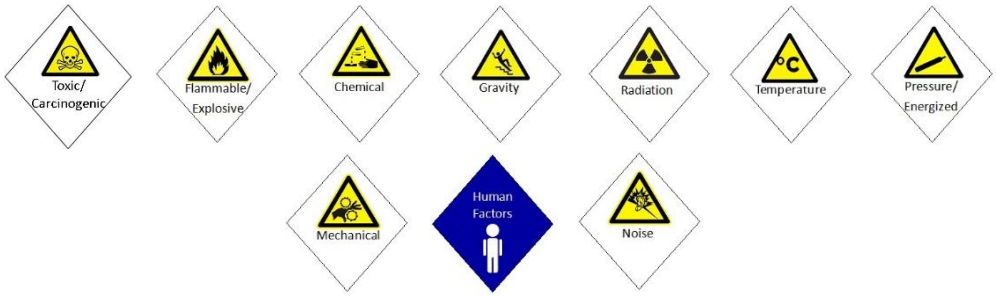


1.0 INTRODUCTION

1.1 Purpose

The purpose of this Code of Practice (COP) is to establish Canadian Plains Energy Services (CPES) standards and provide guidance to all workers who have direct or indirect involvement with work involving confined spaces. Due to their nature (limited egress, limited means of rescue, potentially oxygen deficient/toxic/flammable/explosive environment), confined spaces represent critical work environments, which require a higher level of caution and care to maintain the health and safety of workers. This COP will be applied in conjunction with CPES's Hazard Identification, Assessment, & Control ($HIAC_{TM}$) methodology, and in practice, may also be applied in conjunction with other COP's, such as Working in H2S (COP-01), Respiratory Protective Equipment (COP-02), and Lock Out – Tag Out (COP-05).

One study on confined spaces estimated that performing a given task or job is 150 times more hazardous to workers if performed in a confined space.

1.2 Application

Occupational Health & Safety (OHS) Regulations require that workers affected by this code of practice be familiar with it before any confined space work begins.

This COP applies to all CPES workers, contractors, job site visitors entering a confined or restricted space.

Typical reasons for entering a confined space include:

- Welding or visual inspection of welds inside large diameter pipe
- Cleaning to remove sludge or other waste materials
- Inspecting process equipment
- Maintenance of hydrocarbon, steam, and water piping systems
- Installing valves, pumps, motors, piping, etc.
- Checking or reading meters, gauges, and instruments
- Rescue of workers who are injured or overcome while in the confined space

At CPES, the jobs where we normally encounter confined space work are:

- Repairing tanks
- Tying in pipelines in deep trenches
- Boiler/vessel maintenance and repair
- Certain excavations

RESPONSIBILITIES

1.1 Records Retention

Documentation related to confined space work is required to be kept for a minimum of one year, or a minimum of two years if an incident related to the confined space work occurred.

1.2 Management

Management is to support the health and safety of its workers at all stages of work. In the case of confined space work, the manager is responsible to:

- Ensure workers have appropriate training for confined space entrants, monitors/attendants, and rescuers.
- Not assign work tasks to a worker for which they are not competent.
- Providing the necessary equipment for safe confined space entry and rescue.
- Engaging with the client/owner at the pre-job planning stage to identify and assess the particular hazards expected to be encountered (i.e. benzene, NORM's, iron sulfides, etc.)
- Ensuring all confined spaces are clearly identified/classified.
- Ensuring that this code of practice is utilized and adhered to by supervisors and workers.

2.3 Supervisor

The supervisor is responsible to:

- Lead the confined space planning process – work scope, hazard assessment, hazard controls, rescue planning, individual worker roles, and pre-entry meeting for all workers involved.
- Ensure that workers undertake only the work that they are competent to perform.
- Provide and assist in the pre-use inspection of all applicable PPE.
- Assess workers' fit for work condition.
- Ensure that key pieces of the entry process are executed properly (entry permit, continuous gas testing where appropriate, entry/exit log)
- Ensure that this code of practice is utilized and adhered to by workers.

2.4 Worker (confined space entrant)

Before entering a confined space, all workers must:

- Participate in the confined space planning process.
- Inform their supervisor of any fit for duty issues.
- Refuse to perform any work if it is deemed unsafe (until appropriate hazard controls can be implemented).
- Seek clarification if any parts of the confined space entry planning process (role, rescue plan details, etc.) are incomplete or unclear.
- Ensure they have the appropriate training to perform confined space entries, or act as the confined space monitor/attendant if applicable.
- Inspect any required PPE before use.
- Follow the direction of the supervisor and confined space monitor/attendant.
- Not enter or stay in a confined space if an effective rescue cannot be carried out.
- Adhere to the direction provided by this code of practice.

2.5 Monitor/Attendant/Safety Watch

The confined space monitor or attendant has a critical role in ensuring the health and safety of the confined space entrants. The role requires specialized knowledge and training and should not be taken lightly. The essential duties of a confined space monitor/attendant are:

- Play a leadership role in the confined space planning process.
- Complete, sign, and maintain the confined space permit (but not the issuer of the permit).
- Confirm that any entrants have a valid and current confined space entry certification.
- Being in attendance outside the confined space at or near the entrance (but never enter the confined space).
- Tracking the number and identity of workers inside the confined space at all times, using the entry/exit log.
- Tracking the results of initial and periodic or continuous gas monitoring of the confined space using the gas testing log.
- Ensure correct signage is in place when leaving the unoccupied confined space (work breaks, end of shift, etc.).
- Be familiar with all isolation points and any LOTO applied to systems related to the confined space.
- Maintaining constant communication with workers inside the confined space.
- Activating the rescue plan to ensure an effective rescue of confined space entrants should an emergency arise.
- Being alert and capable of recognizing critical changes, and initiating a "STOP WORK", in critical or Immediately Dangerous to Life and Health (IDLH) situations.
- Control the people working near or in the confined space. Only people with a valid reason for being in a confined or restricted space should be there; the confined space monitor has the authority to deny entry to unauthorized people.
- If working on any OSSA governed job sites, wear a blue confined space monitor vest.
- Adhere to the direction provided by this code of practice.

2.6 Rescuer

- Have and maintain appropriate training to perform confined space rescues.
- Inspect and maintain appropriate PPE and rescue equipment.
- Assist in the development of the confined space rescue plan.
- Maintain an effective communication method with the confined space monitor.
- Adhere to the direction provided by this code of practice.
- Be physically capable of performing rescue responsibilities.

2.0 TRAINING

Competent Workers

One of the key ways to help protect the health and safety of workers is to ensure that they engage only in the work that they are competent to perform. Competency is not the same as training. There are three characteristics which combine to define a worker as competent:

Adequately qualified – the worker has some type of qualification (usually a formal education program, training course, etc.) or a combination of education and practical experience. With certain exceptions, such as professional designations (e.g. P.Eng., C.E.T.), the employer is responsible for evaluating and deciding if a worker is adequately qualified for the work to be performed.

Suitably trained – the worker must have training that is appropriate to the tasks, equipment, etc. that will be performed or used. The employer is responsible for evaluating and deciding if a worker is suitably trained for the work to be performed.

Sufficient experience – to safely perform the work with a minimal degree of supervision, or no supervision. Again, the employer is responsible for evaluating and deciding if a worker has sufficient experience for the work to be performed.

All confined space training should include some hands-on training with the safety equipment including the personal protective equipment and safety harnesses. Workers with emergency rescue responsibilities will need additional specialized training. Online training is not sufficient preparation to prepare for critical work involving confined spaces.

As the employer, CPES must maintain records of applicable training for workers.

3.0 HAZARD IDENTIFICATION, ASSESSMENT, AND CONTROL (HIAC)

Perhaps the most critical part of the hazard assessment is the testing and classification of the atmosphere contained within the confined space.

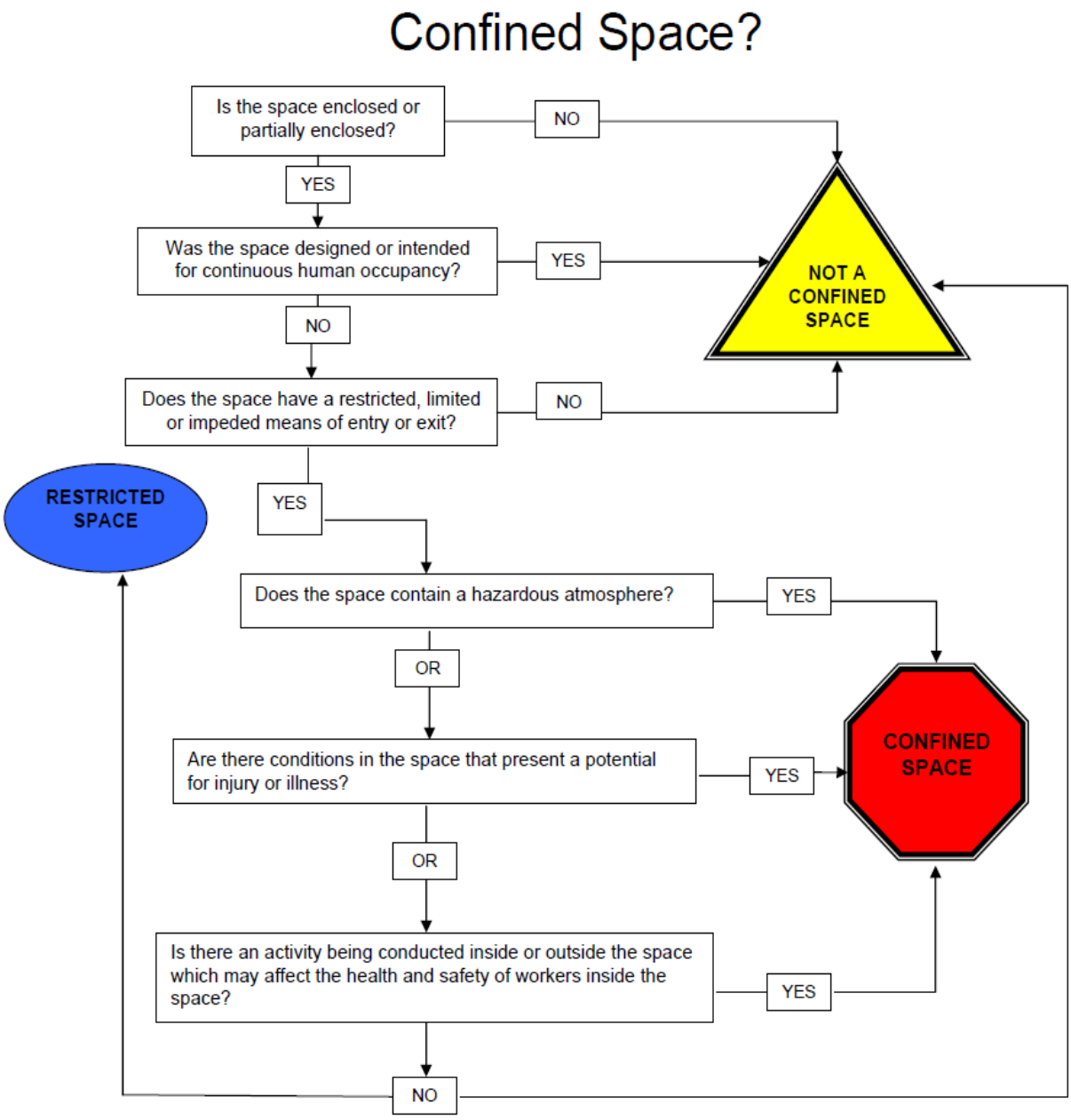
3.1 Assessing the Work Area

The first step in the HIAC process is assessing whether the work area is a confined or restricted space. The 3 questions to consider are:

1. Is the space fully or partially enclosed?
2. Is the space designed and constructed for continuous human occupancy, or not?
3. Might an atmospheric hazard exist or occur?

If you have a fully or partially enclosed space:

Is it designed and constructed for continuous occupancy?	Might an atmospheric hazard occur?	Is it a confined space?	Is it a restricted space?
Yes	**Yes**	**No**	**Yes**
Yes	**No**	**No**	**No**
No	**Yes**	**Yes**	**No**
No	**No**	**No**	**Yes**



Although OH&S does not specify different levels of confined space, the OSSA RCOP does. There are three levels which reflect the degree of hazard, as well as the lowest hazard level, which is a restricted space. These four classifications are detailed below. Although required only on OSSA-governed sites, these classifications provide useful guidance for managing confined spaces.

Level 1 – a confined space that is Immediately Dangerous to Life and Health (IDLH). In the case of the first, or initial entry, where the hazards are unknown, the confined space must be treated as a Level 1. A Level 1 confined space exists where one or all of the following apply:

- Oxygen concentration is less than 19.5% or more than 23.0% by volume.
- Explosive or flammable atmosphere between 10% and 20% of the Lower Explosive Limit (LEL).
- The atmosphere exceeds the protective limits of air-purifier respiratory protective equipment (half-face or full-face respirator).

The following controls must be in place for Level 1 confined spaces before any workers may enter:

- An approved hazard assessment
- An effective means of communication between the confined space monitor and entrants and the rescue team
- Supplied breathing air available and worn by each entry worker
- Emergency air supply available and worn by each entry worker
- All entrants and monitors must be trained in the use of supplied breathing air equipment
- Continuous atmospheric testing
- A competent confined space monitor in attendance at all times
- A specific, documented rescue plan which has been developed, reviewed, and approved by the equipment owner, monitor, and the rescue representative
- A valid confined space entry permit
- A valid level 1 entry tag at each entrance (OSSA only)
- Confined space signage as per the level of entry classification (OSSA only)
- If a level 1 space is left unattended, each entrance must be physically barricaded and a "DANGER DO NOT ENTER" sign hung

Level 2 – a confined space that is not Immediately Dangerous to Life and Health (IDLH), but has the potential to cause injury or illness if preventive measures are not used. A confined space will be considered Level 2 if all identified hazards are controlled and the following applies:

- Oxygen concentration is between 19.5% and 23.0% by volume, and
- Explosive or flammable atmosphere between 1% and 10% of the Lower Explosive Limit (LEL), or
- Concentration of toxic substances exceeds 50% of the OEL.

The following controls must be in place for Level 2 confined spaces before any workers may enter:

- An approved hazard assessment
- An effective means of communication between the confined space monitor and entrants and the rescue team
- A competent confined space monitor in attendance at all times
- Continuous atmospheric testing if there is a potential for the atmosphere to change unpredictably
- A valid confined space entry permit
- A valid rescue plan
- A valid level 2 entry tag at each entrance
- Confined space signage as per the level of entry classification (OSSA only)

Level 3 – a confined space in which the potential danger to life or health would not require any special modifications of the work procedure. A confined space will be considered Level 3 if all identified hazards are controlled, the potential for change is unlikely, and ALL of the following apply:

- Oxygen concentration is between 19.5% and 23.0% by volume
- Explosive or flammable atmosphere is less than 1% of the Lower Explosive Limit (LEL)
- Concentration of toxic substances is less than 50% of the OEL

The following controls must be in place for Level 3 confined spaces before any workers may enter:

- An approved hazard assessment
- An effective means of communication between the confined space monitor and entrants and the rescue team
- A competent confined space monitor in attendance at all times
- A valid confined space entry permit
- A valid rescue plan
- A valid level 3 entry tag at each entrance
- Confined space signage as per the level of entry classification (OSSA only)

Restricted Space

A restricted space is an enclosed or partially enclosed space, not intended for continuous human occupancy that has a restricted, limited, or impeded means of entry or exit because of its construction.

A location may be considered a restricted space by legislation if all other hazards are absent or have been eliminated or controlled, the potential for change is unlikely, and ALL of the following apply:

- Oxygen concentration is between 19.5% and 23.0% by volume
- Concentration of flammable/explosive gases is 0%
- Airborne concentration of toxic substances is 0%
- An approved hazard assessment determines that it is not a confined space
- Entry does not require permitting or gas testing as designated by area work practices

The following controls must be put in place for a Restricted Space:

- All hazardous energy is eliminated or controlled
- No work or activities conducted within or within the vicinity of the restricted space will or have the potential to change the atmospheric conditions of the space
- A competent worker has effective means of communication with the workers inside the space and for summoning assistance in the event of an incident or emergency
- Evacuation procedure
- Valid rescue plan

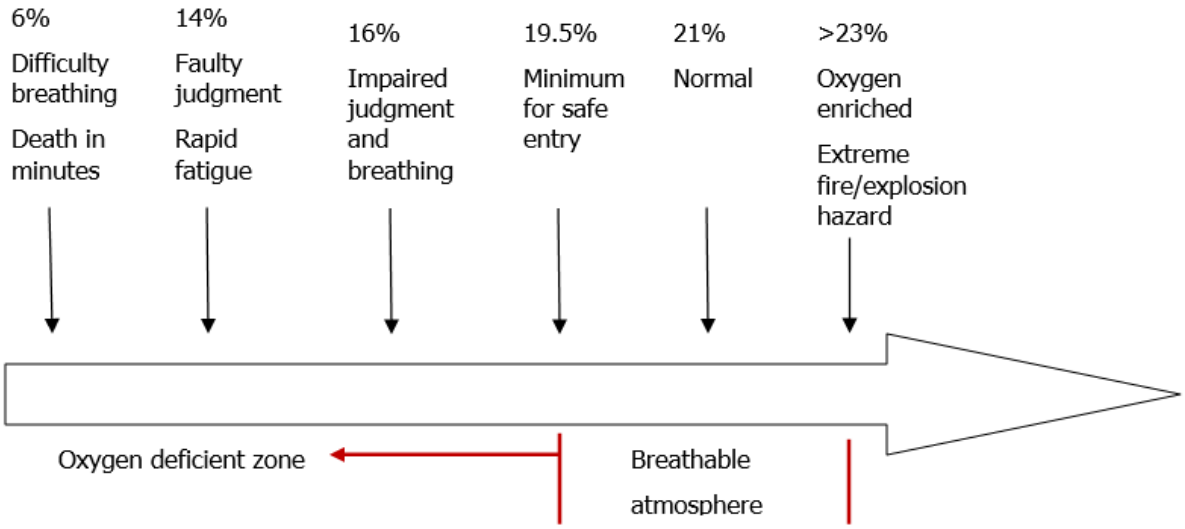
Part of the hazard assessment required is for the employer to appoint a competent person to identify and assess the hazards the worker is likely to be exposed to while in the confined or restricted space.

In order of importance, the atmosphere should be assessed according to:

1. Oxygen concentration of the atmosphere

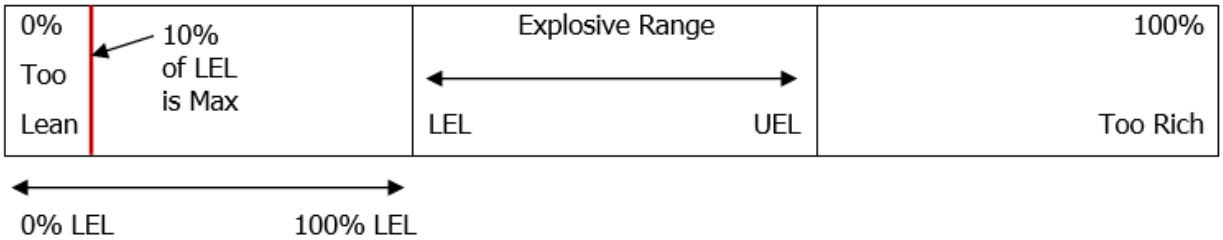
If the oxygen concentration falls below the acceptable limit of 19.5%, the space is oxygen deficient (aka non-breathable atmosphere). This hazard is the cause in a significant number of confined space fatalities.

Oxygen deficiency is caused by biological or chemical reactions, or by displacement of oxygen by other gases.



If the oxygen concentration exceeds 23%, the space is oxygen-enriched, which increases the likelihood of fires or explosions by increasing the likelihood of ignition of flammable material, as well as the rate of reaction. Oxygen enrichment may occur from leaking gases, welding equipment.

2. Flammability of the atmosphere



All gases have an explosive range with a Lower Explosive Limit (LEL) and an Upper Explosive Limit (UEL). When the fuel and air mixture is below the LEL or above the UEL, ignition will not occur.

Note: Work in the confined space can be performed only if the atmosphere tests below 10% of the LEL.

3. Toxicity of the atmosphere

Testing equipment for toxic (poisonous) atmospheres is usually specific to each gas or particulate. Therefore, you need to have the appropriate testing equipment for the gases or particulates that could be expected to be present. Prior to work starting, engaging with the client/owner is invaluable in identifying these potential hazards. This allows for proper job planning, including appropriate material handling, PPE, and hygiene protocols.

Toxic substances can be produced from such sources as:

- The process or product(s) that normally occur in the confined space
- Work activity in the confined space
- Waste materials in the confined space
- Sources outside the confined space

Toxic substances present risks such as:

- Irritation or damage to target organs
- Simple or chemical asphyxiation

Immediately Dangerous to Life and Health (IDLH) is a condition that exists in an oxygen-deficient atmosphere or one in which a substance exists in a concentration that poses an immediate threat to health or life.

For many substances, regulations provide Occupational Exposure Limits (OEL's), which are identified in the Safety Data Sheet (SDS). These outline the duration a worker can be exposed to the substance in various concentrations. What is important to remember is that the concentration can change.

The following are common toxic gases that are especially dangerous in confined spaces:

1. **Hydrogen Sulfide (H_2S)**

   H_2S gas is a common industry in the oil & gas and sewage treatment industries. It is colourless, and heavier than air, so it collects in low areas and ditches. It is soluble in liquids, including oil and water, and can be released by heating or agitating the fluid. In low concentrations, it smells like rotten eggs, but as the concentration rises, it quickly deadens the sense of smell so the worker will no longer be able to detect it. In high concentrations, it can lead to rapid loss of consciousness and death.

2. **Methane (CH_4)**

   Methane is a highly explosive asphyxiate that can create an oxygen-deficient environment.

   Note: There are no OEL's for methane; always treat it as an IDLH condition.

3. **Sulphur Dioxide (SO_2)**

   SO_2 gas is encountered in the oil & gas and mining industries. It is colourless, but has a strong smell, and is poisonous in small amounts.

4. **Carbon Monoxide (CO)**

   Carbon monoxide is a colourless, odourless, tasteless, deadly gas. It is a product of incomplete combustion and is a common component of internal combustion engine exhaust, which highlights the importance of proper ventilation when working around heaters, idling vehicles, and powered equipment.

   While the OEL of CO is 25 ppm up to 8 hours per day, if the concentration exceeds 25 ppm, headache, nausea, sleepiness, and/or disorientation can occur. Higher concentrations can be fatal.

5. **Nitrogen (N_2)**

   Nitrogen gas is colourless, odourless, and is used in the oil & gas industry for inerting and purging. Because it is often used for displacing oxygen, this is essential for the worker to remember with respect to confined space entry.

6. **Benzene**

   Benzene is colourless and flammable liquid that vaporizes easily when exposed to air. It is a known carcinogen that can be easily absorbed through the skin.

7. **Iron Sulphide**

   Iron Sulphide is created when H_2S gas reacts with ferrous metals. When exposed to oxygen, it can ignite and release toxic fumes. The reaction may be mitigated keeping a continuous layer of liquid or inert gas between the material and air.

8. **Naturally Occurring Radioactive Materials (NORMs)**

   NORMs are typically found in piping and process systems where particulates may build up. NORMs present a low-level radiation that are hazardous when inhaled or ingested. Where NORMs are suspected, proper pre-job planning, material handling, specialized PPE and additional hygiene practices are required.

9. **Hazardous Particulates**

   Certain industry-related particulates can cause serious, irreversible health effects. Common ones are:
   - Asbestos
   - Crystalline silica
   - Respirable welding fumes, vapours, dusts
   - Glass fibres

4.2 Hazard Identification, Assessment, and Control

4.2.1 Atmospheric Testing

The purpose of atmospheric testing is to ensure the safety of workers. Therefore, before any worker enters a confined space, the atmosphere must be tested for oxygen deficiency, flammability, and toxic substances by a competent person.

General Testing Procedures

- A person competent in atmospheric testing must be utilized.
- A pump monitor must be utilized for all confined space pre-entry and continuous monitoring.
- Testing equipment must be properly calibrated in accordance with the manufacturer's instructions.
- Testing equipment must be bump tested daily.
- If the tester needs to enter the confined space to test all areas and levels within the confined space, they must wear positive pressure SCBA or SABA
- Document testing results on the testing log sheet, and the entry checklist/permit, along with the entry tag.

Testing Frequency/Continuous Monitoring

After the initial testing has been completed and workers are working within the confined space, periodic or continuous testing/monitoring must occur to ensure their continued safety. Testing interval depends on the risk assessment of the space, the work being performed, and the potential for change. If the assessment determines a high risk to workers, then continuous monitoring is required.

4.2.2 Ventilation & Purging

If atmospheric testing identifies a hazardous atmosphere or one that is likely to become hazardous, the space must be purged, ventilated, or both before a worker can enter the confined space. The terms "ventilating" and "purging" are often used interchangeably, but they are distinctly different processes.

Purging is the method by which gases or vapours are *displaced* from a confined space, typically done by blowing air into the space to reduce the concentration of the toxic gas to below the appropriate atmospheric exposure level. After the contaminants have been removed, i.e. purged, the confined space may be ventilated.

Ventilation is the continuous provision of fresh air into the confined space by mechanical means to *maintain* acceptable atmospheric levels. Ventilation achieves:

- Maintenance of acceptable oxygen levels
- Protection for workers in the case of an accidental release of chemicals
- Removal of contaminants generated by the work being performed, e.g. welding fumes
- Cooling of the atmosphere within the confined space

Where mechanical ventilation is used, such as a fan or air mover, where the worker is not in direct proximity to the fan (i.e. can hear and/or feel the fan), there must be an automatic warning system to alert workers through audible or visual means that a ventilation failure has occurred. The warning system should be located within the air stream, so that the alarm is activated both when there is a ventilation failure due to motor failure, and when there is a ventilation failure without motor failure (e.g. fan belt failure or air stream becomes blocked).

4.2.3 Inerting

Inerting is the method by which a flammable/explosive atmosphere is removed from a confined space. An inert gas such as nitrogen (N_2), carbon dioxide (CO_2), or argon (Ar) is used to displace the oxygen from a confined space to a level low enough so as not to support combustion.

Where inerting is used to control the fire/explosion hazard by achieving an oxygen-deficient environment, any worker entering the confined space will need to wear positive pressure breathing apparatus (SCBA or SABA).

4.2.4 Isolation

Sources of hazardous energy, such as pressurized, electrical, mechanical, hydraulic, pneumatic, thermal, radioactive, and gravitational, must be isolated, locked out, or otherwise controlled to eliminate or minimize worker exposure before they can enter the confined space.

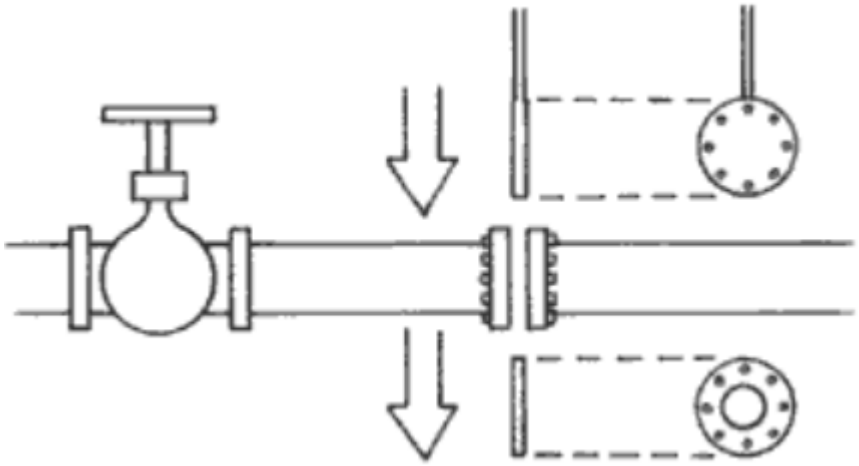
Isolation is the method by which a confined space is protected against the inadvertent release of a harmful substance by one or a combination of methods:

- Blanking/blinding
- Misaligning sections of lines or pipes
- Double block and bleed
- Electrical lockout
- Blocking or disconnecting mechanical linkages

4.3.4 Blanking/blinding

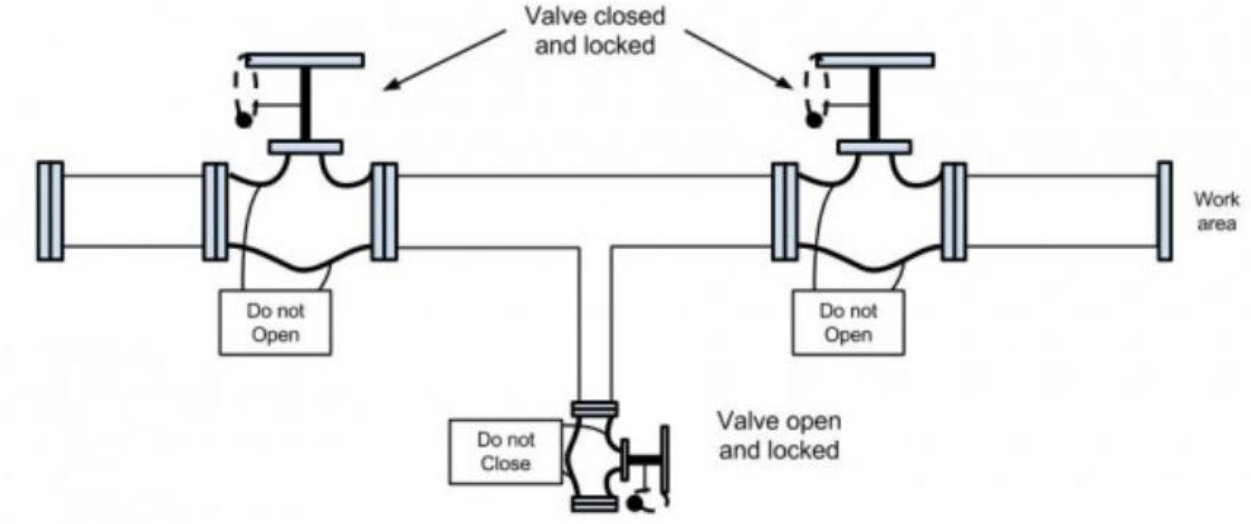
Blanking or blinding is the installation of a solid plate at the flange connection of a piping system. The plate material must be compatible with the product in the piping system, and capable of withstanding the

applicable pressure. The blank/blind should be installed as close as possible to the confined space and must be clearly marked to show that it is in place and is not to be removed.



4.3.5 Double Block and Bleed

The double block and bleed method of isolation can be used to isolate a line, pipe, or duct from a confined space, where two valves can be closed and locked, and the bleed-off valve between them opened and locked.



Any isolation performed with respect to confined space entry should be performed in conjunction with CPES's Lock Out-Tag Out (LOTO) code of practice (COP-05), and only by competent workers.

Note: Even if you don't perform the isolation yourself, as part of a rigorous LOTO procedure, you are responsible to verify zero energy potential before starting work.

4.3.6 Hot Work

Any time hot work is performed, there is an ignition source present (open flame, sparks from welding, cutting, grinding operations). Therefore, when dealing with potentially flammable/explosive environments created by the presence of flammable gases, dusts, etc. or oxygen enrichment, extra care must be taken to manage the atmosphere of the confined space. This is done through atmospheric monitoring, purging, ventilation and/or inerting.

Before any hot work can begin, a hot work permit must be issued, which is an administrative control to ensure that flammable/explosive gases and vapours have been cleared from the confined space, and that atmospheric testing continually ensures that they remain less than 20% of their LEL.

4.3.7 Traffic Hazards/Concurrent Operations

The confined space planning process must ensure a way to protect workers from hazards created by vehicular or equipment traffic, nearby work, etc. In addition, any traffic or concurrent work near the confined space operation must not impede any emergency response required as per the emergency response/rescue plan.

5.0 CONFINED SPACE ENTRY REQUIREMENTS

Once the hazard assessment process (HIAC) has been performed, including initial atmospheric testing, preparations can be made for workers(s) to enter the confined space. The main components required before the entry are pre-entry safety meeting, documentation, signage, and rescue plan.

5.1 Pre-entry Safety/Planning Meeting

The pre-entry safety meeting is critical to review the following:

- Review of the job scope and work assignments (who does what?)
- Role and responsibility of each person (supervisor, entrant(s), attendant, rescuers)
- Results of the hazard assessment
- Plans for atmospheric monitoring

5.2 Documentation

The following codes of practice should be reviewed by all involved workers where applicable before entry:

- COP-01 Hydrogen Sulphide
- COP-02 Respiratory Protective Equipment
- COP-03 Confined Space Entry
- COP-05 Lock Out – Tag Out

Additionally, the following must also be in place before the confined space entry can proceed:

- Confined Space Entry Checklist
- Entry/exit Log
- Gas Testing Record
- Confined Space Rescue Plan
- Safety Data Sheet (SDS or MSDS) on hand and reviewed for any product contained or suspected in the confined space
- Appropriate signage regarding the confined space

5.3 Entry Authorization

Care must be taken in determining who is authorized to enter the space. The work supervisor and the confined space attendant must perform a risk assessment on the work in order to accomplish it while exposing the fewest number of workers to the lowest level of risk possible, through a thorough hazard assessment and implementing effective control measures. Consideration must be given to:

- The competence of the worker (combination of adequate qualifications, suitable training, and sufficient experience, to safely perform the work without, or with minimal supervision)
- The worker's application and use of other control measures (purging, LOTO, use of personal monitor, use of positive pressure breathing apparatus, respiratory protective equipment, as well as personal factors (e.g. claustrophobia).

5.4 Communication System

An effective means of communication must be available between the confined space entrant(s) and monitor/attendant. These could include, but are not limited to verbal, hand signals, air horns, 2-way radios, tugging on a rope, etc.

The system used will vary depending on:

- The hazards present in the space
- The design of the space
- The PPE used (e.g. full face respirator worn by the entrant(s)).
- The noise levels within and near the confined space
- Distance to the emergency response team.

The most common communication methods are:

Voice:

- Hard line duplex system (allows hands free communication)
- Wireless two-way radio (intrinsically safe for confined space use)
- Direct verbal communication with the confined space monitor (limited by distance, obstructions, PPE)

Signaling:

- Visual observation of the entrant(s) by the confined space monitor. Line of sight is critical, and permits use of hand signals (discussed in pre-job safety meeting) or signaling with flashlight (intrinsically safe for confined space use)
- Tactile such as tugging on a rope (used only in the case where the rope does not produce an additional hazard, such as entanglement of the worker)

  Lifeline signals (Firefighter's **OATH** code)
  - 1 pull = **O**kay
  - 2 pulls = **A**dvance
  - 3 pulls = **T**ake up slack
  - 4 pulls = **H**elp (evacuate)
- Audible sounds, such as a whistle, air horn, or tapping on the side of a vessel

It is important that two-way communication must include all four components:

- The call
- The reply
- The message
- The acknowledgement, ending or sign-off

5.5 Entry Permit

No worker is allowed to enter a confined space before a valid entry permit is in place. The permit must specify the following:

- The name of each worker who enters the confined space and the reason for their entry.
- The location of the confined space.
- The time during which the permit is valid.
- The nature/scope of the work to be performed in the confined space.

6.0 EMERGENCY RESPONSE & RESCUE PLANNING

Due to the high-risk nature of confined space work, the legislation stipulates two key responsibilities:

The **employer** must ensure that a worker does not enter or remain in a confined or restricted space unless an effective rescue can be performed.

A **worker** must not enter or remain in a confined or restricted space unless an effective rescue can be performed.

7.0 RESCUE PLAN TYPES

A written emergency response plan is required for confined spaces. The OSSA Regional COP recognizes two types of rescue plans:

Specific Rescue Plan: A specific, documented rescue plan which has been developed, reviewed, and approved by the site owner and emergency response representative, for Level 1 confined space entries.

Valid Rescue Plan: A plan that is general in nature and can be applicable anywhere on site. This type of plan is for level 2 and 3 confined spaces and restricted spaces.

An emergency response plan must address the following:

- Type and availability of rescue equipment
- Location of rescue equipment
- Availability and competence of rescue personnel
- Means of communication (to effectively communicate the emergency and to summon response)
- Execution of the rescue

Rescue Options

The following four types of horizontal and vertical rescues can be used to remove entrants from a confined space:

(1) Self-rescue: a process whereby the entrant is capable of exiting the confined space without assistance. This type of rescue is typically used when there is early notification of a problem (e.g. a gas monitor alarm or ventilation alarm is activated).

(2) External rescue: a process whereby rescuers do not enter the confined space, but instead use a pre-arranged retrieval system to extract the entrant. This type of rescue can be used if the entrant is unable to self-rescue, and the path out of the space is straight up, or straight out, without impeding obstructions (e.g. using a tripod with a retrieval winch to hoist a tethered worker (wearing a full body harness) up from a vault).

(3) Entry rescue: a process whereby rescuers enter the confined space to retrieve the entrant.

(4) IDLH entry rescue: a process whereby the emergency response team has to enter to rescue an entrant exposed to an IDLH atmosphere or to another immediately dangerous condition.

Note: For confined space or similar rescue requirements (e.g. a worker suspended in a harness following a fall from heights), **9-1-1 is not considered to be a valid rescue option**. Viable rescue planning must include an appropriate on-site rescue capability.

6.2 Availability of Emergency Response Team

Part of the rescue plan review process, which is done prior to any entrants entering the confined space, the personnel involved, and specifically the confined space monitor/attendant, must ensure that the rescue team is able to respond in case of an emergency related to the confined space entry. If they are not available or become unavailable to respond during the confined space entry, the confined space work must be suspended, entrants must exit the confined space, and the entry permit suspended (no further entries) until such time as the emergency response capability is reinstated.

Under no circumstances can the confined space monitor/attendant enter the confined space as part of a rescue effort.

6.3 Changes to the Scope of Work

If the scope of work changes prior to or during a confined space entry, then all work must stop until the changes can be reviewed by the supervisor, confined space monitor/attendant, and the rescue team, and the rescue plan amended and reviewed with all involved workers.

7.0 DEFINITIONS

Atmosphere – the gases, vapours, mists, fumes, dusts within a confined or restricted space.

Atmospheric Testing – a procedure used to ensure oxygen levels, flammability/explosive levels (i.e. LEL), and toxicity are known and used to make decisions to enable safe entry by a worker into the confined space.

Blinding/blanking – the process by which isolation devices (blinds, blanks) are placed into piping systems to prevent the possibility of product flow or leakage into a confined space.

Breathable Atmosphere – an environment where the oxygen concentration is between 19.5% and 23.0% by volume.

Competent Worker – refers to a worker, who is adequately qualified, suitably trained, and with sufficient experience to safely perform a given task without, or with minimal supervision.

Communication System – the means of communication agreed upon before entry between the confined space monitor and the confined space entrants. It can consist of verbal, manual, or mechanical means.

Confined Space - An enclosed or partially enclosed space that is not designed or intended for continuous human occupancy with a restricted means of entry or exit and may become hazardous to a worker entering it because of its design, construction, location or atmosphere of the work activities, materials, or substances in it. The provision of First Aid, evacuation, rescue or other emergency response service is compromised.

Confined Space Attendant – essentially the "confined space manager," the person who is adequately trained and certified, and responsible to remain outside the confined space, control the entry/exit of authorized persons, and summon rescue assistance. Also known as the confined space monitor, safety watch, or in some legislation as the tending worker.

Double Block and Bleed – the isolation method whereby two valves leading to the confined space are closed and locked out against operation, and a bleed-off valve between them is drained and locked open.

Entry permit – the document issued by the employer (Usually prime contractor) in charge of the confined space, which ensures that the necessary processes have been followed to permit safe entry by workers, and which is signed off by a competent person.

Engulfment – occurs when a worker becomes submerged in a substance.

Evacuation Plan – a predetermined plan to evacuate a confined space should an alarm be activated or a significant change occurs which could affect the health/safety of the confined space entrants. All workers involved in a confined space entry must review the evacuation plan before any entry takes place.

Flammable (Explosive) Atmosphere – an atmosphere containing a flammable gas or vapour between the lower explosive limit (LEL) and the upper explosive limit (UEL).

Hazardous Atmosphere – exists when gases, vapours, mists, fumes, or dusts which may be harmful to the health or safety of a confined space entrant, by their nature, their displacement of oxygen, or because of their flammability/explosivity.

Hot Work – work that can produce a flame, spark, or other source of ignition, including:

- Welding, cutting, grinding, drilling, chipping, burning
- Using electrical equipment not classified for use in a hazardous location (i.e. not intrinsically safe)
- Introducing a combustion engine to a work process

Hot Work Permit – the document issued by the employer or prime contractor in charge of the hot work, which ensures that the appropriate hazards have been identified and controls implemented to allow safe completion of the hot work, and which is signed off by a competent person.

Human Occupancy – the state or condition of a local environment that would allow people to safely inhabit indefinitely.

IDHL - Immediately Dangerous to Life and Health (IDLH) – an atmosphere that is oxygen-deficient, or has an atmospheric concentration of a harmful substance that poses an immediate threat to human life or health, or that may interfere with a worker's ability to escape from a dangerous atmosphere.

Initial Entry – the first entry into the confined or restricted space to verify conditions and ensure that the space is safe for subsequent entries to perform work.

Isolation – a process whereby the confined space is completely protected against the inadvertent introduction of a material or substance. It is accomplished by one or a combination of the following methods:

- Blinding/blanking
- Misaligning sections of all lines or piping
- Double block and bleed
- Electrical lock-out of all power sources
- Blocking or disconnecting mechanical linkages

Inerting – the intentional displacement of the atmosphere by a non-reactive gas (e.g. nitrogen) to an extent that the resulting atmosphere is non-combustible (oxygen levels are reduced below those needed to support combustion) but also oxygen-deficient.

Lock-out – isolation by using personal and/or group lock(s) and associated devices to secure a valve, switch, etc. against the release of energy.

Lower Explosive Limit (LEL) –the lower value of the range of concentrations of a substance (gas, vapour, mist, dust) in a mixture with air, at which the substance may ignite.

Occupational Exposure Limit (OEL) – the maximum concentration of a substance to which a person can be exposed for specific lengths of time as specified by the OH&S Regulations and Code.

OSSA – Oil Sands Safety Association – A safety association formed by several of the major oil sands producers with an interest in advancing safety in the oil sands region.

Oxygen Deficient – a condition characterized by an atmosphere where the oxygen is less than 19.5% by volume. It is a non-breathable atmosphere, and therefore IDLH.

Oxygen Enriched - a condition characterized by an atmosphere where the oxygen is greater than 23.0% by volume. It represents a high-risk environment for combustion/explosion.

PPE – Personal Protective Equipment

Positive Isolation – control measures (engineered, procedural) that ensure lines, equipment, and systems have been disconnected, de-energized, or depressurized.

Purging – the method by which gases, vapours, or other airborne impurities are displaced from a confined or restricted space.

Rescue Plan – a plan developed to address rescue equipment, location of the equipment, rescue personnel requirements, means of communication, and implementation of a rescue of confined space entrants.

Restricted Space - An enclosed or partially enclosed space that is not designed or intended for continuous human occupancy with a restricted means of entry or exit because of its construction. It can be thought of as a work area where the only hazard is the difficulty of getting into or out of the space. All other hazards are absent or have been eliminated or controlled through the HIAC process. Restricted spaces are not subject to the permitting, atmospheric testing, and tending worker requirements of a confined space. However, employers and workers must be mindful that a restricted space can become a confined space if conditions or work practices change. Examples of restricted spaces include:

(a) Electrical or communication utility vault;

(b) Building crawl space;

(c) Trench with a temporary protective structure;

(d) Deep excavation with ladder or lift access

Retrieval System - a mechanical system of retrieving a confined space entrant from the space. It usually involves the entrant wearing a full body harness, and the use of a rope, tripod, etc.

Safety Data Sheet (SDS; formerly Material Safety Data Sheet, or MSDS) – the resource unique to each controlled product or chemical, which provides information on safe handling, health effects, hazard evaluation, and first aid and emergency procedures. Governed by WHIMS legislation.

Shoring – temporary protective structures or alternatives of sufficient strength to protect workers, by preventing the walls of trenches, excavations or underground shafts from sloughing, collapsing, or caving in.

Specific Rescue Plan – a specific, documented rescue plan which has been developed, reviewed, and approved by the confined space owner and the emergency response representative. This type of plan is specific to level 1 confined space entries.

Upper Explosive Limit (UEL) – the higher value of the range of concentrations of a substance, in a mixture with air, at which the substance may ignite.

Valid Rescue Plan – a plan developed specific to site conditions which are general in nature, making it applicable anywhere on site. This type of plan is specific to level 2 and 3 confined spaces, and restricted spaces.

Ventilation – the process of diluting air contaminants by natural or mechanical air exchange. This method is not appropriate for highly toxic contaminants.

REFERENCES / ADDITIONAL INFORMATION

- Confined Space Checklist/Entry Log/Testing Log - CF-S-44
- COP 01 H2S Environment
- COP 02 Respiratory Protective Equipment
- COP 05 Lock Out/Tag Out
- Applicable OHS Legislation
- CSA Standard Z1006 – Management of Work in Confined Spaces
- (M)SDS's for products known or potentially present in confined space – examples:
  - Hydrogen Sulphide (H2S)
  - Methane
  - Carbon Dioxide (CO2)
  - Client/Owner must provide list of products and/or fugitive emissions on site and in particular, in and/or around the Confined Space area

Developed by:	Angie Anton	Garry Lane	Date:	November 13, 2008
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	Ryan Obleman		Date:	April 18, 2018