persons who enter the space and exit the space, on the Permit
- prevent any unauthorized entry into the CS while assigned to a CS
- perform all Attendant duties required by this CSE Program

### **RESCUE TEAM**

The rescue team will:

- be directly involved with the rescue of person(s) from a confined space
- be trained in rescue procedures and any necessary equipment required during confined space rescue as well as First aid and CPR
- be responsible for rescue equipment and ensure equipment has been checked and is in place
- be readily available and ensure a response time of less than 5 minutes to reach the confined space

### **4.6 JHSC**

The JHSC has a right to the following CSE documents, when requested:

- a copy of any Coordination Document
- a copy of the Program
- a copy of any Hazard Assessment

The JHSC also has the following consultation rights:

- Be consulted by the UofO with regard to the development and maintenance of the confined space Program
- Be consulted in regard to the development of worker training

- Be consulted by the UofO with regard to reviewing the confined space training on an annual basis, as well as whenever there is a change in circumstances
- Be afforded the opportunity to attend the beginning of industrial hygiene testing

## 5.0 HAZARD ASSESSMENT

### 5.1 IDENTIFYING CONFINED SPACES AND HAZARDS

Potential confined spaces were evaluated to determine if it is a “confined space” per O.Reg. 632/05. The following table is provided to facilitate evaluation of areas that may or may not be considered a confined space:

Is it designed and constructed for continuous human occupancy?	Is it possible to have an atmospheric hazard?	IS IT A CONFINED SPACE?
Yes	Yes	No
Yes	No	No
No	Yes	<b>Yes</b>
No	No	No

Workspaces such as offices, arenas, maintenance rooms, control rooms, etc., are obvious places that are designed for humans to occupy for long periods of time (continuously). These spaces are not considered a confined space, regardless of the atmospheric hazards that may occur in them. Occupational health and safety legislation and regulations apply and must be complied with to protect workers.

### 5.2 HAZARD ASSESSMENT

A Hazard Assessment has been completed for all confined spaces listed in the inventory in Appendix A, using the confined space Hazard Assessment Form in Appendix C.

Hazard Assessments will be available for every entry into the confined spaces listed in Appendix A and shall be reviewed prior to each entry to verify that the same conditions exist as well as the adequacy of the plan and permit documents. Once reviewed and determined adequate, the hazard assessment will be signed and dated, prior to entry.

A confined space will be re-assessed whenever changes are introduced to the space that could affect the adequacy of the entry plan instructions and controls developed for the space or when inadequacies with the Plan are identified as a result of the entry or incident occurring during the entry.

A listing of “potentially hazardous spaces” (not considered to be confined spaces) is included in Appendix H for information purposes. It should be noted that a hazard assessment (conducted in October/ November 2006) identified these spaces not to be confined spaces. However, the work to be performed in these spaces should be re-evaluated for additional potential hazardous conditions prior to working in these spaces. Proper control measures for the hazards should be implemented, if required. These “potentially hazardous spaces” are not considered to be confined spaces and hence an entry permit is not required for entry at locations listed in Appendix H only.

A Hazard Assessment may include any or all of the following hazards/controls:

- Oxygen deficiency/oxygen enrichment
- Flammable, combustible or explosive agents
- Toxic air contaminants, smoke, fumes, and dusts and corresponding exposure levels
- Residual chemicals/materials
- Ignition hazards, including hot work, tools and other potential sources of ignition
- Chemical contact hazards, including acids, alkalis
- Physical hazards, including mechanical hazards, thermal stress, humidity, radiation, noise and vibration, working/walking surfaces, engulfing materials, physical obstacles, poor visibility
- Electrical hazards, including lines and cables, exposed terminals
- Traffic hazards, including pedestrian, mobile equipment
- Biological hazards, including animals and biological agents
- Other hazards related to the confined space, including piping/distribution systems, pressurizing fluids, any type of uncontrolled energy (water, liquid, vapour, electric, magnetic, gaseous, etc.), limited access and egress
- Necessary precautions for safe entry and work
- Emergency procedures and equipment required
- PPE required
- Attendant requirement

Atmospheric hazard decision trees are provided in Appendix B.

## **6.0 CONFINED SPACE ENTRY PLAN**

### **Development**

The authorizing CSE Supervisor will ensure that a Base Entry Plan is created for each CSE for spaces listed in Appendix A. Where CSE has been contracted out to another Employer, such as a Contractor, the Plan will be developed by the respective Contractor.

### **Content**

The Base Plan will include duties of workers, measures and procedures to control hazards (including PPE, isolation of energy sources, ventilation, etc.), attendants, atmospheric testing, provisions for on-site rescue procedures, rescue equipment and methods of communication and adequate means for entry and exit.

The University of Ottawa, for the purposes of their CSE Program, has incorporated the Base Plan into the Entry Permit in Appendix D.

If questions concerning confined space entry and assessment arise contact the ORM.

## **7.0 CONFINED SPACE ENTRY PERMIT**

### **Verification**

All confined space entries will require that a CSE Permit be completed. The authorizing CSE Supervisor will verify that the Permit complies with the corresponding CSE Plan and sign their name, prior to entry. A copy of the corresponding CSE Plan will be included and will form part of the CSE Permit.

### **Maintenance**

The Attendant will keep a record of those persons who enter the space and exit the space, on the CSE Permit for the duration of the CSE Permit. The Attendant does not need to sign workers in and out for every minor exit required to work in the space, such as leaving momentarily to obtain a nearby tool.

## **Cancellation**

Confined Space Entry Permits will be cancelled by the CSE supervisor upon completion of the work, or when any prohibited condition arises. Permits cannot be left open and “allowed to” expire. Cancelled permits will be kept by CSE supervisor and its faculty or services for 1 year. A copy of the cancelled permit should also be sent to the ORM.

## **Requirements**

A sample Confined Space Entry (Base Plan) and Permit is in Appendix D and contains the following required information as well as other records:

- location of confined space
- description of work to be performed
- description of hazards and corresponding control measures
- time period for which the entry permit applies
- name of the Attendant and Entrant
- record of each worker’s entries and exits (time)
- list of the equipment required for entry and rescue, and verification that equipment is in good working order
- results of atmospheric testing
- any hot work, adequate provisions for the hot work and corresponding control measures

Other CSE documentation may be incorporated within the “entry permit” and the University of Ottawa, for the purposes of the CSE Program, will incorporate the Plan, onsite rescue equipment inspection records and air testing results into the CSE Plan and Permit document, provided in Appendix D.

## **8.0 CONFINED SPACE ENTRY PROCEDURE**

The following section outlines the steps to be taken prior to each confined space entry:

- Complete hazard assessment
- Establish Plan that includes required procedures and PPE required for entrant
- Establish communication between entrant and attendant
- Perform atmospheric testing prior to entry, record results on Permit form
- Complete Entry Permit and post Entry Permit near confined space
- Station attendant outside confined space
- Execute required control procedures (hot work, lockout/tagout, ventilation)
- Enter space and monitor continuously

### **Step 1: Hazard Assessment**

The hazard assessment shall be reviewed and verified by the CSE supervisor prior to each entry to verify that the same conditions exist. A confined space will be re-assessed whenever changes are introduced to the space that could affect the adequacy of the entry plan instructions and controls developed for the space or when inadequacies with the Plan are identified as a result of the entry or incident occurring during the entry.

Any new suspect confined spaces not identified on the Inventory list in Appendix A should be immediately reported to the ORM to be evaluated prior to entry.

The hazard assessment shall include but is not limited to; oxygen content, flammability, toxics, energy, engulfment, entrapment and personal safety (see form in Appendix C).

### **Step 2: Establish Plan and Procedures & Protective Equipment**

Based on hazard assessment, determine appropriate control measures and equipment required for CSE. The “plan” will be incorporated into the “entry permit”.

### **Step 3: Establish Communication**

Communication between attendant and entrant, and attendant and rescue team must be established and in place depending on the specific confined space. 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, cell phone, two-way radios, hand signals, rope tugs or tapping. Means of communication must be in place prior to entry into the confined space.

### **Step 4: Perform atmospheric testing prior to entry**

Atmospheric testing shall be performed in accordance with section 9.0 Controls (section on Atmospheric Testing). Atmospheric testing shall be monitored prior to every entry when space is vacant. 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. If acceptable atmospheric levels are not possible, breathing air supply (either using supplied air system or self-contained breathing apparatus (SCBA)), is required.

If at any time atmospheric conditions are found to be unacceptable while the entrant is working in the confined space, no matter what the reason, all personnel shall immediately exit the space and no others shall enter until atmospheric conditions are returned to acceptable levels.

### **Step 5: Entry Permit**

Prior to entry, the entry permit shall be correctly and completely filled out.

Each entry permit shall be given a unique entry permit number such as year/ building identifier/confined space #/number. For example if entering confined space number 63 in Physical Plant in 2006 the corresponding entry permit number would be 06-PP-63-01.

The entry permit shall be verified by the Entry Supervisor and signed. No entry into any confined space is permitted without a valid entry permit.

### **Step 6: Station Attendant**

Attendant shall be posted near entrance of confined space for duration of work and shall be in constant communication with entrant(s) while working in confined space. Attendant shall not enter confined space unless relieved by qualified person (attendant) and entry can be safely performed.

### **Step 7: Execute Required Procedures**

Ensure control measures have been properly performed, including lock-out / tag-out of all necessary equipment. If a hot work permit is required, ensure hot work permit paper work is properly filled out and a copy attached to the entry permit.

### **Step 8: Enter Space and Monitor**

All entrants shall use the sign-in log when entering space and 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.

## 9.0 CONTROLS

### Placarding

Every confined space will be identified by a unique number and a placard posted at the entry point to the confined space in order to warn workers of the confined space hazard.

Communication corresponding to confined spaces will clearly indicate:



### Entry Authorization

All confined space entries will be authorized by a CSE Supervisor. Authorization will be granted by the CSE Supervisor only after all requirements of the CSE Program and corresponding documented measures have been complied with.

### Prevention of Unauthorized Entry

Prior to CSE, a means of barricading, cordoning off, taping off and posting will be used in order to notify persons in the area of restricted access to the confined space entry point as well as related work area.

An Attendant will be assigned by a CSE Supervisor, and located outside or near the entrance, to the confined space. The Attendant will not enter the confined space but will remain in constant communication with the Entrant while monitoring the Entrant's safety as well as preventing any unauthorized entry. All entries will be documented by the Attendant on the CSE Plan/Permit.

### Energy Isolation

Prior to CSE, all 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 Tag-out Procedures**

Workers must be protected against any hazard(s) associated with equipment or electrical energy inside the confined space by ensuring that they are de-energized or otherwise controlled.

All energy isolation will be done according to the University of Ottawa Lock Out/Tag Out procedures. Reference the Physical Resources Service Lockout Procedure.

## **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 material cannot pass across a disconnected space (e.g. high pressure steam can cross between the sections of pipe if the piece that has been removed 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 against the release of hazardous substances into the confined space by other adequate means.

## **Other Measures**

Other adequate measures for protecting against hazards associated with equipment or electrical energy can include a “double-block and bleed” system or the formation of a properly engineered “freeze plug”.

Unguarded equipment, or equipment that may have exposed moving parts or that may create a pinch point, will be de-energized or blocked to prevent movement. However, a properly guarded pump or fan need not be de-energized. In a confined space in which flammable, combustible or explosive agents might accumulate, the same equipment must be de-energized or designed so that it does not create a spark.

## **Entrance Cover Removal**

Wherever possible, all unsafe conditions will be eliminated before removing an entrance cover.

After removing an entrance cover, where there is 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.

## **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/Permit.

Where indicated by the Hazard Assessment and Plan, before CSE, 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 procedure should be used:

- a) Test equipment function, (i.e. battery test and all-level function)
- b) Ensure all monitor warning alarms are set appropriately
- c) Test for the following atmospheric hazards:
  - i) Oxygen content– 19.5% to 23.0%
  - ii) Flammable gases and vapors–
    - (1) less than 25% LEL for inspection work
    - (2) less than 10% LEL for cold work (work that does not produce sparks or other sources of ignition); and,
    - (3) 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 the requirements of 5.11 are complied with.
  - iii) Potential toxic air contaminants- less than established limits in O.Reg.833 or designated substance regulations (or ACGIH TLVs if not in O.Reg. 833).
- d) The first test must be done near the entry point, with probe placed approximately 2” above the entry point.
- e) Insert the probe through an inspection port or another opening to take atmospheric reading
- f) If neither combustible nor toxic gases are present, remove the cover and then sample the atmosphere at several levels (heights).

- g) Once the readings have been taken, they must be recorded on the Confined Space Entry Plan/Permit.
- h) 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 space re-tested prior to entry (refer to section 8.4.3).

### **Frequency**

Testing of the CS must be performed prior to each and every entry and then continuously while work is underway, to ensure that acceptable atmospheric levels are maintained. Entrants must be allowed an opportunity to observe the pre-entry and periodic testing.

Where applicable, testing will be conducted prior to purging/ventilation and again after purging/ventilation, and prior to each new entry into the space. A new entry takes place when all entrants have vacated the space and one of the workers or a new worker is going to enter the space.

### **Response to Elevated Findings and Exit Procedure during CSE**

If a hazardous atmosphere is detected during CSE, all of the following will occur:

- Evacuate workers from the space immediately.
- Cancel the Entry Permit.
- Evaluate the space to determine how the hazardous atmosphere developed.
- Implement measures to protect workers from the hazardous atmosphere before re-entry.
- Before re-entry into the same space, verify the Plan and new Permit correspond and are verified and that the space is safe for entry.

### **Continuous Monitoring**

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

## **Ventilation**

### **(a) Purging**

If atmospheric hazards exist or are likely to exist in a confined space, the confined space shall be purged, ventilated or both, before any worker enters it, to ensure that acceptable atmospheric levels are maintained while any worker is inside. In some cases, the ventilation of the space will continue throughout the CSE.

Where toxic gases or vapours are present, spaces will be purged wherever possible; contaminants will be displaced with fresh supply air to the space.

### **(b) Ventilating**

Ventilation of a space will either be accomplished through displacing air and diluting it through the introduction of fresh air or the continuous removal of contaminants by local exhaust ventilation for point sources. To ensure adequate ventilation, the points of air supply and exhaust should be separated as far as possible. Openings must be provided for the entry of clean replacement air or to allow the exhaust of air. Pure oxygen must not be used to ventilate a confined space.

### **(c) Failure Alarm**

To warn of ventilation failure and facilitate safe exit of Entrants from the space, an adequate warning system such as an audible or visual alarm and exit procedure shall be provided. The alarm should be activated by a flow or pressure switch in the air stream rather than by electrical failure or other motive power failure. Refer to Section 9 *Response to Elevated Findings and Exit Procedure during CSE* for exit procedure during alarm.

### **(d) Other precautions**

If it is not practical, for technical reasons, to ventilate or purge, a worker entering the confined space shall use,

- (i) Adequate respiratory protective equipment (to be used during CSE and signed off as appropriate on Entry Permit)
- (ii) Adequate equipment to allow persons outside the confined space to locate and rescue the worker if necessary, and
- (iii) Such other equipment as is necessary to ensure the worker's safety.

All personal protective equipment (PPE) must be inspected by a person with adequate knowledge, training and experience, appointed by the employer, and shall be in good working order before the worker enters the confined space.

## **Hot Work**

### **a) Precautions**

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

- i) 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
- ii) The following precautions must be taken:
  - (1) The space is purged and continuously ventilated to maintain an atmosphere of less than 5% of the LEL;
  - (2) The space is purged and continuously ventilated to maintain an oxygen concentration of 19.5% - 23%;
  - (3) The atmosphere in the confined space is continuously monitored;
  - (4) The entry permit includes adequate provisions for hot work and details the appropriate measures to be taken; and
  - (5) 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.

### **b) Hot Work Permit**

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

## **Personal Protective Equipment**

All workers entering a confined space must have adequate personal protective equipment based on the Hazard Assessment, identified in the Plan and in accordance with respective Regulations.

## 10.0 RESCUE PROCEDURES

### Identify Team

The Entry Supervisor will ensure that before a confined space entry can occur, rescue procedures are in place and the members of the rescue team are immediately available for the duration of the entry.

### On-Site Rescue Procedures

If at any time there is questionable action or non-movement by the entrant inside the confined space, the attendant will make an immediate communication check. If there is no response or a questionable response, the attendant will order the entrant in the confined space to evacuate the space immediately.

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 CSRT by the means of communication recorded on the entry permit. The attendant will attempt to retrieve the entrant via the connected retrieval line (for vertical CS entry only).

If retrieval of entrant is required by means other than a tripod/winch (vertical CS entry), the attendant should immediately summon the CSRT.

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

Under no circumstances shall the Attendant enter space to perform rescue.

The University of Ottawa on-site Rescue Team Procedures are detailed in Appendix E.

### Training Requirements and Records

The U of O Rescue Team (or contracted rescue service) will provide records of training of rescue personnel to the University of Ottawa, ORM. The U of O Rescue Team must have the following:

- Have completed a minimum of 1 day confined space awareness course with ½ day practical component
- Be trained in confined space rescue procedures including scenarios

- Have received training in confined space rescue equipment
- Have undergone respiratory fit testing and be capable of wearing a respirator
- Have received training in First Aid and CPR.
- First aid and cardiopulmonary resuscitation (FA/CPR);

All members of the Rescue Team shall have all required elements of training.

### **Rescue Equipment**

Rescue equipment will include harnesses and lifelines, hoist/retrieval systems, self-contained breathing apparatus, fall arrest, safety footwear, protective gloves, personal flotation device and/or hard hats. The rescue equipment and procedures will be documented on each CSE Plan and available and present at the CSE point prior to entry taking place. The emergency equipment shall be inspected and verified to be in good working condition prior to the entry. This inspection will be documented.

### **Rescue Procedures and the CSE Plan**

The U of O Rescue Team will ensure that the Rescue Plan will be able to effectively remove a worker who has been overcome in a specific confined space.

If entry is required to perform a rescue, rescue personnel must be properly trained and protected against all hazards within the specific confined space.

A minimum of two rescue team members should be included in each rescue plan.

The Attendant will not be part of the Rescue Team and will remain in place stationed outside and near the entrance to the confined space. The Attendant may assist the rescue from outside the space, as long as the work does not impede the Attendant's duties.

***ON-SITE RESCUE PROCEDURES SHALL BE INCLUDED IN THE PLAN DEVELOPED FOR EACH CONFINED SPACE, PRIOR TO CSE.***

## **11.0 CONTRACTORS**

### **Regulatory and Program Requirements**

**NOTE:** Most often, work performed by a Contractor will fall under the jurisdiction of the Regulations respecting Construction under the OHS Act and therefore, the Contractor must

comply with O.Reg.632/05 as well as the requirements of the University of Ottawa CSE Program (compliant with O.Reg.632/05).

A copy of this CSE Program will be provided to each Contractor performing CSE work for the duration of this CSE Program.

The Contractor will have their own CSE Program and the Contractor Program must meet or exceed the University of Ottawa CSE Program.

### **Coordination Document**

If there is more than one employer performing work within the same confined space at a time, a Coordination Document is required. A sample Coordination Document is provided in Appendix F.

With the exception of construction projects, the Coordination Document must be prepared by the "lead employer". The "lead employer" is defined in section 3.0 of this document, and will typically be the University of Ottawa.

The Constructor is responsible for the preparation of the Coordination Document if more than one contractor is hired to perform work in the same confined space or related work with respect to the same confined space on a construction project.

The Coordination Document ensures that employer duties with respect to the following subject matters are performed in a way that protects the health and safety of all workers performing CSE or CSE related work:

- confined space program;
- hazard assessment;
- written plan;
- plan-specific training (if applicable);
- entry permits;
- written on-site rescue procedures and equipment;
- isolation of energy and control of materials movement;
- attendants;
- entering and exiting;
- unauthorized entry;
- atmospheric testing;
- explosive and flammable substances; and
- ventilation and purging of atmospheric hazards.



## 12.0 TRAINING

### Content

Supervisors, attendants, entrants and rescue team members must be adequately trained in O.Reg. 632/05, this CSE Program, Plan, Permit process, hazard assessment/identification and controls, rescue awareness, equipment to be used, personal protective equipment, and documentation. Workers with emergency rescue responsibilities will need training related to rescue response as well as those outlined in section 10.0 of this Program.

Training must include hands-on experience with the safety equipment including the personal protective equipment and safety harnesses.

### Minimum Training Requirements

Minimum training requirements for various positions are outlined below. All training outlined herein must be documented and kept on file by the U of O ORM. Training requirements and needs should be reviewed on an annual basis.

CSE Supervisor - Must be aware of all hazards associated with a confined space and communicate this to his/her workers. Must communicate and monitor the procedures surrounding safe entry and work are followed. Must communicate how to work safely around the hazards identified. Supervisor must enforce the proper use and care of required PPE (eyes, ears, and foot protection). Must ensure all workers assigned to a confined space have undergone the prescribed training.

Confined Space Worker (entrant, attendant)– This encompasses all individuals preparing, entering, guarding or testing the confined space. Every worker who works in or with a confined space must receive adequate training in the recognition of hazards associated with confined spaces and training to be able to safely perform the assigned duties for that specific confined space.

On-site rescuers – An adequate number of on-site rescue workers must be available to perform rescue in accordance with the Rescue Plan. In addition to general confined space training, they will need to be trained in First aid and CPR, on-site rescue procedures, and use of rescue equipment.

All workers – Basic awareness at H&S meetings that confined spaces are present, where they are and that there is prohibited entry to all confined spaces unless authorized by supervisor.

<b>Training</b>	<b>Personnel/Positions to be Trained</b>
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, CPR	Rescue Team
Gas testing	Entrant, Attendant, CSE Supervisor, Rescue Team

**Note:** There could be more than one Entrant, Attendant or CSE Supervisor at training session.

## Review

Training will be reviewed with or by the ORM whenever there are changes in the CS Program or at least annually. A copy of the most recent training program and records identifying workers who received the training will be forwarded to, and retained by ORM.

## 13.0 DOCUMENTATION AND RECORDKEEPING

### Required written documents:

- Co-ordination document (if applicable)\*
- Program \*
- Hazard Assessment
- Plan
- Training records
- CS Entry permit
- On-site rescue procedures \*
- On-site rescue equipment inspection records
- Air testing results

All of the above documents are incorporated within the “entry permit” except for those with an asterisk. The University of Ottawa for the purposes of the CSE Program has incorporated the plan, onsite rescue equipment inspection records and air testing results into one document, the Permit, in Appendix D.

### Retention

University of Ottawa must retain all of the above documents for at least 1 year after they are created, and at least the two most recent records of each document must be retained, with the exception of the Confined Space Program which must be maintained at all times if the workplace includes a confined space that workers may enter to perform work.

For construction projects, these documents must be retained for the duration of the project, and at least one year after the completion of the project.

### **Distribution and Availability**

The Co-ordination document and CS Program document must be provided to the JHSC and other employers, where applicable.

The Hazard Assessment document must be provided, upon request, to the JHSC.

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.

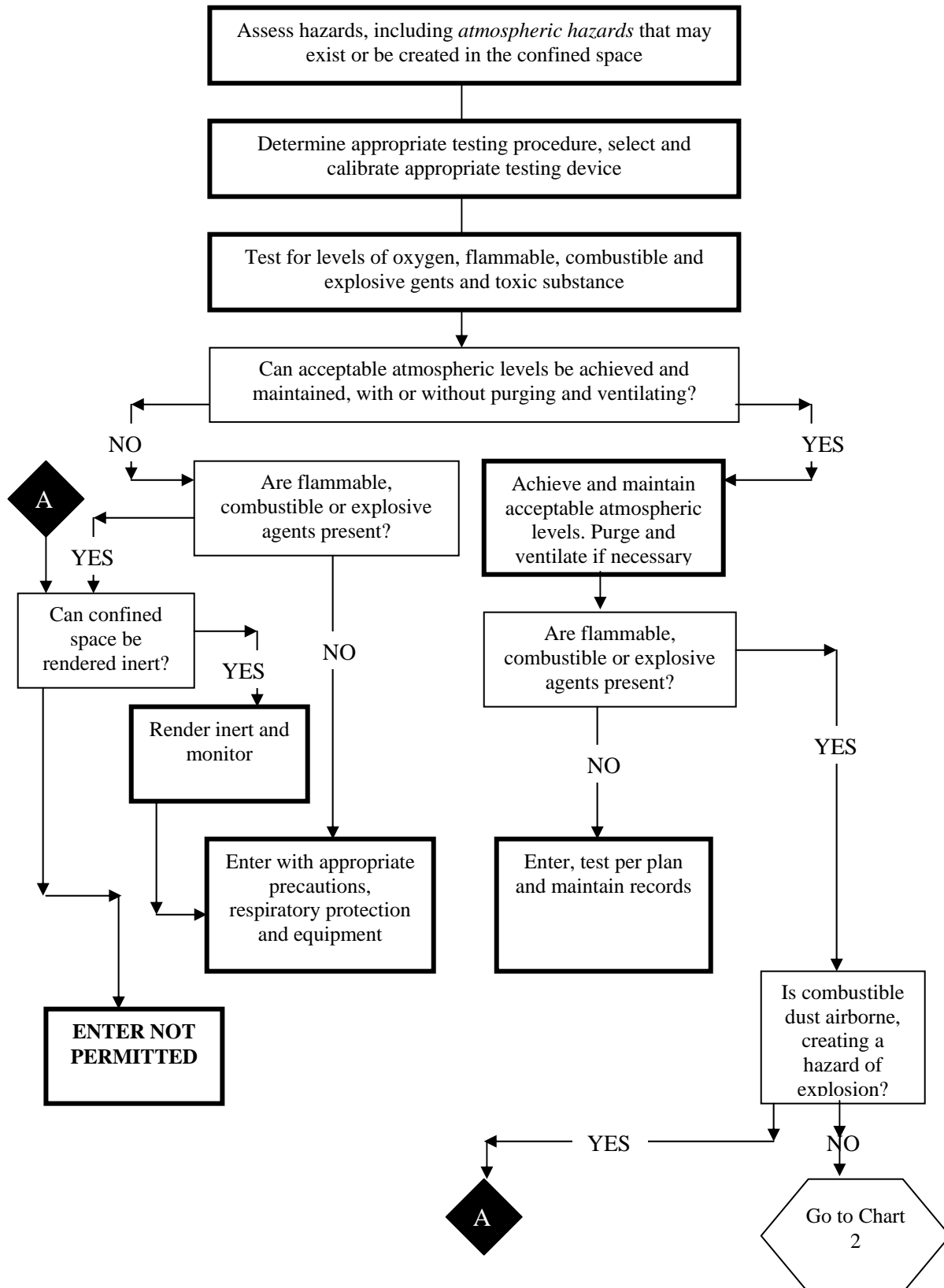
For Construction projects:

U of O must keep available for inspection at the project the assessment, plan, co-ordination document, record of training, entry permit, record of inspection of rescue equipment, and air testing records.

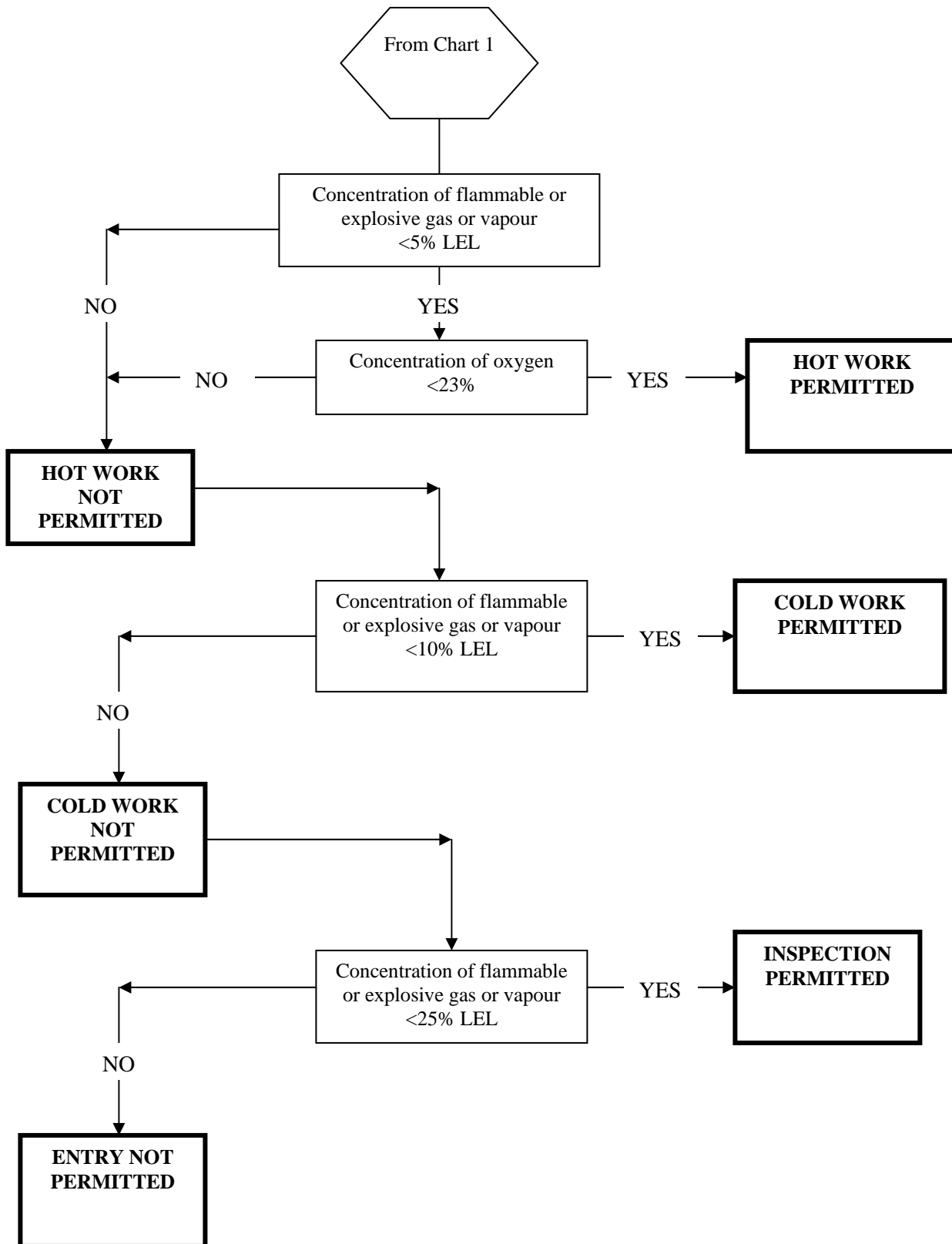
After the completion of the project, U of O or the Constructor must keep a copy of these documents for at least one year.

**Inventory - Identified Confined Spaces under University of Ottawa CSE Program**

CHART 1--DECISION TREE FOR CSE.



**CHART 2--DECISION TREE FOR WORK IN FLAMMABLE OR EXPLOSIVE GAS OR VAPOUR**



**APPENDIX C**  
**Confined Space Hazard Assessment Form**

**APPENDIX D**  
**Confined Space Entry Base Plan and Permit**



**APPENDIX E**  
**Rescue Procedures for Confined Space Entry**

**Confined Space Entry (CSE) Co-ordination 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 CSE 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 workers of Contractor are trained in the work to be performed and the relevant regulated confined space requirements. The Contractor and workers of the Contractor, are to be aware of the University of Ottawa CSE program requirements.

<b>Responsibility:</b>	<b>Lead Employer:</b>	<b>Contractor:</b>
CSE Program**	X	X
Hazard Assessment	X	
Written Entry Plan		
Training*	X	X
Personal Protective Equipment*	X	X
Entry Permit		
Isolation of Energy & Control of Materials Movement		
Attendants		
Entering and Exiting Monitoring & Recordkeeping		
Unauthorized Entry Prevention		
Written On-site Rescue Procedure & Equipment		
Atmospheric Testing		
Explosive and Flammable Substances		
Ventilation & Purging of Atmospheric Hazards		
Rescue Plan		
Rescue Team		
Documentation/Records*	X	X

\* General training, personal protective equipment 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 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 G**

### **Equipment Required for Confined Space Entry**

- Head protection
- Eye protection
- Hearing protection
- Gloves
- Approved safety harness
- Approved Life-line
- CSA-approved foot protection
- Calibrated direct- reading monitor (with alarm) with sensors appropriate to CS (O<sub>2</sub>, CO, LEL, H<sub>2</sub>S)
- Communication equipment
- Ventilation equipment
- Emergency escape respirator
- Portable lighting
- First aid kit
- Ladders or suitable length and construction
- Hand cleaners and paper towels
- Personal lifting device with winch
- Man-hole cover lifting tool
- Emergency rescue equipment (listed in 5.3 of Appendix E)
  - harnesses and lifelines,
  - hoist/retrieval systems,
  - self-contained breathing apparatus,
  - fall arrest,
  - safety footwear,
  - protective gloves,
  - personal flotation device and/or
  - hard hats
  - first aid kit

**APPENDIX H**  
**List of Potentially Hazardous Spaces**  
**(NOT CONFINED SPACES)**