manufacturing
Safety Alliance of BC

Confined Space Entry

PROGRAM MODEL

Manufacturing Safety Alliance of BC

The Manufacturing Safety Alliance of BC, formerly known as FIOSA-MIOSA Safety Alliance of BC, was established in December 2007 to reduce the high injury rate in the food and manufacturing industries. Our mission is to foster commitment among employers to reduce the injury rate in all applicable areas. Our vision is to promote industry leadership in health and safety.

The Manufacturing Safety Alliance of BC strives to accomplish our mission and vision through the delivery of a variety of core services including:

- Training in areas such as occupational health and safety (OHS) leadership, program building, and auditing
- Consultation and Advisory Services
- The certifying partner for the Occupational Safety Standard of Excellence (OSSE) in partnership with WorkSafeBC

For further information, visit: www.safetyalliancebc.com

Disclaimer

This course manual is intended solely for internal use as an awareness and information guide. It is not intended as a statement of the standards required in any particular situation, nor is it intended that this workbook should in any way advise anyone concerning legal authority to perform any activities or procedures.

Every effort was made to ensure the accuracy and relevance of this information; however, this material may be subject to change due to various factors. These factors may include regulatory or interpretive changes, and a need to adapt the material to unique situations or procedures.

Nothing in this package and the course program absolve participants from using their sound judgment in the appropriate application of the material learned.

Prepared by the MSABC Safety Alliance of BC

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Introduction

Confined Spaces Can Be Deadly

Recent histories of fatalities involving confined spaces tell the tale. In November 2002, two winemakers died in a confined space incident while obtaining a sample from a fermentation tank.

In January of 2003, a worker was overcome working in a barge hull, four workers attempted to rescue the worker. Three workers died, two were injured and a firefighter responding to the accident was also injured.

In May 2006 a contractor died in the Sullivan Mine in Kimberly BC. The worker entered a shed that had an oxygen- depleted atmosphere. A worker sent to check on the contractor and two BC Ambulance Paramedics also died.

Six out of 10 fatalities involving confined spaces are workers attempting a rescue.

A confined space is an enclosed or partially enclosed area that is big enough for a worker to enter. It is not designed for someone to work in regularly, but workers may need to enter the confined space for tasks such as inspection, cleaning, maintenance, and repair. A small opening or a layout with obstructions can make entry and exit difficult and can complicate rescue procedures.

Some common examples of confined spaces that can be found in a workplace can include manholes, sewers, boilers, pipelines, tunnels, wells, storage tanks, trenches and silos, etc.

The following confined space entry process model is driven by a need to reduce the risks that is posed by confined spaces by ensuring that a structured confined space entry program is developed and the necessary precautions are taken before workers enter confined spaces to undertake their assigned tasks.

This confined space entry process model is not meant to replace any existing confined space entry programs, but is intended for use by organizations to assist in the development and implementation of confined space entry programs. It is reflective of the Confined Space Program requirement as indicated in Section 9.5 of the WorkSafeBC OHSR.

Portions of this model will be written descriptively by providing a brief description of the segment and then providing a sample or by referring to an appendix section that will provide a template and example.

Policy Statement

A confined space entry policy statement is designed to ensure that all personnel are made aware of the company's stance on confined spaces. In this statement the company will indicate expectations of all personnel who may be involved in a confined spaces entry, citing who may enter a confined space and the steps that must be taken before, during and after said entry in addition to citing confined space entry restrictions.

The policy will set out an action plan that will include such items as procedures, protocols, entry permits, lockout, rescue planning, atmospheric testing, monitoring, ventilation, etc.

The policy will also discuss administrative functions such as setting out responsibilities, hazard assessments, inventory, training, document control, signage, restrictions and will cite local legislation. This policy requires all personnel to comply with these procedures and disregard for this policy will lead to immediate dismissal.

The policy will be then be signed off by senior management

Sample Policy Statement

(Company name) is committed to providing a safe and healthy working environment for employees. The Confined Space Entry program is established so that only (Company name) workers and outside contractors specifically trained and certified in Confined Space Entry procedures and rescue techniques are permitted to enter into identified confined space areas within (Company name) facilities.

All Confined Spaces procedures and protocols are to be followed prior to and during confined space entries. These include, but are not limited to:

- completion of confined space entry permits
- pre-entry discussion of procedures and rescue measures
- observation of lockout and blanking procedures
- pre-entry atmospheric testing and inspection of space for all identified hazards
- adequate ventilation prior to and during entry
- continued atmospheric monitoring while worker is in the space

All confined spaces within the (Company name) facilities must be inventoried at least once a year and when any new equipment has been added to inventory.

A hazard assessment must be completed for all identified confined spaces within the (Company name) facilities and following any modifications or repairs that have been made to a confined space. A review of the confined space hazard assessments and written procedures must be completed annually.

As per Section 9.11 of the WorkSafeBC regulation, all hazard assessments and written confined space entry procedures must be prepared by a qualified person who has adequate training and experience in the recognition, evaluation and control of confined space hazards, and in consultation with the person assigned overall responsibility for administration of the confined space entry program and with the joint committee or the worker health and safety representative, as applicable.

Signed and dated by Senior Management

Scope

Scope sets the parameters of the program by describing who it applies to, provides direction to contractors. The scope also describes some applicable hazards associated with confined spaces and some examples of what areas would be considered to be confined spaces with the purpose in mind to illustrate how this program would apply to the individual.

Sample Scope

This program applies to anyone working in confined spaces under the care and control of (Company name). This includes (Company name) employees, contractors, visitors and client employees. Contractors may follow their own confined space program so long as the provisions outlined in this program are met.

**Please Note: Affected employees must complete training on confined space safety before entry in accordance with the provisions of this program.*

Confined space entry may expose a worker to many hazards. The 5 main dangers in a confined space are:

- Oxygen deficiency
- Oxygen enrichment
- Fire or explosion
- Acute toxicity
- Drowning in liquids or entrapment in free flowing solids

Based on the definition of a confined space some examples of confined spaces could include manholes, sewers, boilers, pipelines, tunnels, wells, storage tanks, trenches and silos, etc.

Responsibilities

Employer

- Ensure that all provisions of this program are fully implemented
- Provide all required resources for the implementation of this program
- Ensure that a Confined Space Administrator is assigned
- Ensure that all confined spaces are identified and inventoried

Confined Space Administrator

- Ensure that all equipment associated with this program is inspected monthly and calibrated according to manufacturers' instructions
- Ensure that all training required by this program is conducted
- Ensure that the program is reviewed annually and updated accordingly

- Ensure the provisions of this program are fully implemented by the employees for all confined spaces in the workplace
- Ensure that contractors adhere to the provisions of this program or the contractor's equivalent program

Confined Space Entry Supervisor

- Participate in the hazard assessment of the confined spaces
- Understand the provisions of this program
- Has overall responsibility for the entry
- Is the person signing the Confined Space Entry Permit
- Knows the hazards and the controls
- Verify the permit has been filled out correctly and all testing and inspection has been done
- Verify that the permit references the hazard assessment and safe confined space entry procedures which
- will identify all potential energy sources and potential hazards to be isolated and locked out prior to issuing the permit
- Verify that the controls are in place and that the space is fit for entry
- Termination of the permit and cancel entry if necessary
- Verify emergency procedures are in place
- Verify that persons entering into the space have had the proper training
- Remove unauthorized personnel from the work area
- Ensure that safe condition are maintained throughout the entry period
- Ensure all workers are briefed, equipped and use the equipment provided
- Transfer responsibilities to incoming entry supervisor at shift or personnel change

Standby Person

- Knows the location of the confined space
- Knows hazards and symptoms of exposure
- Ensure the entry permit identifies the entrants
- Ensure that the permit is signed-off prior to any entry into the confined space
- Keeps track of who enters and leaves the confined space and when
- Remains in constant contact with the entrants
- Monitors conditions inside and outside the space
- The standby person will ensure all required emergency equipment is immediately available, is in good working condition and that they are familiar with the use of the equipment
- Ensures that an entry log of times personnel enter and exit the confined space is recorded on the permit

- Ensures that the gas detector readings are taken and recorded on the permit prior to entry into the confined space, at intervals during the entry, and upon exit from the space
- Ensure that all combustion equipment is exhausted away from the space and the ventilation system
- Keep all personnel not involved in the confined space entry process away from the area and do not become distracted
- Have all documentation available at the space for review as required
- Stay alert at all times
- Remain at the designated post at all times
- Watch for and alert the person(s) inside of any potential hazards
- Monitor the breathing air supply – this may require additional personnel if a supplied air system is used.

The standby person must be qualified in

- The calibration, operation and monitoring of atmospheric testing equipment used in the confined space and in the interpretation of the equipment readings
- Emergency response and evacuation procedures
- Communication procedures
- Safe Rescue Procedures
- Activities involved in the confined space entry such as:
- Being familiar with all of the provisions of this program
- Being familiar with the hazards of the confined space to be entered and the effects of exposure to those hazards
- Knowing how to summon rescue assistance
- Reviewing the entry permit and plan with the entry supervisor and entrant(s) prior to work commencing
- Understand the entry permit process
- If Rescue is required, the standby person must:
- Initiate the Emergency Response Procedures
- Stay outside the space, wait for assistance
- Never attempt the rescue alone unless it can be safely done from outside the space
- Remember... “Rescuers must not become victims”

Entrants

- Know the provisions of this program
- Know the hazards associated with the confined spaces, symptoms of exposure and how to control those hazards
- Conduct a pre-work inspection
- Stay in communication with the standby person

- Use equipment properly
- Notify the standby person of unacceptable conditions within the space immediately
- Exit the space when:
- The order is given
- You recognize a potentially hazardous situation
- The space becomes unfit for continued entry

Review the entry permit and plan with the entry supervisor and standby person prior to work commencing.

Confined space entry program

Overview

The confined space program consists of the following:

- ☐ Identify and create an inventory of all confined spaces on site
- ☐ Assess confined space hazards
  - Qualified Person
  - Hazardous Atmosphere Levels
  - Atmospheric Hazards
  - Other Hazards
- ☐ Restricted entry
- ☐ Establish Safe Entry Requirements
  - CSE Permit System
  - Recordkeeping
  - Isolation of Hazards
  - Air Quality Testing and Monitoring
  - Entry Equipment
  - Ventilation Requirements
  - Standby Person Responsibilities
  - Confined Space Entry Rescue
- ☐ Written safe entry procedures
- ☐ Training
- ☐ Proper Supervision
- ☐ Contractor Compliance
- ☐ Coordination of Other Work Activities
- ☐ Rescue Response

1. Confined Space Inventory

An inventory of all confined spaces within the (Company name) facilities must be completed. A complete list can be found in Appendix B - Confined Space Inventory.

The Confined Space Administrator is responsible for ensuring that the inventory is kept up to date as required. If there is any concern that the inventory is not accurate, this discrepancy must be reported immediately to the Confined Space Administrator.

2. Assessment of Hazards

Though rare, accidents in confined spaces often result in severe injury or death. Oxygen-deficient or toxic atmospheres account for almost half of confined space incidents. Other causes include explosion or fire, entrapment, crushing, falling objects, electrocution and temperature extremes. Hazard identification is the first step in the development of solutions that will prevent the incidents from occurring.

A hazard assessment must be conducted for each space prior to entry to ensure that proper safe entry procedures are developed.

A hazard assessment must be conducted for all confined spaces on site where work is normally conducted in these spaces. See also Appendix B – Hazard Assessments. The hazards must be re-assessed whenever work inside these spaces changes.

It is important to note that a single hazard assessment can be used when there several spaces that are identical. These spaces do however need to be individually inventoried.

Who Is a Qualified Person?

As per WorkSafeBC Regulation 9.11; all hazard assessments and safe entry procedures are to be developed by a qualified person (See Glossary of Terms). WorkSafeBC has defined a qualified person as follows:

- Certified Industrial Hygienist (CIH) or registered occupational hygienist (ROH)
- Certified Safety Professional (CSP), Canadian Registered Safety Professional (CRSP) or
- Professional Engineer (P. Eng.), provided that the holders of these qualifications have Experience in the practice of occupational hygiene related to confined space entry,
- Or other combination of education, training and experience acceptable to the Board.

Hazardous Atmosphere Levels

Atmospheric hazards in confined spaces will be rated as Low, Moderate or High and will be determined during the hazard assessment. The rating will then be used when preparing written safety entry procedures (See Appendix A, B & D – Definitions, Hazard Assessments, and Written Safe Entry Procedures).

Atmospheric Hazards

The atmospheric hazards considered during each hazard assessment include:

Oxygen levels

Normal air contains approximately 20.9% oxygen by volume. Any atmosphere that contains less than 19.5% or more than 23% oxygen by volume will be considered a high hazard.

Flammable/explosive conditions

Result from the presence of flammable gas or vapours, or concentrations of explosive dusts. Any confined space that has an atmosphere in excess of 20% of the lower explosive limit (LEL) will be considered as a high hazard.

Toxic contaminants

Cause adverse health effects when inhaled. Exposure limits are established for normal working conditions and concentrations of contaminants in the confined space will determine the hazard rating.

Other hazards

Over and above the atmospheric conditions, the following hazards are considered and evaluated for each confined space:

Exit/Egress from the confined space

The more difficult the exit/egress, the more difficult rescue and emergency evacuation.

Physical hazards include the following:

- falls from heights
- entrapment/crushing (e.g., burial in silos caused by bridging of granular materials)
- flooding (e.g., caustic, water, etc)
- electrical shock
- poor visibility/lighting
- temperature extremes
- noise & vibration
- slippery, sharp and/or abrasive work surfaces
- moving machinery
- scaffolding

- surface residues
- structural hazards

Chemical hazards in a confined space can result from residue left in the space due to processes that normally take place. Chemical substances can also be introduced into the space as part of the work process such as cleaning or maintenance. Material safety data sheet (MSDS) will be reviewed in order to assess the type and level of hazard that chemical materials present. Incompatibilities and synergistic effects must be given close consideration.

Biological hazards are living organisms that can cause disease in human beings. The main concern being moulds, fungi, bacteria, and viruses. Workers can be affected through contact with contaminated solids and fluids, or through inhalation. Some examples of contaminated locations and items would include septic tanks, sewer systems, sumps, syringes, contaminated foods, first aid processes, etc.

Work processes that are carried out in a confined space can create hazards to persons working inside the confined space, some examples include: Hot work (e.g., welding & burning), sand blasting, painting, and cleaning with solvent materials. Activities such as these require special written authorization that specifies the additional precautions to be taken before the work is allowed to proceed.

Poor communication between the worker inside and the standby person outside is extremely hazardous. The standby person must be able to communicate with workers within the space to determine the status of the inside workers health and to communicate any change in conditions to the inside workers.

3. Restricted Entry

Confined spaces must all be identified and labelled at each entry point into confined spaces to indicate that entry into confined spaces is prohibited and that only persons trained and authorized to do so may access the confined spaces.

The following are examples of confined space signage that should be used:

The first type of confined space label indicates that only authorized persons may enter the confined space. The second label indicates that a Confined Space Entry Permit is required. Moderate risk confined spaces or any confined spaces meeting the requirement of Part 9.13 of the OHSR must have permits for entry. See Appendix B - Hazard Assessments for more information on Permit and Non-Permit required spaces.

4. Basic Requirements for Safe Entry

CSE Permit System

A Confined Space Entry Permit must be issued by the Confined Space Entry Supervisor authorizing entry into the confined space prior to entry into any permit required confined space.

Only one permit is to be issued per confined space that will be entered during each shift.

A Confined Space Entry Permit is only valid for a single work shift, and only while there is no significant break or change in the work activity within the confined space(s). In the event that there is a significant break or change in the work activity that alters the hazards within the space will necessitate revalidation of the entry permit by the Entry Supervisor.

Before a permit can be signed-off the Entry Supervisor must be satisfied that:

a. the permit has been completed properly and that it complies with the Confined Space Entry Procedures
b. all personnel are familiar with and will the contents of the permit, Hazard Assessment and Written Safe Entry Procedures
c. all personnel involved in the confined space entry have the required training

Once the permit has been issued, it must be posted at every point of entry and the information may only be altered by:

- the Supervisor who issued the Permit in order to:
- ensure the ongoing safety of the workers inside the space
- re-validate the Permit if there is a change in the entrants, after each shift change, or after a change of the Supervisor
- the Standby worker to:
- update the list of workers inside the confined space, or
- record atmospheric testing results

Every worker affected by the changes must be informed by the Supervisor of the alterations to the Permit, and changes in the required precautions or work activities.

The Supervisor authorizing the Confined Space Entry must ensure that the Permit refers to the appropriate Hazard Assessment and Safe Confined Space Entry Procedures, and Lockout/Isolation Procedures.

Before entry into the confined space, the personnel involved in the entry (entrants and stand-by persons) must ensure the following items have been addressed and indicated on the entry Permit:

- locking-out/isolating hazards
- purging (when required) space prior to entry
- ventilation in place prior to entry
- testing for contaminants (record pre-entry concentrations found on the Permit)
- using all required protective equipment
- having the required communication equipment
- knowing the emergency rescue/evacuation procedures

The standby person will ensure that all persons entering into the confined space are recorded on the Permit, including the entrant's name, the time in and time out of the space.

The entry Supervisor will sign-off on the Permit once they are satisfied that the confined is safe to be put back into operation when the entry work has been completed.

Recordkeeping

A copy of the Permits must be kept on file for a period one year after the date of completion of the entry. These records must be kept by the Supervisor authorizing the entry and must provide evidence of conformity to program requirements.

Isolation of Hazards

All potential hazards need to be identified and controlled before anyone is allowed to enter a confined space. The confined space must be isolated; no hazardous materials can be allowed to enter the space, and all electrical and mechanical energies must be locked-out. Following are some examples of the types of lockout/isolation that may be required.

- Closing valves and locking in the closed position using a double block & bleed
- Blanking and blinding lines
- Disconnecting lines
- Locking-out all switches and controls for motors and pumps
- Blocking or restraining moving parts
- De-energizing equipment

Lockout/isolation requirements will also be indicated on every Hazard Assessment and Safe Confined Space Entry Procedures.

The Supervisor authorizing the entry Permit is required to ensure all potential energy sources and/or the intrusion of any harmful substance have been isolated prior to permitting the entry to proceed. (See Appendix F - for Lockout Isolation Sheet).

Note: A separate Lockout program and item specific procedures should be developed to compliment this program; in addition refer to Sections 9.17 & 9.18 of the WorkSafeBC OHSR regarding Lockout and Control of Harmful Substances.

Air Quality Testing and Monitoring

The air quality inside confined spaces must be established in order to ensure that personnel are not at risk. Normally, testing of air quality inside the confined space will be done:

- Immediately prior to entry
- No less than every 20 minutes while personnel remain inside the confined space
- On exiting the confined space

Part 9.26(2) requires that the person assigned responsibility for carrying out the testing and monitoring must be qualified through training and experience to calibrate, operate and monitor testing equipment and interpret readings from the testing equipment.

All readings results obtained during this test must be recorded on the Confined Space Entry Permit. Continuous monitoring is required whenever practicable for moderate and high risk atmosphere confined spaces.

Continuous monitoring of air quality inside the confined space must occur whenever the confined space is rated as a:

- High hazard, or
- Moderate hazard with the possibility of flammable gas or vapours exceeding 20% of the LEL

Refer to Part 9.25 of the OHSR for further information on testing and monitoring

Specific testing protocols for each confined space must be specified on the Hazard Assessment and Safe Entry Procedures.

Calibration and bump-testing of gas test meters used during entries is required to comply with the manufacturer's specifications and instructions in order to ensure reliable readings.

Entry Equipment

The necessary equipment for safe confined space entry may include but is not necessarily limited to the following:

Rescue/Retrieval Equipment:

- Hoist and Tripod
- Life Line
- Full Body Harness
- First Aid Equipment
- Fire Extinguisher(s)

Purging and Ventilating Equipment:

- Blower
- Hoses
- Rigid
- Collapsible
- Power Cable

Gas Detection Equipment:

- Gas Detector (typically O2, CO, H2S, LEL)
- Calibration Tools, Equipment and Gases
- Extension Hoses, Tubing Wands
- Intake Filters

Safe Communications Equipment

Personal Protective Equipment and Clothing (based on hazards assessment):

- Respirators
- Hearing Protection
- Eye Protection
- Hand Protection
- High visibility Clothing
- Fall Restraint /Arrest Equipment

Non-sparking, Intrinsically-safe Tools

Other:

- Lockout Devices For Isolation
- Handrails, Guardrails or Barriers Around Any Openings
- Ground Fault Circuit Interrupters (GFCI) For All Electrical Equipment Inside Confined Spaces

Note: See Appendix G for Confined Space Equipment

Ventilation Requirements

Continuous ventilation with clean, breathable air must be continually provided to all confined space during entry unless indicated otherwise on the Hazard Assessment and Safe Confined Space Entry Procedures. The following ventilation rules must be observed.

- Exhaust: Both local and/or general exhaust ventilation must be established and maintained when air contaminants will be created in the space by activities such as hot work or cleaning
- Prior Ventilation: Confined spaces need to be ventilated prior to entry to ensure air quality in the space is clean and respirable as required by the Hazard Assessment and Safe Confined Space Entry Procedures to ensure that the
- Air Testing: Air must be tested no more than 20 minutes before entry to ensure that the atmosphere inside the confined space is clean and respirable.
- Continual Ventilation: Continual ventilation must be ensured while personnel are inside the confined space.
- Air Changes: There must be a minimum of 20 air changes per hour in order to ensure adequate ventilation.
- To accomplish this, use the following formula:

$$20 \text{ air changes/hour} = \frac{\text{Fan capacity (in Cubic feet per minute) X 60 minutes per hour}}{\text{Approximate) Space Volume in Cubic Feet}}$$

The air intake must be kept away from potential air contaminant sources that could be drawn into the confined space, examples include: open pails of solvents or exhaust from a gas or diesel powered pressure washer.

Note: Oxygen must never be used to ventilate a confined space. Oxygen levels inside a confined space that exceed 23% create a health risk and fire/explosion hazard.

Standby Person Responsibilities

The standby person must remain at the entrance to the confined space at all times to monitor the safety of the persons within the confined space. As a trained standby person their duties will include:

- Review Procedures: The Confined Space Entry Permit requirements and Hazard Assessment and Safe Confined Space Entry Procedures must be reviewed with the entrant and Entry Supervisor prior to entry.
- Assist With Permits: Hole Watch must assist in the completion of Confined Space Entry Permits.
- Safeguards / Equipment Check: All protective equipment and safeguards must be in place prior to and during entry.
- Air Quality: Air quality measurements/readings must be taken prior to entry and at intervals no more than 20 minutes apart.
- Record Results: The air quality measurement results must be recorded on the Confined Space Entry Permit.
- Entry Log: An entry log must be maintained of times that personnel enter and exit the confined space(s) and this information must be recorded on the Permit.
- Personnel Checks: Periodic checks of personnel doing work inside the confined space must be made to ensure their well-being. Frequency of checks will depend on the hazard rating and will be indicated on the Hazard Assessment and Safe Confined Space Entry Procedures.
- Emergency Protocols: All emergency rescue protocols (which may include training to conduct entry rescue) must be followed.

The confined space Hazard Assessment will indicate the hazard rating of the confined space. The standby person will review these assessments which will provide the specific requirements for the monitoring of the space.

Low hazard

- Entry personnel must have a means to summon standby personnel
- Standby personnel must check on the well-being of workers inside the confined space at intervals not exceeding 20 minutes, and
- Standby personnel must have a means to immediately summon rescue personnel.

Moderate hazard

- There must be standby personnel at or near each entrance to the confined space
- The standby personnel must visually observe or otherwise check the well-being of the worker(s) inside the space, as often as may be required by the nature of the work to be performed, but the interval must not exceed 20 minutes between checks,
- There must be a continuous means of summoning the standby personnel from inside the confined space, and
- Standby personnel must have a means to immediately summon rescue personnel.

High hazard atmosphere, risk of engulfment or entrapment, or recognized serious hazard:

- There must be standby personnel at or near each entrance to the confined space and they must continuously attend to the standby duties
- The standby personnel must visually observe or otherwise continuously monitor the wellbeing of the worker(s) inside the confined space
- There must be a continuous means of summoning standby personnel from inside the confined space
- Standby personnel must be equipped and capable of immediately effecting rescue using lifting equipment if required, or otherwise performing the duties of rescue persons, and
- Standby personnel must prevent the entanglement of lifelines and other equipment.

Note: Standby persons must never enter the confined space for any reason

Confined Space Rescue

Prior to a confined space entry a rescue plan must be created and the rescue team briefed to ensure that all members of the rescue team are made aware of where the confined space is located and about the hazards associated with the space. It is also important to ensure that there is adequate coverage in case an emergency rescue is required. Emergency equipment must be immediately available and a tripod set up prior to entry into the confined space.

There are two typical types of rescue:

Non-entry rescue

This type of rescue is the preferred method of rescue because it does not expose additional personnel to the hazards that may be present in the confined space. It involves the use of a harness, lifeline, and lifting equipment. The standby personnel can remove the personnel from inside the confined space without having to enter the confined space. Non-entry rescue requirements will be detailed in the Hazard Assessment and Safe Confined Space Entry Procedures for each confined space.

Entry rescue

This type of rescue involves the use of a rescue team equipped with appropriate respiratory equipment, harnesses, lifelines and lifting apparatus (if appropriate for the rescue scenario). The rescue team will enter the confined space to remove the injured worker(s).

5. Written Safe Entry Procedures

Written Safe Entry Procedures are typically created using the hazard assessments and utilizing the notion of eliminating or minimizing the risk of all hazards that are identified. For instance a written procedure for a specific confined space will explain where required:

- What to include in the entry permit
- Lockout and isolation
- Verification of all precautions and testing the atmosphere, including how to set up specific air- monitoring device(s) for the identified hazards (such as oxygen deficiency and the contaminants present),where the monitoring is to occur, and how frequently
- Cleaning, purging, venting, or inerting
- Ventilation required, including proper placement of the ventilating system
- The standby person's duties, including numbers to call for emergency help
- Rescue personnel and procedures
- Lifelines, harnesses, and lifting equipment
- Personal protective equipment (for example, fall protection, safety headgear, or respirators)
- Other precautions required by the Occupational Health and Safety Regulation such as:
- Keeping hazardous compressed gas tanks outside the space,
- Ensuring hoses do not block the entranceway
- Ensuring electrical tools and equipment are grounded or double-insulated, protected by a ground fault circuit interrupter, and CSA-approved for hazardous locations such as use in spaces that have flammable or explosive gas
- Ensuring ladders, scaffolds and work platforms meet the requirements of the regulation,
- Control measures required when there is reduced visibility
- Coordination of work activities (for instance, ensuring that contractors are well informed of procedures and ensuring specific tasks will not harm other workers
- Equipment required for entry and instructions for use (for example, the ladder size, tie-off point, and tool bucket for lowering tools to workers inside the space)

Note: See Appendix D for a Written Safe Entry Procedure sample

6. Training

Training must be provided for all employees that are involved in confined space entry and rescue. Prior to being permitted to conduct confined space work, all persons involved in confined space entry must be suitably trained. Specific training delivery is chosen based on identified needs, and those needs must be re- assessed periodically by the Confined Space Entry Supervisor.

A general guideline for the type of training that should be considered includes the following:

Personnel involved in confined space entry require training in:

- hazards in confined space
- the use of gas test meters used to monitor air quality
- how to bump test and calibrate atmospheric monitoring equipment
- exposure limits and meter alarm levels
- proper use and an understanding of the limitations of protective equipment and clothing, and other safety equipment required for entry into confined spaces
- hazard assessments and written safe entry procedures
- permit entry requirements
- understanding of the conditions that would prohibit entry
- duties and responsibilities of the confined space entry team
- method(s) for alerting standby personnel
- recognizing the symptoms of overexposure to probable air contaminants
- emergency protocols

Additional training required for standby personnel:

- emergency rescue protocols
- summoning rescue or other emergency services
- proper use of communication equipment for communicating with entry and emergency/rescue personnel

Additional training for emergency rescue personnel:

- procedures for each different type of confined space
- proper use of emergency rescue equipment
- CPR and first aid

Note: See Appendix E for training standard

7. Proper Supervision

Regulatory requirements place a high importance on proper supervision of confined space entry. Personnel that supervise confined space entry have an essential role to play in ensuring that the entry is conducted in a safe manner. (See Responsibilities for details of Entry Supervisor Responsibilities).

8. Contractor Compliance

To ensure contractor safety, all contractors conducting confined space entry must provide a comprehensive confined space entry program that is acceptable to the Confined Space Entry Administrator or in the absence of a Confined Space Entry Program must review and comply with that of the one used by the Company that is being contracted to. The Company therefore has an obligation to provide access to a copy of the program document to the contractor.
The company will designate personnel to have responsibility for coordinating contractor confined space activities. The coordinator will:

- Ensure that the contractor has proof of confined space training
- Provide information to the contractor on known site hazards, including providing access to the company's Hazard Assessments and Safe Confined Space Entry Procedures
- Ensure that the contractor has performed a risk assessment of the activities that will be performed.
- Ensure contractor and the company work activities do not conflict so as to create a hazard for the contractor's or company's employees
- Monitor the contractor's activities to ensure compliance with this program and the legal requirements
- Ensure that a rescue plan has been created.

9. Coordination of Other Work Activities

To ensure the safety integrity of the confined space, it is important to coordinate the activities of other work that may be conducted near or adjacent to the confined space that may interfere with the confined space activities. Activities may include equipment that may be operating near the entrance to the confined space or near the ventilation air intake, welding activities in the vicinity of the confined space or the air intake, etc.

Coordination may be as simple as setting up delineators and caution tape or other barriers or more complex as suspending extraneous activities that could adversely affect the integrity of the confined space.

10. Rescue Response

Create a Rescue Plan

Before any confined space entry occurs it is vitally important to create a rescue plan.

Policies and Procedures:

Policies and procedures for confined space rescue must be created and contained in the Confined Space Program.

Equipment:

The following is an example of a confined space rescue equipment inventory

Equipment	Location	Notes
Basket Stretcher		Also used for regular FA services
First Aid Kit		Also used for regular FA services
Blower, hose, electrical cord & GFCI		Dedicated for rescue only
Gas Test Meter		
Rescue Bag		Contains: • 3 x "E" Type harnesses • 4 x 100' rescue ropes • 3 x locking carabineers
Tri-pod, hoist, connectors, and line		• May also be used during entries. • Used at discretion of Team Leader.

Note: FA services, refers to First Aid Services

Training

All personnel who will be part of the confined space rescue team must be adequately trained to carry out such duties.

Drills

Each person designated to be part of the confined space rescue team must participate in an annual drill on emergency rescue.

On Standby

Preparation also means being physically available and ready to conduct a rescue. This means that once a person has been notified that they are on standby to conduct a rescue, they must:

- be readily available, without delay, to respond
- know where the confined space being entered is located and the quickest route to get there
- know their duties on the rescue team
- know where the rescue equipment is located

First Response

Each member of the emergency response team's initial response to a call for confined space rescue is defined as follows:

Rescue Team Leader

Must proceed to incident location directly with radio and/or cell phone. Assess and take responsibility for the situation and call for any emergency services (VFR, ambulance) needed.

Occupational First Aid Attendant (OFAA)

Proceed directly from the First Aid Room with the basket stretcher and jump bag. Provide first aid to injured personnel, under direction of the Team Leader.

Team Members

Assist with assessing the situation, setting-up equipment, rescuing, retrieving or any other actions as directed by the Team Leader and/or OFAA.

It cannot be over emphasized that the Rescue Team Leader initiates the rescue after being contacted by the entry standby person that there is an emergency!

Lockout and Isolation Requirements

Each member of the rescue team that enters a confined space must observe standard lockout isolation requirements, i.e., place your locks on all required lockout points before entering. KEEP IN MIND that rescue may be required because of a failure in applying proper lockout/isolation, or a failure in the lockout/isolation. The Rescue Team must ensure that all hazardous energies and materials are isolated and locked-out prior to entering the confined space.

Assessing the Situation

Key considerations for on-scene assessment have been discussed previously under the heading Hazards and Confined Space Emergencies.

It needs to be emphasized that you need to correctly assess the emergency to distinguish between a High-Risk emergency, Moderate Risk emergency and a Low-Risk emergency. A Low-Risk emergency is where the injuries sustained or other medical conditions (e.g., heart attack) are not related to confined space atmosphere conditions, and do not involve engulfment/entrapment or high-angle rescue.

Under the supervision of the Rescue Team Leader, the Confined Space Rescue Team will:

1. Determine if the injury or collapse of a worker is the result of a hazardous atmosphere, engulfment/entrapment, or if high-angle rescue is required – or is there another condition that caused the injury or worker to collapse? Determine if there is continual ventilation of clean respirable fresh air. Does the gas test meter confirm that there is clean respirable air? If there is any question about the air quality then appropriate respiratory protection must be worn for entry to the confined space.
2. Assess the injured person's level of consciousness and try to get the person to exit the confined space. If the person inside the confined space is acting erratically, instruct them to come out immediately. If they are unconscious, assess further before proceeding.
3. If the person inside requires assistance due to injury or collapse, try and determine the mechanism of injury. Is the cause of the injury obvious? Does the mechanism of injury indicate that it is due to a contaminated atmosphere? Continue to assess further before deciding on an appropriate action.
4. If the worker is connected to a lifeline and harness, attempt to remove them from the confined space. If the person is conscious, and the mechanism and nature of injury is such that the injury will be grossly aggravated, wait for help to arrive. An entry rescue may be a better choice if removal from the space can wait. In these circumstances the Rescue Team Leader may have to decide the best course of action.

Low-Risk Rescue

Members of the Rescue Team may enter into the confined space to render assistance if there is substantial confirmation from your assessments that the atmospheric conditions are safe; there is no engulfment/entrapment hazard, and high-angle rescue is not required. The Rescue Team Members must use a lifeline and harness. The priority is essential first aid only! Exit the confined space as soon as possible.

Moderate-Risk Rescue

The Confined Space Rescue Team must, upon arrival do the following:

1. The Standby Person will brief the Rescue Team Leader when they arrive on site of all information that is known about the incident, injuries and current status.
2. The Standby Person will provide the Rescue Team Leader with as much information as is known about:
   - the nature of the hazards involved
   - physical characteristics/layout of the confined space
   - ventilation of the confined space

- air quality testing that has been done prior to and during entry, and readings that have been taken
- additional contaminants that may be present or introduced into the space during the occupation

High-Risk Rescue

1. The Confined Space Rescue Team must, upon arrival do the following:
   The Standby Person will brief the Rescue Team Leader when they arrive on site of all information that is known about the incident, injuries and current status.
   - The Standby Person will provide the Rescue Team Leader with as much information as is known about:
   - The nature of the hazards involved
   - physical characteristics/layout of the confined space
   - ventilation of the confined space
   - air quality testing that has been done prior to and during entry, and readings that have been taken
   - Additional contaminants that may be present or introduced into the space during the occupation.

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Appendix

Appendix A: Identifying and assessing confined spaces

Appendix B: Confined space entry permit

Appendix C: Written safe entry procedure

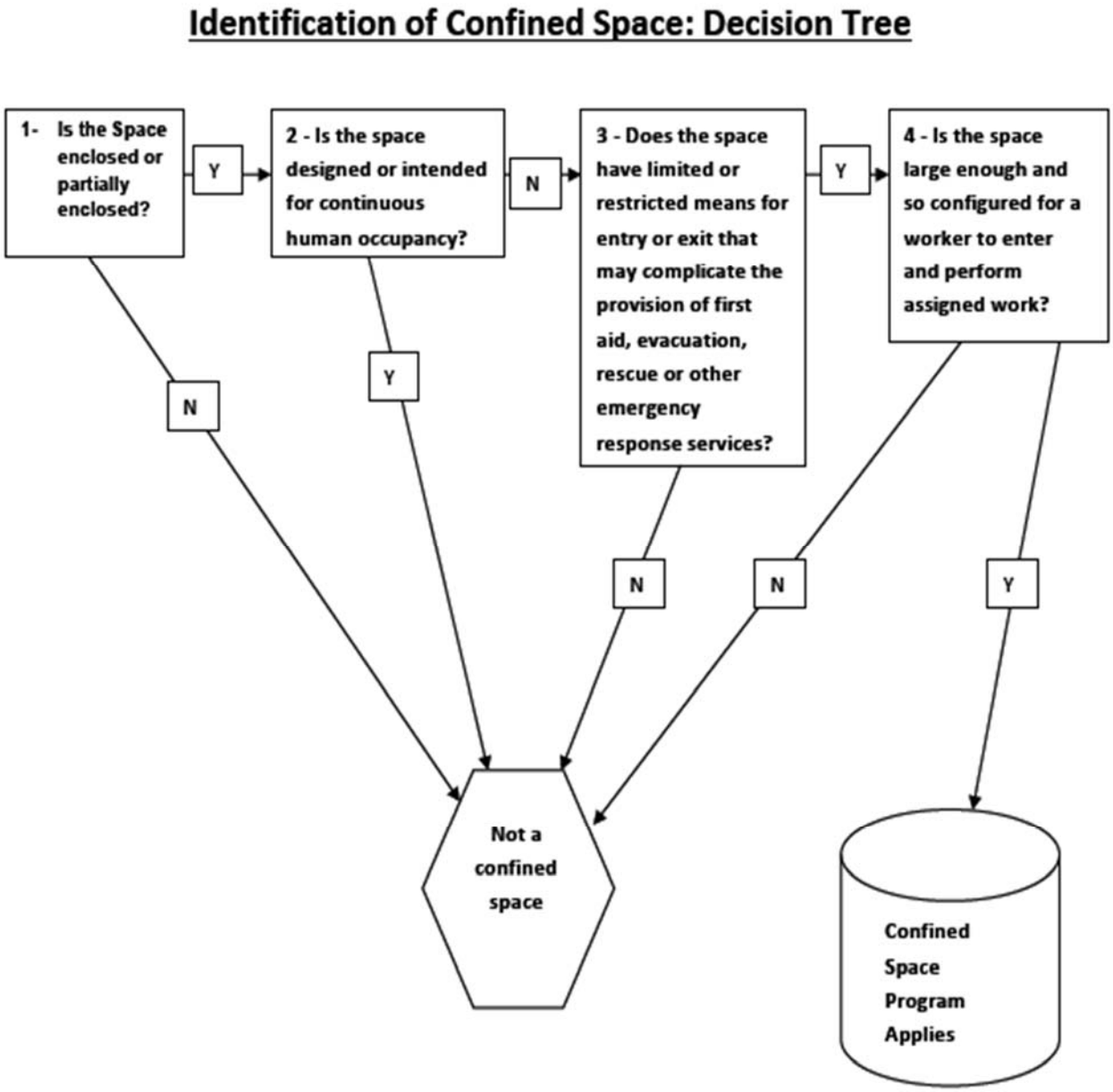
Appendix D: CSE training standard (sample)

Appendix E: Lockout isolation sheet

Appendix F: Confined space equipment

Glossary

Appendix A: Identifying and assessing confined spaces



Confined space assessment

Confined Space Location: _____

Confined Space Description: _____

Date: _____

Note: this form has been completed taking into consideration static conditions and not conditions that may be created by the work to be done. If the space is a process tank or vessel, it has been shut down, drained & prepared for entry/inspection. Any hazards introduced by the task in hand should be covered in the Confined Space Permit and/or special procedures.

Description			
Physical size and shape			
Materials of construction			
Describe contents			
Describe access points			
Describe adjacent spaces, pipelines, etc. if applicable			
Assessment	Y	N	**Explanation**
IS THIS A CONFINED SPACE? (If you answer YES to the next four questions, it is a Confined Space.)			
Is there a limited or restricted means of entry/exit for rescue purposes?			
The space not intended for continuous human occupancy? (Spaces that are intended for human occupancy have an easy access and adequate lighting and ventilation.)			
Is the space enclosed or partially enclosed? (Enclosed enough to restrict ventilation.)			
Is the space large enough for a worker to enter to complete the required work? (It must be big enough to physically get inside and a worker is considered to have entered a confined space once their breathing zone has broken the plane of the confined space.)			
Is this a confined space? (Yes/No)			
Atmospheric hazard rating			
High Hazard - Worker's ability to escape unaided would be impaired upon failure of ventilation system or respirator			

Moderate Hazard - Not clean, breathable air, but not likely to impair worker's ability to escape upon failure of ventilation system or respirator.			
Assessment	Y	N	**Explanation**
Low Hazard - Clean, breathable air as shown by pre- entry testing or otherwise known immediately prior to entry and not likely to change.			
Air Quality In Confined Space			
Is there a potential for oxygen enrichment/deficiency?			
Is there a potential for flammable/explosive gases?			
Is there a potential for toxic gases?			
Additional Hazards			
Are there any energy sources that could cause injury if released? (electrical, mechanical, hydraulic, pneumatic, thermal, steam) If yes, a lockout is required.			
Are there any hazards due to the confined space's design/structure (hidden openings, tight quarters, obstacles, protruding objects, crush hazards, pinch hazards, etc.)?			
Are there any hazards due to the confined space location (traffic, below grade, above grade, nearby power lines)?			
Are there any nearby hazards which may affect this confined space (drawing in air contaminants)?			
Is there any potential for engulfment/immersion?			
Is there potential for entrapment?			
Are there any hazards due to the confined space's materials of construction (fiberglass, leaching, rusting of metal tanks, rotting materials, obstructions, etc.)?			
Are there any hazards due to the confined space's use (toxic, corrosive, or other materials, residues, or purge gases, bridging of materials, etc.)?			
Is there any danger of slipping/tripping?			
Are there any potential skin, ingestion, contact hazards?			
Are there any laser or radioactive measuring devices which need to be locked out prior to entry?			
Is there a danger from falling objects or process materials? If yes, eliminate the hazard or use PPE as appropriate.			
Assessment	Y	N	**Explanation**
Is there a danger from drowning? If yes, specify use of a personal floatation device.			
Are there any noise hazards? (loud tools, hearing injury, communication difficulties) If yes, specify			

Are there any temperature hazards? (hot, cold, wet) If yes, specify appropriate PPE and work schedule.			
Are there any height hazards that require special consideration? (fall arrest harness and lifeline, ladder, scaffolding)			
Is artificial lighting required?			
Control Measures			
Describe atmospheric testing requirement.			
Describe ventilation requirement.			
Describe Standby person requirement.			
What are the PPE requirements (if any)? (Rubber clothing, rubber boots, face shield, goggles, harness and lifeline, respirator, hardhat, hearing protection, etc.) Specify.			
Indicate communication method. Briefly describe the method.			
Are there any other sources of energy not covered by the lockout procedure?			
Are there any other hazardous conditions that need to be considered?			
Activities Normally Completed In The Space: Describe			
Hazard Rating: Low: Moderate: High: Excluded Space:			
Confined Space Permit Required: Yes No			

Insert photos or drawings of confined space:	
Evaluated by:	
Reviewed By (Confined Space Administrator):	
Comments:	

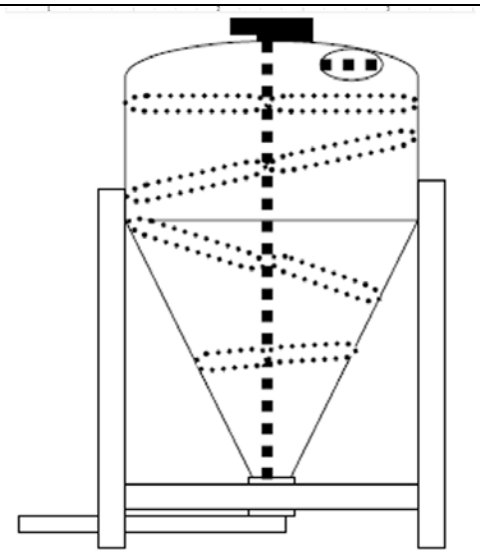
Confined Space Assessment (Sample)

Confined Space Location:	North East Building		
Confined Space Description:	Stainless Steel Tank		
Date:	April 27, 2011		
Note: this form has been completed taking into consideration static conditions and not conditions that may be created by the work to be done. If the space is a process tank or vessel, it has been shut down, drained & prepared for entry/inspection. Any hazards introduced by the task in hand should be covered in the Confined Space Permit and/or special procedures.			
Description			
Physical size and shape		Approx. 16 ft. x 9ft dia. cylindrical/conical extraction tank with a shaft running from top to bottom of the tank supports, horizontal agitator paddles and an auger at the bottom of the vessel. (refer to attached drawing)	
Materials of construction		Stainless steel construction	
Describe contents		Typically contain ethyl alcohol	
Describe access points		Accessed via a 2ft-dia. inspection hatch located at the top of the vessel.	
Describe adjacent spaces, pipelines, etc. if applicable		Charged by removable hoses from adjacent tank	
Assessment	**Y**	**N**	**Explanation**
Is This A Confined Space? (If you answer YES to the next four questions, it is a Confined Space.)			
Is there a limited or restricted means of entry/exit for rescue purposes?	X		
The space is not intended for continuous human occupancy? (Spaces that are intended for human occupancy have an easy access and adequate lighting and ventilation.)	X		
Is the space enclosed or partially enclosed? (Enclosed enough to restrict ventilation.)	X		
Is the space large enough for a worker to enter to complete the required work? (It must be big enough to physically get inside and a worker is considered to have entered a confined space once their breathing zone has broken the plane of the confined space.)	X		
Is this a confined space? (Yes/No)	X		
Atmospheric Hazard Rating			
High Hazard -Worker's ability to escape unaided would be impaired upon failure of ventilation system or respirator.			
Assessment	**Y**	**N**	**Explanation**

Moderate Hazard -Not clean, breathable air, but not likely to impair worker's ability to escape upon failure of ventilation system or respirator.	X		Vapour from residual alcohol in vat and possible cleaning materials can contribute to diminished air quality in the space
Low Hazard - Clean, breathable air as shown by pre- entry testing or otherwise known immediately prior to entry and not likely to change.			
Air Quality In Confined Space			
Is there a potential for oxygen enrichment/deficiency?	X		Cleaning chemical and lack of ventilation can contribute to oxygen deficiency
Is there a potential for flammable/explosive gases?	X		Residual alcohol and cleaning chemicals can contribute to flammable/explosive gases
Is there a potential for toxic gases?		X	
Additional Hazards			
Are there any energy sources that could cause injury if released? (electrical, mechanical, hydraulic, Pneumatic, thermal, steam) If yes, a lockout is required.	X		Mechanical internal auger/agitator motor must be locked out.
Are there any hazards due to the confined space's design/structure (hidden openings, tight quarters, obstacles, protruding objects, crush hazards, pinch hazards, etc.)?	X		The space is conical in shape with an internal auger/agitator with horizontal paddles that can tangle lifelines. The
Are there any hazards due to the confined space location (traffic, below grade, above grade, nearby power lines)?	X		The vat access is located on the top vat (approx. 18ft above the ground) without guardrails or other fall protection
Are there any nearby hazards which may affect this confined space (drawing in air contaminants)?	X		Natural gas powered mobile equipment operate in area when maintenance is being conducted.
Is there any potential for engulfment/immersion?		X	
Is there potential for entrapment?		X	
Are there any hazards due to the confined space's materials of construction (fiberglass, leaching, rusting of metal tanks, rotting materials, obstructions, etc.)?		X	
Are there any hazards due to the confined space's use (toxic, corrosive, or other materials, residues, or purge gases, bridging of materials, etc.)?	X		Residual ethyl alcohol may be present; also cleaning chemicals may pose a hazard.
Is there any danger of slipping/tripping?	X		Due to the interior configuration, workers will have to stand on the auger/agitator paddles which are smooth and can be slippery.
Are there any potential skin, ingestion, contact hazards?	X		
Are there any laser or radioactive measuring devices		X	
Which need to be locked out prior to entry?	X		

Is there a danger from falling objects or process materials? If yes, eliminate the hazard or use PPE as appropriate.	X		
Assessment	**Y**	**N**	**Explanation**
Is there a danger from drowning? If yes, specify use of a personal floatation device.		X	
Are there any noise hazards? (loud tools, hearing injury, communication difficulties) If yes, specify	X		Noise created while using high pressure water hoses to spray inside of vessel
Are there any temperature hazards? (hot, cold, wet) If yes, specify appropriate PPE and work schedule.		X	
Are there any height hazards that require special consideration? (fall arrest harness and lifeline, ladder, scaffolding)	X		Fall protection harness and lifeline must be used due to internal configuration and elevation of access point (18ft)
Is artificial lighting required?	X		Intrinsically safe lighting must be used due to alcohol residue

Control Measures	
Describe atmospheric testing requirement.	Use of a multi---gas detector is required: CO, LEL, O2, H2S
Describe ventilation requirement.	Intrinsically safe blower fan, flex duct, saddle vent
Describe Standby person requirement.	Must be trained in: confined space entry and rescue, multi---gas detector use, permit documentation
What are the PPE requirements (if any)? (Rubber clothing, rubber boots, face shield, goggles, harness and lifeline, respirator, hardhat, hearing protection, etc.) Specify.	Disposable cover---all, rubber boots, face shield, harness and lifeline
Describe communication method. Briefly describe the method.	Due to the location of the access hatch and internal configuration visual & verbal communication with suffice.
Are there any other sources of energy not covered by the lockout procedure?	N/A
Are there any other hazardous conditions that need to be considered?	Due to the potential for the presence of residual alcohol, non--- sparking and intrinsically safe tools and equipment must be used in the space.

Activities Normally Completed In The Space: Describe
Cleaning of equipment is conducted between batches and usually involves the use of high pressure water hoses to wash the interior of the vessel; however chemical cleaners are occasionally used in the cleaning process.
Hazard Rating: Low: Moderate: ☑ High: Excluded Space:
Confined Space Permit Required: Yes ☑ No
Insert photos or drawings of confined space:

Evaluated by: Andrew McKenzie, CRSP
Reviewed by (confined space administrator): Joe Blowsky
Comments:

Appendix B: Confined Space Entry Permit

Confined Space Entry Permit

Permit must be signed by each affected employee at the beginning of every shift. Permit is to be posted at every confined space entrance.

Date:	Time of initial entry:	Estimated duration of entry:
Location/Description of Space:		
Reason for entry:		
Description of work to be completed:		
Issued to:		
Supervisors name:	Supervisor signature:	

Atmospheric Testing	Pre-entry Test	Follow-up Tests								Performed by (initial)
Time										
Oxygen 19.5% - 23%										
Explosive/Combustibles (LEL)										
CO (Carbon Monoxide)										
H2S (Hydrogen sulphide)										

Make & Model of Meter		Calibration Date	

Procedure Checklist	Protective Equipment Required
Ensure Confined Space is Locked---out/isolated/blanked off	Harness & lifeline & rescue equipment available and verified in good order
Ensure atmosphere in Confined Space has been tested	P.P.E.--- identify
Emergency rescue plan in place and communicated	Respiratory protection
Qualified Confined Space Entry Watch available	Spark proof tools
Entry Plan reviewed with all team members entering the confined space	Air purge equipment
	Fire protection
Pre-Entry Hazard assessment completed and reviewed with all participants and attached to permit.	Atmospheric monitoring equipment appropriate for hazards and inspected prior to use.
Confined Space Assessment reviewed with all participants and attached to permit	12 V extension – GFIC's

Entry plan review and worker signatures:

Entry Record – Record all entry and exits for the confined space.

Rescue & Emergency Procedures: (list the procedure in this space)

Communication Procedures: (list the procedures in this space)

Roles and Responsibilities:

Entry Supervisor		
Authorized Entrant(s)		
Authorized Standby Person		
Qualified Tester:		
Rescue Team Leader		
PERMIT CANCELATION & CLOSURE: Permit closed and all space conditions and equipment returned to normal operation on:		
Date:		Time:
Entry Supervisor:	(Print)	(Sign)

Appendix C: Written Safe Entry Procedure

	STANDARD OPERATING PROCEDURE	
TITLE: Generic C.S.E. Procedures	NUMBER: CSE001.001	PAGE 45 OF 9
WRITTEN BY: Andrew M[c]Kenzie, CRSP	DATE:	
APPROVED BY:	DATE:	
QA APPROVAL:	DATE:	EFF. DATE: April 27, 2011

This package includes:

1. Purpose

This plan establishes proper guidelines and general precautions required for protecting workers when entering a confined space. It defines responsibilities and practices for evaluating the work areas and developing the proper procedures and permit for safe entry. It establishes requirements for confined space entry at the ACME facility for compliance with Part 9 of the WorkSafeBC OHSR.

2. Scope

This procedure is designed for use by ACME Staff or outside contractors entering into identified confined spaces within the ACME facilities for the purposes of cleaning or maintenance.

3. Definitions

Confined Space means an area, other than an underground working, that:

a. Is fully or partially enclosed
b. Is not designed, intended, or capable of sustaining continuous human occupancy
c. Has limited or restricted means of entry or exit which may complicate the provision of first aid, evacuation, rescue, or other emergency response
d. Is large enough and so configured that a worker could enter to perform assigned work

See Glossary of Terms for additional definitions

4. Frequency

This procedure shall be followed whenever any entry into the Confined Space for cleaning or maintenance is to be performed by any person working for ACME (ACME employees or outside contractors).

5. Documentation Requirement

- Hazard assessment
  - Confined space entry permit
  - Rescue/entry equipment checklist
  - Material Safety Data Sheets (MSDS's)
  - Rescue plan
- Confined Space Rescue Command Checklist
- Confined Space Entry and Rescue Incident Command System Worksheet
- Confined Space Entry and Rescue Tactical Log

6. Equipment

- Lockout
- Personal Protective Equipment (PPE)
- Air Monitoring Equipment
- The air monitor must be equipped with sensors to detect flammables, oxygen, and hydrogen sulphide. The monitor available from the "supply room" should be fitted with the required sensors. Check with the technician prior to use to be sure the correct sensors are installed and the monitor is calibrated and bump tested. Prior to use in the space, use the monitor in a clean air environment to be sure the reading shows 20.9% oxygen and 0% flammables and 0 ppm hydrogen sulphide. Prior to entry and prior to ventilating ensure the monitor (using the 15' hose and pump mechanism) draws air from inside the space across the sensors on the monitor. Ensure enough time for the air to travel from the space, through the hose, and across the sensors. If readings are 20.9% oxygen, 0% flammables and 0 ppm hydrogen sulphide then entry can proceed. Ventilate if the readings are not within the acceptable range. The first worker to enter should take the end of the air monitor hose into the area where work will be done.
- Ventilation Equipment
- Ventilation fan
- Hose
- Hose duct
- Other related equipment

Any ventilator used must provide no less 20 air exchanges per hour.

Example: For a space with a volume of 2000 cubic feet we use the formula of:

$$\text{20 Air Changes / hour} = \frac{\text{(Fan capacity: in Cubic feet per minute) X (60 minutes per hour)}}{\text{Space Volume in cubic feet}}$$

Or (20 AC/H X 2000 Cu Ft) / 60 min = 670 CFM

Which mean it would require the fan to move a minimum of 670 cubic feet per minute to ensure adequate ventilation to the space.

Note: Bends in the air hose will reduce the amount of air getting into the space.

Prior to Entry

If there is an indication that the air inside the space is not clean breathable air (less than or greater than 20.9% oxygen, or greater than 0% flammables, or greater than 0 ppm hydrogen sulphide), blow air into the space until levels are 20.9% oxygen, 0% flammables, and 0 ppm hydrogen sulphide.

1. Use positive pressure ventilator, available from the tool crib and marked with a yellow tag. Attach the 8" diameter 15 foot long yellow hose to the positive pressure side. This supplies 700 cfm.
2. Set up the air intake 10 feet away from the entranceway, use a hose on the inlet side if necessary, to prevent recirculation of the contaminated air.
3. Set up the air intake away from any internal combustion engines or other contaminant generating equipment.
4. Place air hose to blow fresh air beside workers in the space.

Entrance/Extrication Equipment

- Harness(s) Shoulder D---Ring style
- Rescue rope rigging system
- Tripod or boom
- Rescue sling

Misc. Equipment

- Fire extinguisher (s)
- Intrinsically safe lighting
- Non sparking/static free tools
- First aid kit

7. Entry Procedures

Responsibility # **Action**

7.01 Any person entering the confined space only qualified workers and personnel educated and trained in confined space entry techniques are allowed to enter into confined spaces.

7.02 Review and discuss the hazard assessment (refer to Appendix 1) with all confined space entrants, standby person and rescue team members to ensure that all are familiar with the all aspects of the confined space to be entered.

7.03 Discuss emergency procedures with all workers involved in the confined space entry. (Refer to Section 8)

7.04 Assign and discuss duties with each person involved in the confined space entry; each worker involved shall be provided with a duty package which will include a description of what the responsibilities of duty are and a copy of any check lists or logs required for that duty (refer to Appendix 3)

- Who will be entering the confined space
- Who will be the standby person
- Who will perform the air monitoring (this can be taken care of by the standby person)
- Who will be performing the ventilation of the space before and during the entry (this can be taken care of by the standby person)
- Who will be in charge of communications (this can be taken care of by the standby person)

7.05 Assign and discuss rescue duties with each worker. (Refer to Appendix 3)

- who will be incident commander during a rescue
- who will be the operations officer during a rescue
- who will be performing the rescue during a rescue
- who will perform the air monitoring during a rescue
- who will be the air supply officer during a rescue
- who will be performing the ventilation of the space during a rescue
- who will be in charge of communications during a rescue
- who will be the resource officer in charge of information and equipment control during a rescue
- who will be responsible for first aid

7.06 Assemble and inspect all equipment using the rescue/entry equipment checklist (refer to Appendix 4)

7.07 Ensure that electrical lockout/tag out and/or pipe blanking has been put in place as required.

7.08 Calibrate air monitoring equipment for ethanol and record the date, time, who performed the calibration and any abnormalities observed. (Refer to Appendix 4)

7.09 Perform initial atmospheric test of confined space environment with air monitoring equipment and record results (remember to allow time for gases to reach meter). (Refer to Appendix 4)

7.10 Record any hazards observed that are not listed in the initial hazard assessment. (Refer to Appendix 6)

7.11 Install ventilation equipment into space and ventilate space for 10 to 20 minutes depending on the size of the space.

7.12 Retest the atmosphere within the confined space to determine if the atmosphere is within safe limits. Between 19.5% to 23.5% Oxygen, less than 20% of LEL

7.13 If space atmosphere is not within safe limits, ventilate space for further 10 to 20 minutes and retest atmosphere (remember to allow time for gases to reach meter).

7.14 Prior to space entry, workers should have donned personal protective equipment (refer to appendix 8)

7.15 Before workers enter the space a final check must be performed on each entry worker to ensure that they are properly equipped for the entry (i.e. the harness is properly donned, the air supply is properly attached, etc.)

7.16 The standby person must keep periodic contact with the entry worker and continually monitor atmospheric conditions, recording the results every 15 minutes. (Refer to appendix 6)

7.17 All rigging, which includes air lines, rescue/entry ropes, communication wires, must be kept as untangled as possible by the standby person.

7.18 If the atmosphere within the space reaches a dangerous level, such that the oxygen level goes below 19.5% oxygen or the LEL reaches above 20%, the standby person must alert the space worker(s) and have them leave the space if the situation cannot be immediately rectified. The space must then be ventilated once again and atmospheric testing must be performed. Once safe atmospheric levels are achieved, the workers can once again re---enter the space and continue the work.

7.19 If the work permit expires before the work is complete, the worker(s) must be removed from the space and a new work permit must be issued before workers can re---enter the space.

7.20 After the workers are complete in the confined space, the space must be cleared of all personnel and equipment before returning the space to normal operation.

7.21 Once the space is returned to normal operating condition, the entry permit is to be returned to the permit authorizer for filing. All forms and records taken during the entry must be also be reviewed and filed.

7.22 All confined space equipment must be cleaned and inspected for damage before putting into storage after each confined space entry.

7.23 Any abnormal conditions observed during the confined space entry, must be investigated and corrective action taken and discussed before next confined space entry.

8. Confined Space Rescue Procedures

Responsibility # **Action**

For Confined Space Rescuers

8.1 Review and discuss the hazard assessment (refer to Appendix 1) with all confined space rescuers prior to confined space work, to ensure that all standby persons and rescue team members are familiar with all aspects of the confined space to be entered.

8.2 Assign and discuss duties with each person involved in the confined space rescue; each worker involved shall be provided with a duty package which will include a description of what the responsibilities of duty are and a copy of any check lists or logs required for that duty (refer to Appendix 3)

Discuss:

- who will be incident commander during a rescue
- who will be the operations officer during a rescue
- who will be performing the rescue during a rescue
- who will perform the air monitoring during a rescue
- who will be the air supply officer during a rescue
- who will be performing the ventilation of the space during a rescue
- who will be in charge of communications during a rescue
- who will be the resource officer in charge of information and equipment control during a rescue
- who will be responsible for first aid

8.3 Assemble and inspect all equipment using the rescue/entry equipment checklist (refer to Appendix 4)

8.4 Calibrate air---monitoring equipment and record the date, time, who performed the calibration and any abnormalities observed. (Refer to Appendix 4)

8.5 Each member of the rescue team must be provided with a list of their duties and must be clear on these duties prior to initial worker entry.

8.6 In the event of an emergency, the standby person must alert rescue workers with an air horn.

8.7 The ventilation in the confined space must be increased and if possible a retrieval of the worker from the outside must be attempted.

8.8 Upon arrival, the rescue team must assume their assigned duties as per pre---entry discussion and prepare the site for entry and rescue.

8.9 The standby person must brief the rescue team of the nature of the emergency situation.

Responsibility #	Action

For Confined Space Rescuers

8.10 Atmospheric monitoring must continue throughout the rescue (refer to Appendix #)

8.11 All rigging, which includes air lines, rescue/entry ropes, communication wires, must be kept as untangled as possible by the standby person.

8.12 Before and after entry into the confined space, the rescuers must first consider the risks to themselves before commencing with the rescue.

8.13 If the atmosphere within the space reaches a dangerous level, for instance the LEL reaches above 20%; the standby person must alert the rescuers and have them leave the space if the situation cannot be immediately rectified. The space must then be ventilated once again and atmospheric testing must be performed. Once safe atmospheric levels are achieved, the rescuers can once again re---enter the space and continue the rescue.

8.14 If at any time a rescuer becomes fatigued or overcome with stress the rescuers must be brought out and a second team sent in.

8.15 Constant communication must be maintained at all times with the rescuers.

8.16 Rescuers must perform an initial medical assessment prior to packaging and extricating the injured worker.

8.17 During extrication care must be taken not injure or put rescuers in harm's way.

8.18 Once the injured worker and the rescuers have cleared of the confined space, medical attention must be administered as required.

8.19 All equipment must be disassembled, cleaned, inspected for damage and stored and the confined space sealed pending an investigation.

8.20 The entry permit is to be returned to the permit authorizer for filing. All forms and records taken during the entry must be also be reviewed and filed.

8.21 All rescue members and worker must be de---briefed as soon as possible after the rescue is complete for the purpose of discussing the events of the rescue and the emotions of the rescuers.

8.22 An investigation must be performed as soon as possible after the incident to determine the cause and put forward recommendations.

9. Procedure Signoff

I have read and will comply with the above Standard Operating Procedure:

Name	Signature	Date

Appendix D: CSE Training Standard (Sample)

CSE Training Standard (Sample)

Purpose

The following standards will be used to assess suitability of training provided by internal and external confined space training providers. It will allow for flexibility of training delivery while meeting the need for ensuring key skills and knowledge are provided through the training delivery.

Each Objective and Key Topic must be included in the training delivered by the training service provider. Mandatory Knowledge and Skills Requirements must be verified through appropriate testing/confirmation methodology.

Training Standards

Topic: Awareness of Confined Spaces and Hazards

Audience: All personnel that need to be aware of locations and hazards of confined spaces, but who will not necessarily enter into a confined space.

Objectives:

Inform personnel of the need for caution when dealing with confined spaces.

Inform personnel that confined spaces are hazardous and require special considerations prior to entry.

Increase knowledge of what a confined space is, and how to identify confined spaces on site.

Key Topics:

- Definition of a confined space.
- WCB OHSR, Part 9 (overview/awareness).
- Reasons why confined spaces require extra precautions.
- ACME's Confined Space Entry Program (general overview).
- Typical confined spaces found at ACME

Mandatory Knowledge and Skills Requirements:

At the completion of this training, participants will be able to demonstrate that they can:

- Identify a confined space by how it is marked and by definition of a confined space.
- Explain why confined spaces are hazardous and why entry is restricted.
- Describe who is permitted to enter a confined space.
- Identify the regulatory and program requirements that define safe confined space entry

Topic: Safe Confined Space Entry

Audience: All personnel supervising, entering, or monitoring entry into a confined space.

Objectives:

- Inform personnel of internal program standards and regulatory requirements.
- Train personnel so they have the required skills and knowledge to conduct safe confined space entry
- Inform personnel of the general hazards to be considered when entering a confined space, and the specific hazards of confined spaces
- Equip personnel with the skills required to correctly use the Permit system.

Key Topics:

- WCB OHSR, Part 9 – regulatory requirements.
- Confined Space Entry Program requirements.
- Confined space hazards including high risk hazards that are the three most frequent fatality producing conditions (atmosphere contaminated with CO, CO2, or H2S), oxygen deficient atmosphere, and explosive/flammable atmosphere).
- Hazard assessment and safe entry procedure requirements -general & specific to ACME
- The confined space entry permit system.
- Purging and ventilating requirements
- Lockout/Isolation requirements.
- Safe confined space entry procedure.
- Atmospheric Testing - equipment & protocols.
- Standby person duties including logging entry/exit, monitoring for well-being and recording gas test results.
- Exiting the space and putting back into service.
- Emergency situations and protocols.

Mandatory Knowledge and Skills Requirements:

At the completion of this training, participants will be able to demonstrate that they can:

- Complete and post an entry permit when required for permit required confined spaces.
- Understand and interpret hazard assessments and safe entry procedures.
- Control access points to prevent unauthorized entry when applicable.
- Correctly isolate hazardous energy sources prior to entry into confined spaces.
- Recognize the need to remove materials from conveyances if they pose a hazard to workers.
- Conduct appropriate cleaning and/or purging before entry as per entry procedures.
- Conduct appropriate pre-entry atmosphere (gas) testing and record results.
- Conduct pre-entry testing appropriate for the expected contaminants (as per hazard assessment).
- Correctly identify conditions when the confined space should not be entered, e.g., if the gas testing show contaminants are above acceptable levels, isolation is incomplete, etc.
- Conduct and record atmosphere tests at appropriate intervals.

- Use ventilation equipment so that the confined space is continually vented with clean breathable air supplying at least 50cm per entrant.
- Identify and correctly apply alternatives to continuous mechanical ventilation.
- Perform the duties of a standby person when required, including as a minimum:
  - Checking/monitoring the well-being of entrant(s) at appropriate intervals
  - Positioning at/nearby entry point, as is appropriate for hazard rating
  - Using suitable means to summon assistance, i.e., proper communications
  - Know the correct emergency protocols to follow
- Use the proper personal protective equipment and clothing suitable for the hazards.
- Use remote rescue/lifting equipment (lifeline, harness, etc.) when required by entry procedures.
- Take appropriate actions to ensure lifelines do not become entangled.
- Identify the need to remove torches and hoses used for welding, brazing or cutting from the space when not in use and when the space is vacated.
- Identify the need to use appropriate electrical tools inside the space that are of the right type and design (CSA, grounded).
- Identify conditions when a GFCI must be used for electrical equipment, i.e., wet/damp situations.
- Identify when only non-sparking tools are to be used in confined spaces, i.e., when there may be flammable or explosive gases, vapours, or liquids.

Topic: Confined Space Entry Supervision

Audience: Personnel with confined space entry supervisory responsibility.

Objectives:
Equip confined space supervisory personnel with the skills and knowledge required to effectively supervise confined space entry.

Key Topics:

- Confined space supervisory responsibilities.
- Issuing permits for permit required confined spaces and when permits are not required.
- Pre-entry meetings.
- Verification of training of confined space personnel.
- Verification of confined space lockout/isolation requirements.
- Monitoring/checking confined space entry.
- Ending entry and cancelling the permit.
- Permit record keeping requirements.
- Supervising contractors conducting confined space entry on site.

Mandatory Knowledge and Skills Requirements:

At the completion of this training, participants will be able to demonstrate that they can:

- Explain their responsibilities as confined space entry supervisors in accordance with the legal requirements and the Confined Space Entry Program.
- Complete and issue Confined Space Entry Permits.
- Identify permit required and non---permit required confined spaces, and explain the conditions that create the need for a permit to be issued prior to entry.
- Conduct pre---entry meetings appropriate for the hazards, safe entry procedures, and training/abilities of entry personnel.
- Evaluate the training/abilities of confined space entry personnel.
- Inspect/audit and evaluate the effectiveness and appropriateness of confined space isolation/lockout.
- Conduct checks of confined space entries at intervals that are appropriate for ensuring entries are done in accordance with legal requirements and program requirements.
- Review, amend and end permits.
- Keep appropriate records including proper filing of Confined Space Entry Permits.
- Inspect and evaluate confined space entries conducted by contractors to ensure compliance with legal requirements and the Confined Space Entry Program.

Appendix E: Lockout Isolation Sheet

Lockout Isolation Sheet

Date:	
Seal Number:	

Seal Number		Reason for Removal	
Seal Number		Reason for Removal	
Seal Number		Reason for Removal	
Seal Number		Reason for Removal	
Seal Number		Reason for Removal	

Colour	Control Lockout Point	Lockout method	Initial 1	Initial 2

NOTE: Secure lock box with personal locks ONLY and remove locks at the end of shift!

	Print	*Sign*
Operator #1		
Operator #2		
Supervisor		

SteamBoiler #2 Lockout Isolation Sheet (Sample)

Date:	April 21, 2011
Seal Number:	2011240412345

Seal Number		Reason for Removal	
Seal Number		Reason for Removal	
Seal Number		Reason for Removal	
Seal Number		Reason for Removal	
Seal Number		Reason for Removal	

Colour	Control Lockout Point	Lockout method	Initial 1	Initial 2
RED	Forced draft fan	Scissor locked off		
RED	Steam drum stop & check valve	Chained shut		
RED	Gas supply valve	Chained shut		
RED	Feedwater isolation valve (before control valve)	Chained shut		
RED	Fuel oil supply valve	Chained shut		
RED	Fuel oil air/steam atomizing valves	Chained shut		
RED	Chemical injection line	Disconnected		
RED	Safety valve #1	Blanked		

NOTE: Secure lock box with personal locks ONLY and remove locks at the end of shift!

	Print	*Sign*
Operator #1		
Operator #2		
Supervisor		

Appendix F: Confined Space Equipment

Confined Space Equipment

The following is a list of equipment necessary for safe confined space entry. This will include but may not be limited to the following:

Rescue and retrieval equipment including:

- Tripod and hoist
- Life line
- Full body harness
- Appropriate respiratory protection (air purifying , air supply or scba)
- First aid equipment
- Fire extinguisher(s)

Equipment for purging and ventilating the space including:

- Ventilation blower
- Collapsible hose
- Power cable
- Gas detection equipment includes:
  - Gas detector (typically o2, co, h2s, lel)
  - Calibration tools, equipment & gases
  - Extension hoses/tubing and wands
  - Intake filters
- Communications equipment (intrinsically safe when required) personal protective equipment and clothing as may be required for the hazards:
  - Respirators
  - Gloves
  - Hi---vis clothing/vest
  - Fall arrest or restraint equipment
  - Eye protection
  - Hearing protection
  - Special tools as required, e.g., non-sparking, intrinsically safe

Other safety equipment as may be required such as:

- Lockout devices to ensure isolation procedures
- Barriers or guardrails around openings
- Ground fault circuit interrupters (gfci) used for all electrical equipment used inside a confined space

If confined space entry and rescue is to be safe and effective the use of specific equipment intended for these activities is essential. Specific equipment requirements for each entry scenario will be discussed in the Hazard Assessment and Safe Confined Space Entry Procedures.

Special equipment requirements not elsewhere specified is as follows:

Gas Testing

Standard gas detectors for confined spaces are multi-gas detectors that measure:

CO – Carbon Monoxide
O2 – Oxygen
H2S – Hydrogen Sulphide Gas
LEL – Lower Explosive Limit

Equipment must calibrated by a qualified person in accordance with the manufacturer's instructions. A "bump-test" must be completed before each day's use to ensure that calibration is within allowable tolerances.

Air Purifying Respirator/Supplied Air Respirator/Self-Contained Breathing Apparatus (SCBA).

This equipment must be checked prior to each use and only used by trained and authorized personnel. It is only to be used for entry rescue if personnel have been trained in confined space entry rescue and those personnel authorized to conduct this type of work. The location of this equipment is as follows:

Communication Equipment (Walkie-Talkies)

Checking prior to each use is required. A radio check must be performed and if the equipment is not working it must be replaced with equipment that does work. Any communications equipment used in an atmosphere where there may be flammable gases, vapours or dusts must be intrinsically safe, i.e., rated for use in Class I & II environments.

Life-lines, Harnesses and Lowering/Lifting Equipment

Prior checking before each use is essential to ensure it is safe and in good condition. Harnesses and lifelines used for lowering/lifting personnel must be rated for such use. Any harnesses and life---lines only rated for fall protection must be removed from service and inspected in accordance with the manufacturer's specification if used for lowering/lifting. Harnesses, life---lines and lowering/lifting equipment must be rated for lowering/lifting, and also rated for fall arrest if lowering/lowering where there is a fall from heights hazard.

Ventilation

The commonly accepted method for ventilating a confined space is a portable ventilation blower. It is essential that the air blown into the space must be "clean breathable air" – there must be no less than 20 air exchanges per hour in the space. The control of air contaminants in the confined space can be enhanced by augmenting the air blown into the confined space with exhaust ventilation (Note: exhaust ventilation DOES NOT replace the need to blow clean air into the space). Natural ventilation can be used provided that it is shown through measurement that the required air flow (20 air exchanges per hour) is present.

20 air exchanges per hour can be calculated using the formula:

$$\text{20 Air Changes / hour} = \frac{\text{(Fan capacity: in Cubic feet per minute) X (60 minutes per hour)}}{\text{Space Volume in cubic feet}}$$

Glossary

Asphyxiant
A vapour or gas that can cause unconsciousness or death by suffocation (lack of oxygen). There are two classes of asphyxiates: simple asphyxiates such as nitrogen or methane that act by replacing oxygen in the air, and chemical asphyxiates such as carbon monoxide that cause asphyxiation by preventing the body cells from using the oxygen in the blood.

Assessment
An assessment of hazards with respect to one or more confined spaces in a workplace.

Atmospheric Hazards
The accumulation of flammable, combustible or explosive agents

Atmospheric Testing
Testing of the atmosphere in the confined space to identify oxygen levels, lower explosive limits (LEL) and the presence of any potentially hazardous airborne contaminants. This must be done by a qualified person with the training and experience to calibrate, operate and monitor testing equipment and interpret the readings. This testing must be done as often as necessary before and while a while a worker is in a confined space to ensure that acceptable atmospheric levels are maintained in the confined space in the relevant confined space plan.

Blanking or Blinding
The absolute closure of adjacent piping, by fastening across its bore a solid plate or cap that completely covers the bore and that is capable of withstanding the maximum pressure of the adjacent piping.

Bump Test
A bump test verifies calibration by exposing the instrument to a known concentration of test gas.

Calibration
The act of ensuring that a piece of equipment is pre-set to manufacture specifications and applications stand as appropriate.

Clean, Breathable Air
Used to describe the atmosphere inside a confined space, means an atmosphere which is equivalent to clean, outdoor air and which contains:

- About 20.9% oxygen by volume
- No measurable flammable gas or vapour as determined using a combustible gas

- No air contaminant in concentrations exceeding either 10% of its applicable exposure limit in or an acceptable ambient air quality standard established by an authority having jurisdiction over environmental air standards, whichever is greater.

Confined Space
A confined space is, except as otherwise determined by WorkSafeBC, means an area, other than an underground working, that:

- Is enclosed or partially enclosed,
- Is not designed or intended for continuous human occupancy,
- Has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service
- Is large enough and so configured that a worker could enter to perform assigned work.

Confined Space Entry Permit
A permit that ensures that pre-entry preparations outlined in the standard have been completed prior to entry into a confined space.

Contaminant
A harmful or irritant material, or nuisance dust, foreign to the normal composition of a substance, or a material that varies the normal proportions of components in a mixture such as air.

Continuous Monitoring
Continuous atmospheric testing of a confined space, while workers are in the space, to identify concentrations of gas, oxygen, and explosives.

Disconnecting
Physically disconnecting adjacent piping from a confined space to prevent its contents from entering the space in the event of discharge.

Engineering Controls
The physical arrangement, design, or alteration of workstations, equipment, materials, production facilities, or other aspects of the physical work environment, for the purpose of controlling risk.

Entering a confined Space
A worker has entered a confined space when the worker's breathing zone breaks the plane of an opening into the confined space.

Entry Supervisor
A person tasked with the responsibility to organize the confined space work and its performance. This person understands the nature of the work, the hazards associated with the work and the method used to control the identified hazards. This person is also familiar with the regulations that apply with to the work to be performed.

Entrapment and Crushing
The act of being engulfed in a liquid or free flowing solid; death usually occurs by asphyxiation when the lungs are compressed to the point where the victim cannot breathe.

Flammable Gas
A substance which meets the criteria for WHMIS Class B Division 1 flammable gas (a compressed gas with an upper flammable limit of 13% or less or with an explosive range of 12% or more).

Harmful Substance
A WHMIS controlled product or a substance which may have a harmful effect on a worker in a confined space.

Hazard
A thing or condition that may expose a person to the risk of injury or occupational disease.

Hazard Assessment
Hazard identification and risk assessment of a confined space conducted by a qualified person.

High Hazard Atmosphere
An atmosphere that may expose a worker to risk of death, incapacitation, injury, acute illness or otherwise impair the ability of the worker to escape unaided from a confined space, in the event of a failure of the ventilation system or respirator.

Hot Work
Work that is capable of producing a source of ignition.

IDLH Atmosphere

An atmosphere containing a substance at a concentration that is immediately dangerous to life or health (IDLH) because the concentration is greater than that from which one could escape without any impairing symptoms or irreversible health effects, and includes an atmosphere with an unknown concentration with the potential to be immediately dangerous to life or health.

Inserting
Intentionally flooding the atmosphere inside a confined space with an inert gas such as nitrogen to eliminate the hazard of ignition of flammable vapours inside the confined space but thereby creating an oxygen deficient atmosphere.

Intrinsically Safe
To ensure something is intrinsically safe refers to ensuring an electrical apparatus is designed so that it is unable to release sufficient energy, by either thermal or electrical means, to cause an ignition of a flammable gas.

Lockout/Tag out
The process of de-energizing energy sources and ensuring re-activation does not occur by applying locking devices to control and identification of the individual attaching the locking source.

Low Hazard Atmosphere
An atmosphere which is shown by pre-entry testing or otherwise known to contain clean breathable air immediately prior to entry to a confined space and which is not likely to change during the work activity, as determined by a qualified person after consideration of the design, construction and use of the confined space, the work activities to be performed, and all engineering controls required by this regulation.

Lower Explosive Limit (LEL)
The minimum concentration of combustible gas or vapour in air, expressed as a percentage by volume that will ignite if a source of ignition is present. Also known as lower flammable limit (LFL).

Material Safety Data Sheet or MSDS
A document disclosing the information referred to in section 13(a)(i) to (v) of the Hazardous Products Act (Canada) and section 12(1) to (3) of the Controlled Products Regulations (Canada).

Mechanical Ventilation
Ventilation of a space with mechanical air movers (such as fans) or local exhaust systems and a means of directing the air, such as ductwork.

Moderate Hazard Atmosphere
An atmosphere that is not clean breathable air but is not likely to impair the ability of the worker to escape unaided from a confined space, in the event of a failure of the ventilation system or respirator.

Natural Ventilation
Ventilation of a space by natural air movement resulting from wind or convection currents.

Oxygen Deficient
In relation to air, a condition in which there is less than 19.5% oxygen by volume or the partial pressure of oxygen is less than 16.3 kPa.

Purging
The act of emptying a system of hazardous materials such as gases and replacing with clean breathable air.

Qualified
Being knowledgeable of the work, the hazards involved and the means to control the hazards, by reason of education, knowledge, experience or a combination thereof. See page 12 for information on requirements for qualified person carrying out CSE hazard assessments and/or developing safe entry procedures. See page 17 on requirements for qualified person carrying out air testing or monitoring of confined spaces

Rescue Person
A person who is properly equipped and adequately trained to perform rescue duties in confined spaces.

Risk
A chance of injury or disease.

S.C.B.A.
Is an acronym for Self-Contained Breathing Apparatus, which is a piece of equipment that supplies air to the user.

Standby Person
A person who waits outside the confined space entrance(s) and checks on the well---being of workers inside the space by visually observing them or using another method of checking. The standby person also summons help in the event of an emergency.

Ventilation

The simultaneous supplying and exhausting of air to an enclosed machine, room or an entire building.

Venting
Opening up a confined space to allow clean air to enter and circulate without the use of mechanical ventilation.

WHMIS
Workplace Hazardous Materials Information System

Notes:

manufacturing
Safety Alliance of BC

About us

The Manufacturing Safety Alliance of BC, formerly known as FIOSA-MIOSA Safety Alliance of BC, was established in December 2007 to reduce the high injury rate in the food and manufacturing industries.

Our mission

We are catalysts for improving workplace health and safety within the BC Manufacturing Industry. Our leading edge health and safety programs, services and tools enable companies to make a difference in the lives of their employees – every day.

Our vision

Partnering with BC's industry leaders to achieve cultural change that ensures safe workplaces for all employees. The Manufacturing Safety Alliance of BC strives to accomplish our mission and vision through the delivery of a variety of core services including:

- Training in areas such as occupational health and safety (OHS) leadership, program building, and auditing.
- Consultation and advisory services.
- The certifying partner for the Occupational Safety Standard of Excellence (OSSE) in partnership with WorkSafeBC.

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