

UBC Confined Space Entry Program

Safety & Risk Services



THE UNIVERSITY OF BRITISH COLUMBIA



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Introduction

A confined space is an enclosed or partially enclosed area with limited or restricted means of entry or exit. Although it is large enough for a worker to enter, it is not designed for someone to work in regularly. Workers may need to enter confined spaces for tasks such as inspections, cleaning, maintenance or repair. Examples of confined spaces at UBC include manholes, pits, boilers, tanks and hoppers.

A confined space can be more hazardous than regular workspaces. While incidents in confined spaces are not common, they can result in severe injury or death. Hazards may include, but are not limited to atmospheric, chemical, biological and physical exposures. To effectively control the risks to these hazards, a hazard assessment and safe work procedures must be established for each confined space. Entry into UBC confined spaces is only permitted to trained and authorized workers.

UBC trained and authorized workers enter confined spaces that have a low or moderate hazard atmosphere. UBC workers are not authorized to enter confined spaces that have a high hazard atmosphere, where an immediately dangerous to life or health (IDLH) condition exists.

Written Confined Space Entry Program

Regulatory Compliance

The Occupational Health and Safety Regulation (OHSR) requires that before a worker is required or permitted to enter a confined space, the employer must prepare and implement a written confined space entry program which includes:

- (a) an assignment of responsibilities,
- (b) a list of each confined space or group of similar spaces and a hazard assessment of those spaces, and
- (c) written safe work procedures for entry into and work in the confined space, that address, where applicable
 - (i) identification and entry permits,
 - (ii) lockout and isolation,
 - (iii) verification and testing,
 - (iv) cleaning, purging, venting or inerting,
 - (v) ventilation,
 - (vi) standby persons,
 - (vii) rescue,
 - (viii) lifelines, harnesses and lifting equipment,
 - (ix) personal protective equipment and other precautions, and
 - (x) coordination of work activities.



Use of this Document

This document will assist Administrative Heads of Unit, managers, supervisors, workers and Joint Occupational Health and Safety Committees (JOHSC) understand the requirements for workplaces that have confined spaces. This document describes what must be done before workers can safely enter and work in a confined space.

This document directs you to seek the assistance of a Qualified Person to assess the hazards of the confined spaces in your workplace and to provide safe work procedures. This document does not include site-specific hazard assessments and safe work procedures.

If there are any questions regarding the Confined Space Entry Program, please contact Safety & Risk Services (SRS) at 604-822-6732.



Roles and Responsibilities

ADMINISTRATIVE HEADS OF UNITS

Roles and Responsibilities of Administrative Heads of Units includes:

- Ensure confined spaces within their jurisdiction have been identified and an inventory list is established and maintained.
- Ensure confined spaces within their jurisdiction have established hazard assessments, entry procedures and rescue procedures developed by a Qualified Person for each confined space or group of similar spaces.
- Ensure rescue services are made available for their workers before a worker enters a confined space.
- Protect employees from hazards in the workplace by implementing and considering the hierarchy of controls, in the order of elimination, substitution, engineering, administrative and personal protective equipment (PPE).
- Provide instruction and training to authorized supervisors, workers and UBC rescue persons that are involved in confined space entry work and maintain training records.
- Assign responsibility for supervision of confined space work to a person who is adequately trained to supervise the job, prior to any workers entering a confined space.
- Provide supervisors with the necessary support, resources (e.g. equipment, tools, PPE) and training to carry out health and safety responsibilities.
- Understand that UBC workers and UBC rescue persons do not enter into confined spaces with high hazard atmospheres in which an immediately dangerous to life or health (IDLH) condition exists.
- Ensure an effective inspection program is in place.
- Ensure documentation is maintained (e.g. training, hazard assessments, safe work procedures, rescue procedures, entry permits, inspections).
- Ensure UBC departments not having jurisdiction request and receive approval to enter prior to starting confined space work.
- Ensure contractors request and receive approval prior to entering into UBC confined spaces.
- Ensure contractors follow their own Confined Space Entry Program that meets the requirements of the Occupational Health and Safety Regulation (OHSR) and fulfill their roles and responsibilities listed in this document.
- Cooperate with UBC Safety & Risk Services to ensure the Confined Space Entry Program meets OHSR compliance.

SUPERVISORS

"Supervisor" means: a person who instructs, directs and controls workers in the performance of their duties. A supervisor can be any worker (management or staff) who meets this definition, whether or not they have the supervisor title. In this document, the supervisor is referenced as the "Responsible Supervisor".

Roles and Responsibilities of Responsible Supervisor includes:

- Ensure the health and safety of all workers.



- Understand OHSR requirements that apply to the work and make sure those requirements are met.
- Request authorization to enter into confined spaces outside of their jurisdiction (e.g. confined spaces that belong to another UBC Department).
- Identify and authorize workers to enter a confined space.
- Attend Confined Space Entry training and retraining.
- Ensure all workers involved in confined space work attends required training and retraining.
- When an entry permit is required, complete and ensure it is posted at the entry points of the confined space. Completed entry permits must be kept for at least one year by the responsible supervisor.
- Ensure rescue services are available and notification is given to rescue persons, prior to starting confined space work.
- Ensure workers are aware of all known and foreseeable hazards.
- Coordinate work activities with other UBC departments and/or contractors to ensure hazards are not being generated that could affect the health and safety of UBC workers and contractors.
- Complete site-specific rescue procedures prior to workers entering confined spaces.
- Review site-specific hazard assessments, entry procedures, rescue procedures and other related procedures with workers involved in confined space work and document the review took place.
- Ensure pre-entry testing and inspections are conducted based on safe work procedures.
- Ensure precautions identified in safe work procedures are followed.
- Ensure communication means are appropriate between the worker entering the space, standby person and rescue persons.
- Provide workers with the appropriate equipment, tools and PPE and ensure they are being used properly and inspected and maintained regularly.
- Understand UBC workers and UBC rescue persons do not enter into confined spaces with high hazard atmospheres in which an IDLH condition exists.
- Report to Safety & Risk Services should additional hazards be identified in existing confined spaces.
- Ensure workers are aware of procedures for reporting injuries immediately to first aid and supervisor.
- Cooperate with UBC Safety & Risk Services to ensure the Confined Space Entry Program meets OHSR compliance.

WORKERS

Roles and responsibilities of Workers include:

- Attend required Confined Space Entry training and retraining.
- Understand regulatory requirements as per OHSR.
- Understand hazard types and hazard classifications.
- Utilize atmospheric monitoring equipment.
- Inspect equipment, tools and PPE.
- Review confined space documentation (e.g. site-specific hazard assessment, entry procedure, rescue procedure, entry log, entry permits, other related documents).
- Follow established safe work procedures.
- Enter in a confined space or assist in confined space work only if authorized and trained to do so.



- Understand UBC workers and UBC rescue persons do not enter into confined spaces with high hazard atmospheres in which an IDLH condition exists.
- Ensure communication means are appropriate between the worker entering the space, standby person and rescue persons.
- Report to supervisor immediately should additional hazards be identified.
- Report to first aid and supervisor immediately if an injury occurs.
- Cooperate with UBC Safety & Risk Services to ensure the Confined Space Entry Program meets OHSR compliance.

RESCUE PERSONS

Roles and responsibilities of Rescue Persons include:

- Understand regulatory requirements as per OHSR.
- Inspect rescue equipment and PPE.
- Attend required confined space and rescue training and retraining.
- Participate in simulated rescue or evacuation exercises on a regular basis with the use of rescue equipment.
- Review confined space documentation (e.g. site-specific hazard assessment, entry procedure, rescue procedure, entry logs, entry permits, other related documents).
- Monitor communication systems that will be used when being summoned to rescue.
- Understand self rescue is the preferred option and will be utilized whenever possible.
- Enter into a confined space to rescue only if safe to do so and there is at least one additional trained rescue person located outside to render assistance.
- Understand UBC workers and UBC rescue persons do not enter into confined spaces with high hazard atmospheres in which an IDLH condition exists.
- Cooperate with UBC Safety & Risk Services to ensure the Confined Space Entry Program meets OHSR compliance.

JOINT OCCUPATIONAL HEALTH AND SAFETY COMMITTEE (JOHSC) MEMBERS

Roles and responsibilities of JOHSC include:

- Participate in the development and ongoing review of the Confined Space Entry Program.
- Identify situations that may be unsafe for workers and advise on effective systems for responding to those situations.
- Consult with workers and the employer on issues related to confined space work.
- Make recommendations to the employer and the workers for the improvement of the health and safety of workers involved in confined space work.
- Make recommendations to the employer on educational programs promoting the health and safety of workers and compliance with the regulations.
- Ensure incident investigations and regular inspections are carried out as required.



SAFETY & RISK SERVICES

Roles and responsibilities of Safety & Risk Services include:

- Overall responsibility for the administration of the UBC Confined Space Entry Program to ensure the program meets OHSR compliance.
- Ensure a Confined Space Entry Program is written and implemented.
- Assist in determining who a Qualified Person is.
- Interpret OHSR and provide guidance and recommendations.
- Review and update the Confined Space Entry Program on a regular basis to ensure effectiveness.
- Consult with Administrative Heads of Units, Supervisors, Workers, Rescuer Persons and JOHSC members to ensure the Confined Space Entry program meets OHSR compliance.

CONTRACTORS

Roles and responsibilities of Contractors include:

- Ensure the health and safety of their workers entering the confined space.
- Follow their own Confined Space Entry Program.
- Develop their own Confined Space Hazard Assessment and Entry Procedures as it pertains to the work they are performing.
- Ensure all work meets the requirements of the OHSR.
- Ensure their workers have attended Confined Space Entry training that meets the requirements of the OHSR.
- Ensure rescue services are made available for their workers before a worker enters a confined space.
- Request access to UBC confined spaces and enter only when authorized to do so.
- Coordinate work activities with UBC to ensure hazards are not being generated that could affect the health and safety of their workers, UBC workers and any other personnel.



Definitions

The following terms are referenced in the Occupational Health and Safety Regulation (OHSR) and will be used throughout this document. Knowing what these terms mean will help your understanding of confined spaces.

“Adjacent Piping” means a device such as a pipe, line, duct or conduit which is connected to a confined space or is so located as to allow a substance from within the device to enter the confined space.

“Blank” means a solid plate installed through the cross-section of a pipe, usually at a flanged connection.

“Blanking or Blinding” means 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.

“Blind” means a solid plate installed at the end of a pipe which has at that point been physically disconnected from a piping system.

“Clean Respirator Air” when used to describe the atmosphere inside a confined space, means an atmosphere which is equivalent to clean, outdoor air and which contains

- (a) about 20.9% oxygen by volume,
- (b) no measurable flammable gas or vapour as determined using a combustible gas measuring instrument, and
- (c) no air contaminant in concentrations exceeding either 10% of its applicable exposure limit in OHSR Part 5 (Chemical Agents and Biological Agents) or an acceptable ambient air quality standard established by an authority having jurisdiction over environmental air standards, whichever is greater.

“Confined Space” except as otherwise determined by WorkSafeBC, means an area, other than an underground working, that

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

Confined Spaces can be further defined depending on the type of atmosphere and configuration of the space. There are three classifications of confined space atmospheres. They are:

“Low Hazard Atmosphere” means an atmosphere which is shown by pre-entry testing or otherwise known to contain clean respirable 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 the OHSR.



“Moderate Hazard Atmosphere” means an atmosphere that is not clean respirable 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.

“High Hazard Atmosphere” means 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. **It is important to note, UBC workers do not enter confined spaces with high hazard atmospheres.**

“Disconnecting” means physically disconnecting adjacent piping from a confined space to prevent its contents from entering the space in the event of discharge.

“Double Block and Bleed” means the closure of adjacent piping by locking out a drain or vent in the open position in the line between 2 locked out valves in the closed position.

“Harmful Substance” means a WHMIS hazardous product, a substance referred to under OHSR Section 5.48, or a substance which may have a harmful effect on a worker in a confined space.

“IDLH Atmosphere” means an atmosphere containing a substance at a concentration which is immediately dangerous to life or health (IDLH) because the concentration is greater than that from which one could escape without any escape-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.

“Inerting” means 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.

“Lockout” means the use of a lock or locks to render machinery or equipment inoperable or to isolate an energy source in accordance with a written procedure.

“Qualified Person” means a person who has had adequate training and experience in the recognition, evaluation and control of confined space hazards. This may include a:

- certified industrial hygienist (CIH),
- registered occupational hygienist (ROH),
- certified safety professional (CSP),
- Canadian registered safety professional (CRSP),
- professional engineer (P. Eng.), or
- one who has a combination of training, education and experience acceptable to WorkSafeBC.

“Supervisor” means a person who instructs, directs and controls workers in the performance of their duties. A supervisor can be any worker (management or staff) who meets this definition, whether or not they have the supervisor title. In this document, the supervisor is referenced as the “Responsible Supervisor”.



Identifying Confined Spaces

At UBC, the majority of confined spaces are utility manholes, but other confined spaces such as pits, tunnels, vessels and sumps are also present.

Characteristics

In order for a space to be identified as a confined space, it must meet the definition of a confined space, which includes all four of the following characteristics:

- 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, and
- is large enough and so configured that a worker could enter to perform assigned work.

A Qualified Person must be consulted to review the space and assist in determining if the space is a confined space. A Qualified Person, as defined in the Occupational Health and Safety Regulation (OHSR) Section 9.11, is one who has adequate training and experience in the recognition, evaluation and control of confined space hazards.

Inventory

Administrative heads of units must ensure confined spaces within their jurisdiction have been identified and an inventory list is established and maintained.

Identification

When a confined space requires entry by a worker, each point of access, which is not secured against entry, must be identified by a sign or other effective means which indicates the hazard and prohibits entry by unauthorized workers.

In some circumstances, use of signs or securing a confined space may be impracticable, for example, on utility manholes. Instruction and training of workers will ensure that they will be aware that this type of space is included in the Confined Space Entry Program and that additional requirements to sign or secure those spaces would not be necessary.

Excluded Spaces

In addition to confined spaces, the OHSR allows certain spaces to not be identified as confined spaces, rather, that they be identified as excluded spaces. In order for a space to be an excluded space, a Qualified Person must assess the space based on specific exclusion criteria and the space must satisfy all the criteria for it to be deemed an excluded space. Examples of excluded spaces include swimming pools, crawl spaces, excavations, attic spaces, elevator shafts and HVAC plenums, but only if they satisfy all required exclusion criteria.

While excluded spaces may be exempt from confined space regulatory requirements, other parts of the OHSR may still apply and hazards in those spaces would still need to be controlled accordingly.



Hazard Assessments

Hazard assessments describe hazards found in confined spaces and must be prepared for all confined spaces. If hazards are not identified, assessed and controlled appropriately, they can cause serious injury or death. Safe work procedures must then be developed from the site-specific hazard assessment..

A Qualified Person as defined by the Occupational Health and Safety Regulation (OHSR) is one who has adequate training and experience in the recognition, evaluation and control of confined space hazards. A Qualified Person must prepare the hazard assessments for:

- confined space or group of confined spaces with similar characteristics, and
- work activity or group of work activities which present similar hazards and are performed in a confined space.

Hazard assessments are carried out to determine the confined space hazard rating (e.g. low, moderate or high hazard atmosphere) by reviewing and documenting the following:

- Location details,
- Work overview,
- Space characteristics and hazard rating
- Pre-existing hazards prior to entry due to confined space's design, location or use,
- Additional hazards which may develop based on planned work activities inside the space,
- Potential for oxygen enrichment and deficiency, flammable gas, vapour or mist, combustible dust, other hazardous atmospheres,
- Harmful substances requiring lockout or isolation,
- Engulfment and entrapment,
- Other hazardous conditions (e.g. noise, lighting, thermal extremes, slipping/tripping, etc.).

A generic hazard assessment can be used where multiple, similar confined spaces exist and where similar work is performed in those confined spaces. However, the hazards and risk factors must be identical for each of those spaces.

Should there be any changes to the space conditions, potential hazards and/or work activities performed in a confined space, all confined space work for that space must stop and the responsible supervisor must be notified immediately. A Qualified Person must conduct a reassessment of the confined space and make required updates to the hazard assessment and all safe work procedures, prior to workers entering the confined space.

Before confined space work begins, the site-specific hazard assessment and safe work procedures must be reviewed by all workers involved in the confined space work, including standby persons and rescue persons, and must be available at the worksite.

POTENTIAL HAZARDS OF CONFINED SPACES

Below is a list of potential hazards found in confined spaces. Additional hazards may be present depending on the space. Refer to the site-specific hazard assessment for a complete listing of potential hazards for the confined space.



Hazardous Atmospheres

The only way to determine if the atmosphere is hazardous is by monitoring with an air monitor that is equipped with correct sensors that is specific to the hazards present in a confined space. The monitor must be in good working order, properly maintained, calibrated and bump tested daily.

- **Oxygen deficient atmosphere:** Normal air contains 20.9% oxygen and an oxygen deficient atmosphere is one that has less than 19.5% oxygen. If the air in the confined space is anything other than 20.9%, the reason should be investigated by a Qualified Person to ensure the space is safe to enter. Lack of oxygen can damage the brain and cause the heart to stop after a few minutes. NOTE: UBC employees will not enter any confined space with less than 19.5% oxygen.
- **Oxygen enriched atmosphere:** is one that has more than 23.0% oxygen and can greatly increase the risk of fire or explosion in the confined space. Materials that would not normally catch fire or burn in normal air may do so extremely quickly and easily where there is a high level of oxygen.
- **Toxic gases and vapours:** Contaminants in the air can result in an atmosphere that is toxic to workers and may result in injury or death. Toxic gases and vapours come from a variety of sources. Sewage and other rotting organic materials produce hydrogen sulfide (H₂S). Carbon monoxide (CO) is produced by the incomplete combustion of fossil fuels. Liquids may produce hazardous atmospheres if it evaporates. Other toxic substances may have been spilled or dumped into a sewer system. Additional toxic gases and vapours may be present in a confined space, created by the work being performed or entered from outside sources. At certain concentrations, some substances become immediately dangerous to life and health (IDLH) and even a brief exposure can cause make workers dizzy or unconscious as well as cause permanent health effects. Allowable occupational exposure limits can be found in the OHS Guideline 5.48-1.
- **Explosive atmosphere:** Three elements are necessary for a fire or explosion to occur: oxygen, flammable material (gas, vapour, or mist) and an ignition source. Methane, gasoline vapours, H₂S and oxygen enriched atmospheres are some examples that can cause a fire or explosion in a confined space. Concentration of a flammable gas or vapour must not exceed 20% of the lower explosive limit (LEL). Exposure limits and lower explosive limits must be consulted to determine safe levels.

Slip, Trip and Fall Hazards

Wet surfaces may be present on flooring and ladder rungs that can cause surfaces to be slippery. Equipment present can cause trip hazards. Entering into confined spaces may require one to ascend or descend using ladders, which can cause fall hazards. If there is a danger of falling from a height and the hazard cannot be eliminated, a fall protection system (e.g. guardrails or a harness and lifeline, may be required.

Falling Objects

Workers in confined spaces should be aware of the possibility of falling objects especially in spaces that have access ports or work activities located above the workers. Attempt to eliminate or minimize the hazard by scheduling work activity so that no worker is working above another worker. Lower equipment and tools into the space before workers enter and remove them after workers leave the space.



Lockout or Isolation

Hazardous energy sources must be locked out or isolated if work in a confined space could potentially cause an accidental release of energy (e.g. mechanical equipment, electrical shock, substances entering through piping, etc.). When lockout or isolation is to be applied, lockout and isolation procedures must be followed and a Confined Space Entry Permit must be completed and posted at the confined space entrances prior to confined space work starting.

Engulfment and Entrapment

Engulfment results when a substance, liquid, or solid flows around a person and encloses them, hindering their ability to escape and often making it impossible for them to breathe because they become immersed in the substance. Examples include a sudden release of water into a confined space or a sudden release of sawdust, sand or grain into a confined space.

Entrapment can occur in any space that has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.

Engulfment and entrapment hazards require that a Confined Space Entry Permit be completed and posted at the confined space entrance prior to confined space work starting.

Thermal Extremes

Extremely hot or cold temperatures can lead to heat or cold stress challenges for workers. Steam manholes and other spaces that might cause heat stress must be assessed with a heat stress meter (e.g. hygrometer or Wet Bulb Globe Temperature (WBGT) meter) prior to entry and allowed to cool if too hot. If the temperature risk cannot be reduced to an acceptable level, then other work procedures must be employed, such as a work/rest regime, a shutdown, or specialized personal protective cooling equipment.

Noise

Noise produced in confined spaces can be amplified because of the design of the space. Excessive noise can not only damage hearing, but can also affect communication, such as causing a shouted warning to go unheard. If noise levels cannot be reduced, proper hearing protection must be worn where necessary.

Poor visibility

If poor visibility results from inadequate lighting, the light levels should be increased, as required. If activities such as sandblasting or welding results in poor visibility, appropriate ventilation may be needed to reduce harmful substances in the air.

Toxic Chemicals

Chemicals in controlled products may restrict a worker's ability to escape from confined spaces. Exposure limits and safe work procedures should be referred to before using any toxic chemicals



Hot Surfaces

Hot surfaces may be present in confined spaces and contacting them with unprotected skin can result in thermal burns. Proper personal protective equipment and protective devices must be utilized in spaces with hot surfaces.

Awkward Spaces

Many confined spaces have limited room for one to move around in (e.g. low ceilings, protruding pipes, etc.), which may increase the risk of musculoskeletal injuries. This risk may increase with the use of tools, climbing ladders and lifting heavy objects without good footing or mechanical aids.

RESOURCES

- APPENDIX A: Confined Space Hazard Assessment Template

Safe Work Procedures

Safe work procedures describe the means to eliminate or minimize the hazards that are identified in the hazard assessments. Before workers enter into a confined space, written safe work procedures, which includes entry procedures and rescue procedures must be developed by a Qualified Person for each confined space (or group of similar spaces), based on the hazard assessment for that space and the type of work performed inside the space. Additional safe work procedures may apply.

Safe work procedures will document and explain the following:

- Location details,
- Work overview,
- Space characteristics and hazard rating,
- Roles and responsibilities of supervisor, workers, standby person, rescuers, Qualified Person,
- Equipment requirements,
- Personal protective equipment requirements,
- Documentation requirements,
- Other precautions required by OHSR,
- Verification and testing of the atmosphere,
- Cleaning, purging, venting or inerting,
- Ventilation requirements,
- Rescue procedures,
- Entry permit (if applicable),
- Lockout or isolation (if applicable), and
- Coordination of work activities.

Similar to hazard assessments, should there be any changes to the space conditions, potential hazards and/or work activities performed in a confined space, all confined space work for that space must stop and the responsible supervisor must be notified immediately. A Qualified Person must conduct a reassessment of the confined space and make required updates to the hazard assessment and all safe work procedures, prior to workers entering the confined space.

Before confined space work begins, the site-specific hazard assessment and safe work procedures must be reviewed by all workers involved in the confined space work, including standby persons and rescue persons, and must be available at the worksite.

RESOURCES

- APPENDIX A: Confined Space Hazard Assessment Template
- APPENDIX B: Confined Space Entry Procedure Template
- APPENDIX C: Confined Space Rescue Procedure
- APPENDIX D: Confined Space Entry Log
- APPENDIX E: Confined Space Entry Permit



Testing the Atmosphere

Prior to workers entering a confined space the atmosphere must be tested by trained and qualified workers in accordance to the site-specific entry procedure.

Testing Initial Conditions

Confined spaces may contain explosives, toxic or oxygen-deficient atmospheres. As a result, test the atmosphere before opening hatches or starting ventilation whenever possible. This will assist in identifying whether or not an explosives atmosphere exists, the amount of ventilation required for the space and helps prevent the venting of a hazardous atmosphere out of the space into areas occupied by workers.

Pre-entry testing is testing the atmosphere before a worker enters a confined space. Pre-entry testing is to be done before the space is ventilated, if ventilation is required. Pre-entry testing must be done within 20 minutes of entering a confined space and is often conducted more than once. All testing results must be recorded and posted at all entry points to the confined space.

Testing the atmosphere before workers enter a confined space will verify that all required precautions are effective at controlling the identified hazards and that the atmosphere is safe for workers to enter a confined space.

Continuous Monitoring

While a worker is inside a confined space with a moderate or high hazard atmosphere, additional testing must be conducted to ensure the worker's continued safety. The intervals at which additional testing will occur will be documented in the site-specific written safe work procedure. **It is important to note, UBC workers do not enter confined spaces with high hazard atmospheres.**

Continuous monitoring provides continuous feedback to the workers entering into a confined space. Whenever possible, continuous monitoring of the atmosphere must be done.

Testing Equipment

Confined space atmospheric testing equipment must be calibrated and bump tested in accordance with the manufacturer's instructions. For example, calibration is generally every 30 days and daily bump testing is at the start of the work shift. Records of calibration and bump testing must be kept and maintained.

What to Test

Atmospheric testing equipment is used to test for:

- Oxygen level (measured as a percentage of oxygen in the air)
- Explosive conditions and flammable gases (measured as a percentage of the lower explosive limit, or LEL or as mg/m³)
- Contaminants that have been identified in the hazard assessment (measured as the concentration in parts per million, or ppm or as mg/m³)



UBC atmospheric testing equipment are to be set with low and high alarm set points to notify workers of the potential of an unsafe condition in the atmosphere. Should the multi-gas detector alarm, workers are to immediately exit the confined space and report to their supervisor. Workers are not to re-enter the confined space until the atmosphere is back to acceptable conditions or further instructions and entry procedures are provided by a Qualified Person.

	Acceptable Conditions	Unsafe Conditions
Oxygen (O ₂)	Between 19.5% and 23.0%	Below 19.5% or above 23.0%
Lower explosive limit (LEL)	Less than 20% of LEL	Greater than 20% of LEL
Carbon monoxide (CO)	Less than 25 ppm	Greater than 25 ppm
Hydrogen sulfide (H ₂ S)	Less than 10 ppm	Greater than 10 ppm

UBC's atmospheric testing equipment are generally multi-gas detectors that monitor the above. Should a site-specific hazard assessment and work procedure indicate additional hazards to be monitored, ensure the correct multi-gas detector is used.

When to Test

Test the atmosphere:

- Before opening access to the space, if possible,
- Immediately after opening access to the space,
- Prior to initial entry into confined space, within 20 minutes of entry,
- While workers are in the space, at regular intervals as outlined in site-specific entry procedures,
- Before workers re-enter a space after it has been vacant for more than 20 minutes,
- When there is a change in work,
- During work that causes contaminants to be generated in the space,
- If a change in atmosphere is suspected,
- If a hazardous substance is accidentally introduced into the space,
- If ventilation fans have been shut down for any reason, and
- When entry procedures require it (e.g. before and after procedures such as cleaning and purging).

Where to Test

When testing a confined space, ensure that the space is tested at all levels because some gases are heavier or lighter than others are. Test:

- Around access points before opening,
- Just under the access hatch, lid, or cover where flammable gases may collect,
- In the middle of the space as gases such as oxygen and carbon monoxide may be throughout the space,
- At the bottom of the space as hydrogen sulfide is heavier than air,
- Test at two-foot intervals, and
- At locations where workers perform work.



Documentation

Atmospheric test readings must be recorded in either the Confined Space Entry Log or the Confined Space Entry Permit (if required) and posted at all entry points to the confined space.

RESOURCES

- APPENDIX D: Confined Space Entry Log
- APPENDIX E: Confined Space Entry Permit



Making the Atmosphere Safe

Before workers enter a confined space, the goal is to have clean respirable air in the space. Clean respirable air is equivalent to clean outdoor air which contains sufficient oxygen, no flammable substances, and air contaminants within acceptable levels. This is why atmospheric testing includes these three conditions.

If it is known or pre-entry testing shows a confined space does not have clean respirable air, the hazard must be eliminated or controlled before workers enter the space. For example, it may be necessary to:

- clean the space to remove contaminants,
- replace an unsafe atmosphere with clean respirable air by purging and ventilating the space,
- prevent fires and explosions,
- inert the space,
- use continuous ventilation to keep the atmosphere safe,
- use respirators if clean respirable air cannot be maintained.

If a hazard must be eliminated or controlled in ways that are listed above and it is known in advance, the site-specific entry procedures as developed by a Qualified Person will detail the requirements. If pre-entry testing shows a confined space no longer has clean respirable air as stated in the site-specific hazard assessment and entry procedure, workers are to immediately exit the confined space and report to their supervisor. Workers are not to re-enter the confined space until the atmosphere is back to acceptable conditions or further instructions and entry procedures are provided by a Qualified Person.

Ventilation

Even if atmospheric testing shows clean respirable air, further controls such as ventilation may be required to ensure the atmosphere remains safe while workers are in the space. Ventilation is the active movement of air.

Every confined space must be ventilated continuously while a worker is inside the space, except in:

- a low hazard atmosphere provided that:
 - the atmosphere is continuously monitored and shows to contain clean respirable air,
 - the space is occupied for less than 15 minutes,
 - work generates no contaminants, and
 - the space has an internal volume greater than 1.8 m³ per occupant; or
- an atmosphere that is intentionally being inerted.

The two main types of mechanical ventilation used are:

- Local exhaust ventilation – uses exhaust fans or ducts to remove contaminated air at its source before it has a chance to spread through a confined space
- General (diluted) ventilation – uses mechanical equipment (e.g. fans, blowers, ducting) to deliver clean air into a space or to remove contaminated air from a space.



Natural ventilation is ventilation of a space by natural air movement resulting from wind or convection currents. Natural ventilation must not be used:

- to ventilate a confined space that has a high hazard atmosphere, or
- if such ventilation could draw air other than clean respirable air into the confined space.

Ventilation requirements will be outlined in site-specific entry procedures that are developed by a Qualified Person.



Controlling Physical Hazards

When physical hazards have been identified in a confined space hazard assessment, means to eliminate or minimize the hazards will be identified by the Qualified Person in the confined space entry procedures. Additional safe work procedures may also apply.

The following are examples of physical hazards that need to be eliminated or minimized to ensure the space is made safe for workers to enter:

- Loose and unstable material – danger of entrapment or engulfment
- Moving parts of machinery – hazardous energy in the form of electrical, chemical, thermal, radiation, kinetic and potential can injure a worker if not properly de-energized or locked out
- Substances entering through piping – if adjacent piping contains (or has contained) a harmful substance that has the potential to enter the confined space, the substance must be controlled using isolation procedures to ensure contaminants inside the piping will not enter the confined space.
 - Examples of isolation include:
 - Disconnecting a pipe,
 - Blanks and blinds,
 - Double block and bleed.
- Electrical shock – electrical tools and equipment used in a confined space must be grounded or double-insulated. If wet or damp conditions exist inside the confined space, electrical tools and equipment must be protected by an approved ground fault circuit interrupter (GFCI) or other acceptable means of protection.



Standby Persons

All confined space entries must have a standby person stationed at or near the entrance to the space. The role of the standby person is to check the well-being of workers inside the space either by visually observing them or using another method of checking in.

At UBC, the standby person is responsible for testing the atmosphere inside the confined space.

The standby person is also responsible for summoning help in the event of an emergency. Workers inside the space must always have a means to contact the standby person at any time, whether it be visual or voice contact. The standby person must always be outside of the space and never inside the space.

Standby person requirements are different depending on if the space is rated as a low, moderate or high hazard atmosphere.

Low Hazard Atmospheres

If a worker enters a confined space which contains a low hazard atmosphere:

- another worker must be assigned as a standby person,
- there must be a continuous means of summoning the standby person,
- a standby person must be stationed near the entrance to the space,
- the standby person must check on the well-being of the worker(s) inside the space at least every 20 minutes, and
- the standby person must have a means to immediately summon rescue persons.

Moderate Hazard Atmospheres

If a worker enters a confined space which contains a moderate hazard atmosphere:

- another worker must be assigned as the standby person
- there must be a continuous means of summoning the standby person from inside the space,
- a standby person must be stationed at or near the entrance to the space,
- the standby person 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 at least every 20 minutes, and
- the standby person must have a means to immediately summon rescue persons.

High Hazard Atmospheres

While the Occupational Health and Safety Regulation (OHSR) has specific requirements for a standby person for confined spaces that have a high hazard atmospheres, **UBC workers do not enter confined spaces with high hazard atmospheres.**

Standby person requirements, roles and responsibilities will be outlined in the site-specific entry procedures developed by a Qualified Person.



Rescue

Rescue services and rescue procedures must be in place each time a confined space entry is made. Arrangements for rescue must consider the size and shape of the confined space, nature of the work, obstacles and hazards within, number of workers in the space and the location of entry and exit points.

Provision for Rescue

Rescue from a confined space must be done only by trained and authorized rescue persons.

Rescue persons can be a UBC rescue team that is trained and authorized to perform rescue from confined spaces that are non-immediately dangerous to life or health (IDLH). **UBC workers and UBC rescue persons do not enter into confined spaces with high hazard atmospheres in which an IDLH condition exists.**

If rescue persons are employees of another firm or agency, there must be a written agreement detailing the services to be provided.

Rescue Equipment

Self rescue is the preferred option and will be utilized whenever possible. As a result, all workers entering a confined space will be required to wear a retrieval harness that meets the requirements acceptable to the OHSR.

Rescue equipment such as lifelines, harnesses and lifting equipment must be available and appropriate to the confined space it is being used for. All rescue equipment must meet the requirements acceptable to the OHSR. Rescue equipment must be inspected and certified according to the manufacturer's instructions and replaced as required by the Occupational Health and Safety Regulation (OHSR). Inspection and certification records must be kept and maintained.

Rescue Training

Rescue persons must be trained at a minimum in Non-IDLH Confined Space Rescue and attend regular retraining. They must also participate in simulated rescue or evacuation exercises with the use of the rescue equipment every year. Rescue persons must also be a minimum Occupational First Aid Level 1 attendant trained to immobilize and package for transport an injured worker.

Notification

Before a worker enters a confined space, the responsible supervisor or standby person must notify rescue persons of work in the space and ensure they are available to rescue.

The responsible supervisor or standby person must notify rescue persons when all workers have completed their work and exited the space.

If more than one confined space is to be entered at the same time, notification of rescue persons to be on alert status at the start of work is adequate. However, if a rescue takes place and rescue persons respond to a confined space and there is insufficient capacity to deal with multiple rescues, the employer must stop all other confined space work.



Notification requirements listed above do not apply if the written agreement indicates that rescue personnel are available 24 hours each day.

Summoning Rescue

Rescue persons must ensure they monitor communication systems that will be used to summon the rescue persons in the event of an emergency once they have been informed by the responsible supervisor or standby person that a confined space entry is in progress.

Rescue Procedures

Rescue procedures will document and explain the following:

- Location details,
- Work overview,
- Space hazards,
- Rescue team personal protective equipment,
- Rescue team equipment,
- Notification,
- Summoning rescue,
- Names of workers involved,
- Names of rescue persons,
- Roles and responsibilities of supervisor, workers, standby person, rescuers, Qualified Person, and
- Documentation.

Before confined space work begins, the responsible supervisor must complete a site-specific rescue procedure. The rescue procedure along with the site-specific hazard assessment and entry procedures must be reviewed by all workers involved in the confined space work, including standby persons and rescue persons, and must be available at the worksite. The responsible supervisor must designate a team leader who is adequately trained in the rescue procedures to direct rescue persons.

Effective voice communication must be maintained at all times between rescue persons and the team leader directing the rescue.

Self rescue is the preferred option and will be utilized whenever possible. Should a rescue person need to enter a confined space, they can only enter if there is at least one additional trained rescue person located outside to render assistance. As a result, there needs to be a minimum of 2 rescue persons notified to be part of a rescue. A standby person can serve as a rescue person as long as they are adequately trained and equipped to perform rescue. Where this occurs, the confined space work will involve a minimum of 3 people, the worker in the confined space needing rescue, the standby/rescue person and another rescue person to render assistance. If the standby person does not serve as a rescue person, the confined space work will involve a minimum of 4 people, the worker in the confined space needing rescue, the standby person and 2 rescue persons.

All possible effort must be applied to eliminate, control or reduce the risk to rescue persons when a rescue is required.



RESOURCES

- APPENDIX A: Confined Space Hazard Assessment Template
- APPENDIX B: Confined Space Entry Procedure Template
- APPENDIX C: Confined Space Rescue Procedure
- APPENDIX D: Confined Space Entry Log
- APPENDIX E: Confined Space Entry Permit



Entry Permits

An entry permit is a document that details work to be done when a worker enters a confined space.

When an Entry Permit is Required

An entry permit is required in confined spaces that:

- require lockout or isolation procedures to be followed, or
- have a hazard of entrapment or engulfment.

While the Occupational Health and Safety Regulation (OHSR) also requires an entry permit to be filled for confined spaces with high hazard atmospheres, **UBC workers do not enter confined spaces with high hazard atmospheres.**

Required Information

An entry permit must be completed and signed by the responsible supervisor before a worker enters a confined space and must contain the following information:

- confined space and the work activities to which it applies,
- names of workers authorized to enter the space,
- control measures or precautions required prior to and during entry,
- length of time the permit is valid for, and
- signature of the responsible supervisor of the confined space entry.

The entry permit must be posted at each designated point of entry to a confined space.

Changes to an Entry Permit

Once an entry permit is issued, the information on the entry permit may only be altered by:

- the responsible supervisor who signed the permit, to:
 - review, update and re-sign as necessary to ensure the ongoing safety of the workers inside the space, which may include:
 - changes in the work crew,
 - after each shift change, or
 - after a change in the responsible supervisor.,
- the standby person to update the list of workers inside the confined space, or
- the tester to record test results.

Once an entry permit has expired, a new permit must be issued before entry into the confined space is allowed. Every worker affected must be informed of an alteration of entry permit regarding a change in the required precautions or work activity.

Record Keeping

A copy of the signed entry permit must be kept for at least one year by the responsible supervisor.



RESOURCES

- APPENDIX E: Confined Space Entry Permit



Personal Protective Equipment

Hazards within confined spaces need to be controlled appropriately by following the hierarchy of hazard control, which is a system used to protect workers from hazards in the workplace by considering the following (in order from most to least effective):

1. Elimination – Can the hazard be eliminated from the workplace?
2. Substitution – Can the hazard be replaced with something non-hazardous or less hazardous?
3. Engineering – Can the physical work environment be changed to control the risk?
4. Administrative – Can changes be made to the work activities to make them safer?
5. Personal Protective Equipment (PPE) – If elimination, substitution, engineering and administrative controls do not effectively control the hazard, PPE may be necessary, either alone or in addition to other measures, to help protect workers.

A list of potential hazards for a confined space will be documented in the site-specific hazard assessment. Site-specific safe work procedures will describe the means to eliminate or minimize the potential hazards and will list PPE requirements. There may be different PPE requirements for workers inside the confined space, standby persons and rescue persons and may include, but not limited to the following:

- Retrieval harness,
- Safety footwear,
- Safety headgear,
- Eye and face protection,
- Limb and body protection,
- Air purifying respirator,
- Hearing protection,
- Gloves,
- High visibility apparel.

All PPE must be used, inspected and maintained in accordance with the manufacturer's instructions. All PPE must meet the requirements acceptable to the Occupational Health and Safety Regulation (OHSR). Workers must be instructed and trained in the use, limitations and maintenance requirements of PPE to ensure they are using the equipment properly.

The responsible supervisor must ensure workers entering confined spaces are provided and wear the required personal protective equipment.



Instruction and Training

All UBC workers who are required to perform work in or related to confined space as well as supervisors who direct confined space work must receive appropriate instruction and training on the hazards of the space and precautions to properly perform their work. This includes worker that enters a confined space, standby person, responsible supervisor and rescue persons.

Confined Space Entry Training

All workers who are required to perform work in or related to confined space must attend Confined Space Entry training that meets the requirements of the Occupational Health and Safety Regulation (OHSR) and includes:

- Identification and inventory of confined spaces,
- Regulatory requirements,
- Roles and responsibilities,
- Hazard types and hazard classifications,
- Utilize atmospheric monitoring equipment,
- Controls (e.g. elimination/substitution, engineering, administrative, personal protective equipment (PPE)),
- Hazard assessments and safe work procedures,
- Rescue, and
- Entry permits.

Rescue Person Training

In addition to Confined Space Entry Training, all rescue persons at a minimum must attend the following trainings that meet the requirements of the OHSR:

- Non-Immediately Dangerous to Life or Health (IDLH) Confined Space Rescue,
- Occupational First Aid Level 1, and
- Transport Endorsement.

UBC workers and UBC rescue persons do not enter into confined spaces with high hazard atmospheres in which an IDLH condition exists.

Rescue persons must also participate in simulated rescue or evacuation exercises with the use of the rescue equipment every year. Regular practices and exercises will help rescue persons retain their skills.

Retraining

Workers and rescue persons must attend retraining every 3 years to ensure knowledge and skills are maintained.

Record Keeping

Records of training and simulated rescue or evacuation exercises must be kept and maintained.



Coordination of Work Activities

With various work activities occurring at the same time at UBC, it is important that work activities from one worksite do not generate hazards that could affect the health and safety of adjacent workers at a different worksite. In addition, work may involve workers of more than one employer (e.g. UBC and a contractor) and workers may be working in the same space at the same time or within the same day.

Whenever possible, work activities should be planned ahead of time to prevent overlap of work areas and to prevent hazards from causing injuries to another group of workers. Common hazards may include the additional contaminants being generated (e.g. from pressure washing, sandblasting, welding, etc.), falling materials, struck by equipment/materials and trip hazards.

Use of barriers can help restrict work areas, establish work schedule can provide anticipated timeline and regular communication will ensure all adjacent work groups are of the same understanding.

UBC workers requiring entry into confined spaces that are outside of their jurisdiction must request authorization and receive approval prior to entering. They must request for the site-specific hazard assessment and safe work procedures from the owner of the space.

Contractors entering any UBC confined spaces must also request authorization and receive approval prior to entering. Contractors are required to follow their own Confined Space Entry Program.

Where two or more employers are present at the same worksite, one of the employers must be assigned the duty of prime contractor.



Program Review

The UBC Confined Space Entry Program will be reviewed and updated as needed by Safety & Risk Services. The purpose of a program review is to determine the effectiveness of the program and to implement changes needed to improve the health and safety of workers involved in confined space work.

The program review will also identify areas of non-compliance with the Occupational Health and Safety Regulation.

The program review will include consultation with UBC stakeholders and the Joint Occupational Health and Safety Committee.



Appendix A: Confined Space Hazard Assessment Template

HA

Confined Space Hazard Assessment

*This specific Confined Space Hazard Assessment **MUST** be reviewed and followed along with the site-specific Confined Space Entry Procedure and Rescue Procedure by all workers involved in the confined space work (e.g. responsible supervisor, worker entering, standby person, rescue persons).*

1.0 GENERAL/LOCATION DETAILS

NAME OF SPACE

SITE ADDRESS

ASSESSMENT DATE

2.0 WORK OVERVIEW

3.0 SPACE IDENTIFICATION

These spaces have been identified as “confined spaces” as it meets the definition under the Occupational Health and Safety Regulation (OHSR) Section 9.1, which includes all of the following criteria:

- ☒ Enclosed or partially enclosed,
- ☒ Not designed or intended for continuous human occupancy
- ☒ Has limited or restricted means for entry/exit that may complicate emergency response service (e.g. first aid, evacuation, rescue, etc.)
- ☒ Large enough and so configured that a worker can enter to perform work tasks

Photo of Confined Space



Confined Space Hazard Assessment

4.0 SPACE CHARACTERISTICS

DIMENSIONS OF SPACE		ENTRY/EXIT ACCESS POINT	
GENERAL SHAPE		GENERAL SHAPE	
LENGTH		LENGTH	
WIDTH		WIDTH	
HEIGHT		HEIGHT	
DIAMETER		DIAMETER	
VOLUME		VOLUME	
SPACE ABOVE OR BELOW GROUND		# of ACCESS POINTS	
		ACCESS POINT LOCATION	
USE/FUNCTION			
CONTENTS			
EQUIPMENT INSIDE			
ADJACENT PIPING INTO SPACE			
ADJACENT PIPING OUT OF SPACE			

Detailed Photos of Confined Space (e.g. access points, contents, equipment)



Confined Space Hazard Assessment

5.0 ASSESSMENT OF PRE-EXISTING HAZARDS IN SPACE (Not including hazards from work activities)

ATMOSPHERIC TESTING RESULTS						OBSERVATIONS/NOTES
OXYGEN	TOP		MIDDLE		BOTTOM	
LEL	TOP		MIDDLE		BOTTOM	
CARBON MONOXIDE	TOP		MIDDLE		BOTTOM	
HYDROGEN SULFIDE	TOP		MIDDLE		BOTTOM	

RISK LEGEND	LOW (L)	MODERATE (M)	HIGH (H)
-------------	---------	--------------	----------

#	HAZARD	Y	N	RISK	OBSERVATIONS/NOTES
A. ATMOSPHERIC					
1	OXYGEN DEFICIENT (<19.5%)	<input type="checkbox"/>	<input type="checkbox"/>		
2	OXYGEN ENRICHED (>23.0%)	<input type="checkbox"/>	<input type="checkbox"/>		
3	EXPLOSIVE GASES/VAPOURS	<input type="checkbox"/>	<input type="checkbox"/>		
4	CARBON MONOXIDE	<input type="checkbox"/>	<input type="checkbox"/>		
5	HYDROGEN SULFIDE	<input type="checkbox"/>	<input type="checkbox"/>		
6	NITROGEN DIOXIDE	<input type="checkbox"/>	<input type="checkbox"/>		
7	METHANE	<input type="checkbox"/>	<input type="checkbox"/>		
B. CHEMICAL					
8	PARTICULATE/DUST (NOT OTHERWISE CLASSIFIED)	<input type="checkbox"/>	<input type="checkbox"/>		
9	CHEMICALS	<input type="checkbox"/>	<input type="checkbox"/>		
10	CHEMICAL RESIDUE/SCALE/SLUDGE	<input type="checkbox"/>	<input type="checkbox"/>		
11	CHEMICAL REACTIVITY	<input type="checkbox"/>	<input type="checkbox"/>		
C. BIOLOGICAL					
12	MOULD/BACTERIA/VIRUSES/PATHOGENS	<input type="checkbox"/>	<input type="checkbox"/>		
13	SEWAGE (HUMAN ORGANIC MATTER)	<input type="checkbox"/>	<input type="checkbox"/>		
14	ANIMAL ORGANIC MATTER	<input type="checkbox"/>	<input type="checkbox"/>		
D. PHYSICAL					
15	NOISE (>85 dBA L_{ex} or 140 dBC peak sound level)	<input type="checkbox"/>	<input type="checkbox"/>		
16	VIBRATION	<input type="checkbox"/>	<input type="checkbox"/>		
17	NON-IONIZING/IONIZING RADIATION	<input type="checkbox"/>	<input type="checkbox"/>		
18	LASER	<input type="checkbox"/>	<input type="checkbox"/>		
19	THERMAL EXTREMES	<input type="checkbox"/>	<input type="checkbox"/>		
20	HOT/COLD SURFACES/MATERIALS	<input type="checkbox"/>	<input type="checkbox"/>		
21	LIGHTING/VISIBILITY	<input type="checkbox"/>	<input type="checkbox"/>		
22	ERGONOMIC	<input type="checkbox"/>	<input type="checkbox"/>		
E. PHYSICAL DESIGN/CONFIGURATION					
23	STRUCTURAL	<input type="checkbox"/>	<input type="checkbox"/>		
24	FLOOR OPENINGS	<input type="checkbox"/>	<input type="checkbox"/>		



Confined Space Hazard Assessment

#	HAZARD	Y	N	RISK	OBSERVATIONS/NOTES
F. EQUIPMENT/CONTENT					
25	FALLS	<input type="checkbox"/>	<input type="checkbox"/>		
26	ENTRY/EXIT	<input type="checkbox"/>	<input type="checkbox"/>		
27	OVERHEAD/UNDERNEATH	<input type="checkbox"/>	<input type="checkbox"/>		
28	PERSONAL CONFINEMENT	<input type="checkbox"/>	<input type="checkbox"/>		
29	OBSTACLES	<input type="checkbox"/>	<input type="checkbox"/>		
30	MECHANICAL	<input type="checkbox"/>	<input type="checkbox"/>		
31	PNEUMATIC	<input type="checkbox"/>	<input type="checkbox"/>		
32	HYDRAULIC	<input type="checkbox"/>	<input type="checkbox"/>		
33	ELECTRICAL	<input type="checkbox"/>	<input type="checkbox"/>		
34	ADJACENT PIPING	<input type="checkbox"/>	<input type="checkbox"/>		
35	ENGULFMENT	<input type="checkbox"/>	<input type="checkbox"/>		
36	ENTANGLEMENT	<input type="checkbox"/>	<input type="checkbox"/>		
G. GENERAL SAFETY					
37	SHARPS	<input type="checkbox"/>	<input type="checkbox"/>		
38	VEHICULAR TRAFFIC/MOVING EQUIPMENT	<input type="checkbox"/>	<input type="checkbox"/>		
39	PUBLIC INTERFERENCE	<input type="checkbox"/>	<input type="checkbox"/>		
40	ANIMAL INTERACTION	<input type="checkbox"/>	<input type="checkbox"/>		
41	COMMUNICATION	<input type="checkbox"/>	<input type="checkbox"/>		
42	SLIPS/TRIPS	<input type="checkbox"/>	<input type="checkbox"/>		
43	WEATHER CONDITIONS	<input type="checkbox"/>	<input type="checkbox"/>		

6.0 ADDITIONAL HAZARDS (Based on planned work activities)

WORK
ACTIVITIES

#	ADDITIONAL HAZARDS	Y	N	RISK	OBSERVATIONS/NOTES
		<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>		



Confined Space Hazard Assessment

7.0 CLASSIFICATION OF CONFINED SPACE BASED ON THE HAZARDS FROM THE SPACE AND WORK ACTIVITIES

“Low hazard atmosphere” means an atmosphere which is shown by pre-entry testing or otherwise known to contain clean respirable air immediately prior to entry to a confined space and which is not likely to change during the work activity.

“Moderate hazard atmosphere” means an atmosphere that is not clean respirable 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.

“High hazard atmosphere” means 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. *It is important to note, UBC workers do not enter confined spaces with high hazard atmospheres*

	LOW, MODERATE, HIGH	RATIONALE
ATMOSPHERIC HAZARD CLASSIFICATION:		

8.0 SIGN OFF BY QUALIFIED PERSON

	QUALIFIED PERSON COMPLETING CONFINED SPACE HAZARD ASSESSMENT
NAME AND DESIGNATIONS	
TITLE	
CONTACT INFORMATION	
SIGNATURE	
ASSESSMENT DATE	

9.0 DISCLAIMERS

This document only outlines potential hazards that were identified for the space and planned work activities conducted by UBC workers at the time the assessment was conducted. Should there be any change to the space characteristics, potential hazards and/or planned work activities, all work must stop and the responsible supervisor must be notified immediately. A Qualified Person, as defined in the Occupational Health and Safety Regulation Section 9.11, must reassess the space and update this Confined Space Hazard Assessment accordingly.

Refer to the Confined Space Entry Procedure specific to this space for a list of equipment, tools, materials, controls and steps to take for safe entry, work and rescue. Should there be any changes made to this Confined Space Hazard Assessment, the site-specific Entry Procedure must also be reassessed by the Qualified Person and updated accordingly.



Appendix B: Confined Space Entry Procedure Template

EP

Confined Space Entry Procedure

*This specific Confined Space Entry Procedure **MUST** be reviewed and followed along with the site-specific Confined Space Hazard Assessment and Rescue Procedure by all workers involved in the confined space work (e.g. responsible supervisor, worker entering, standby person, rescue persons).*

1.0 GENERAL/LOCATION DETAILS

NAME OF SPACE	
SITE ADDRESS	
ATMOSPHERIC HAZARD CLASSIFICATION	
PHOTO OF SPACE	

2.0 WORK OVERVIEW

--

*The work activities listed above **MUST NOT CHANGE** for this space. Should there be any changes, all work must stop and the responsible supervisor must be notified immediately. A Qualified Person must reassess the space and update this document and any other applicable documents accordingly.*



Confined Space Entry Procedure

3.0 REQUIRED EQUIPMENT (ON SITE)

WORK AREA, SECURITY AND ENTRY

<input type="checkbox"/> Delineators, barricades, caution tape	<input type="checkbox"/> Confined Space Work – warning signage
<input type="checkbox"/> Portable lighting, flashlight, headlamp	<input type="checkbox"/> Electrical cords (GFCI)
<input type="checkbox"/> 2-way radios, cell phones	<input type="checkbox"/> Portable ladder
<input type="checkbox"/> Standby Person multi-gas monitor (O ₂ , LEL, CO, H ₂ S) with pump	<input type="checkbox"/> Personal multi-gas monitor (O ₂ , LEL, CO, H ₂ S)
<input type="checkbox"/> Personal locks, scissor hasps, tags, lockout devices	<input type="checkbox"/> Group locks, tags, lock box, positive sealing device
<input type="checkbox"/> Positive pressure ventilation fan with flexible ducting	<input type="checkbox"/> Flexible ducting

DOCUMENTATION

<input type="checkbox"/> Confined Space Hazard Assessment	<input type="checkbox"/> Confined Space Entry Procedure
<input type="checkbox"/> Confined Space Entry Log	<input type="checkbox"/> Confined Space Entry Permit
<input type="checkbox"/> Rescue Procedure	<input type="checkbox"/> Lockout and Isolation Procedures

PERSONAL PROTECTIVE EQUIPMENT

<input type="checkbox"/> Retrieval full body harness	<input type="checkbox"/> Respirator
<input type="checkbox"/> Safety footwear	<input type="checkbox"/> Hearing protection
<input type="checkbox"/> Hard hat	<input type="checkbox"/> Gloves
<input type="checkbox"/> Eye and face protection	<input type="checkbox"/> High visibility apparel
<input type="checkbox"/> Limb and body protection (e.g. coveralls, Tyvek disposable coveralls)	

RESCUE

<input type="checkbox"/> Refer to Confined Space Rescue Procedure for a complete list of required rescue equipment	
--	--

4.0 SUMMARY OF IDENTIFIED HAZARDS (AS DOCUMENTED IN HAZARD ASSESSMENT) AND REQUIRED CONTROLS TO BE IN PLACE

#	IDENTIFIED HAZARDS	REQUIRED CONTROLS



Confined Space Entry Procedure

5.0 VENTILATION REQUIREMENTS

ATMOSPHERIC HAZARD CLASSIFICATION	<input type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High (Note: UBC Workers do not enter into HIGH hazard spaces)
SPACE VOLUME	FT ³		METHOD
MAKE AND MODEL			# OF UNITS
MIN FAN CAPACITY	CFM		DUCT LENGTH
MIN # OF AIR CHANGES	PER HOUR		MAX # OF DUCT BENDS
OBSTRUCTIONS			MIN PURGE TIME
AIR MIXING EFFECTIVENESS			
RATIONALE			

6.0 PROCEDURES

PRE-ENTRY REVIEW OF DOCUMENTATION

WORK AREA SETUP

LOCKOUT OR ISOLATION OF ENERGY SOURCES

ATMOSPHERIC TESTING AND VENTILATION

COMMUNICATION, FINAL PREPARATION, TESTING

ENTRY INTO SPACE

EXIT, CLEAN UP



Confined Space Entry Procedure

7.0 SIGN OFF BY QUALIFIED PERSON

QUALIFIED PERSON COMPLETING CONFINED SPACE ENTRY PROCEDURE	
NAME AND DESIGNATIONS	
TITLE	
CONTACT INFORMATION	
SIGNATURE	
DATE	

8.0 DISCLAIMERS

This document is based on hazards that were identified for the space and for the planned work activities conducted by UBC workers at the time the Confined Space Hazard Assessment was conducted. Should there be any change to the space characteristics, potential hazards and/or planned work activities, all work must stop and the responsible supervisor must be notified immediately. A Qualified Person, as defined in the Occupational Health and Safety Regulation Section 9.11, must reassess the space and update the Confined Space Hazard Assessment and this Confined Space Entry Procedure accordingly.



Appendix C: Confined Space Rescue Procedure Template

RP

Confined Space Rescue Procedure In Low and Moderate Hazard Atmospheres

*This specific Confined Space Rescue Procedure **MUST** be reviewed and followed along with the site-specific Confined Space Hazard Assessment and Entry Procedure by all workers involved in the confined space work (e.g. responsible supervisor, worker entering, standby person, rescue persons).*

1.0 LOCATION DETAILS

NAME OF SPACE			
SITE ADDRESS			
ATMOSPHERIC HAZARD CLASSIFICATION	<input type="checkbox"/> Low	<input type="checkbox"/> Moderate	(Note: UBC Workers do not enter into HIGH hazard spaces)

2.0 WORK/GENERAL DETAILS

DATE OF ENTRY	
TIME OF ENTRY & EXIT	
WORK OVERVIEW	
RESPONSIBLE SUPERVISOR	Name: Emergency Contact Number:
WORKER(S) ENTERING CONFINED SPACE	Name: Name:
STANDBY PERSON	Name: Emergency Contact Number:
RESCUE PERSONS NOTIFIED TO PERFORM RESCUE (minimum 2)	Rescuer (Team Lead): Emergency Contact Number: Rescuer: Emergency Contact Number: Rescuer: Emergency Contact Number: Rescuer: Emergency Contact Number:

ONLY workers who are trained and authorized to perform rescue may enter the confined space to rescue and/or assist in the rescue.



Confined Space Rescue Procedure In Low and Moderate Hazard Atmospheres

3.0 METHOD OF RESCUE & EQUIPMENT

TYPE OF RESCUE	<input type="checkbox"/> Vertical <input type="checkbox"/> From Above	<input type="checkbox"/> Horizontal <input type="checkbox"/> From Below	<input type="checkbox"/> Vertical and Horizontal
LIST ALL REQUIRED RESCUE EQUIPMENT	<input type="checkbox"/> Tripod and winch <input type="checkbox"/> Self-retracting lifeline (SRL) <input type="checkbox"/> Rescue rope <input type="checkbox"/> Safety line rope arresting system <input type="checkbox"/> Single sheaved prussic minding pulley <input type="checkbox"/> Double sheaved prussic minding pulley <input type="checkbox"/> Rescue Carabineers <input type="checkbox"/> Tandem prusiks <input type="checkbox"/> Anchor straps <input type="checkbox"/> Edge protection	<input type="checkbox"/> Spine board with straps <input type="checkbox"/> SKED <input type="checkbox"/> Wrap EVAC <input type="checkbox"/> First Aid level 2 kit <input type="checkbox"/> Personal tandem prusik <input type="checkbox"/> Personal locks/tags <input type="checkbox"/> Intrinsically safe lights <input type="checkbox"/> Communication methods (e.g. radio, cell phone) <input type="checkbox"/> Other: _____	
LIST ALL REQUIRED RESCUE PPE (In addition to that listed in the Entry Procedure)	<input type="checkbox"/> Rescue harness <input type="checkbox"/> Safety footwear <input type="checkbox"/> Helmet with chinstrap <input type="checkbox"/> Eye protection <input type="checkbox"/> Gloves	<input type="checkbox"/> Limb and body protection (e.g. coveralls) <input type="checkbox"/> Air purifying respirator <input type="checkbox"/> Hearing protection <input type="checkbox"/> Knee pads	

Before a worker enters a confined space, the responsible supervisor must notify rescue persons of confined space work taking place.

When all workers have completed their work and exited from the confined space, the responsible supervisor must notify rescue personnel that work is complete.

4.0 PRE-ENTRY PLANNING

Responsible Supervisor	Completes this Rescue Procedure and verifies the rescue procedure is appropriate for the type of space, workers and equipment involved.	<input type="checkbox"/>
	Notifies rescue persons (minimum of 2) of work occurring in a confined space and receives confirmation that the rescue persons are available for rescue.	<input type="checkbox"/>
	Reviews Site-Specific Hazard Assessment, Entry Procedure and Rescue Procedure with all workers involved in confined space work, prior to worker entering the space (e.g. worker entering, standby person, rescue persons).	<input type="checkbox"/>
	Confirms communication methods are appropriate and available.	<input type="checkbox"/>



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4.0 PRE-ENTRY PLANNING (cont)

Rescue Team Lead	Verifies rescue equipment and PPE is appropriate, functioning and available.	<input type="checkbox"/>
	Reviews and consider ways to rescue. Self rescue will be the preferred option.	<input type="checkbox"/>
	Verifies if additional requirements are needed (e.g. lockout or isolation) before rescue can begin	<input type="checkbox"/>
	Monitors communication systems that will be used when being summoned to rescue.	<input type="checkbox"/>

5.0 SUMMONING RESCUE

Standby Person	Contacts rescue team lead that rescue is required. Provide details (e.g. what happened, number of injured workers, nature of injuries).	<input type="checkbox"/>
	Contacts UBC First Aid at 604-822-4444 if worker is injured. In the event of a medical emergency, first call 911 and then call first aid at 604-822-4444.	<input type="checkbox"/>
	Contacts responsible supervisor to inform them a rescue has been initiated.	<input type="checkbox"/>
	Continue to check on the well-being of the worker(s) inside the space and continue air monitoring.	<input type="checkbox"/>
Rescue Team Lead	Contacts rescue persons that rescue is required.	<input type="checkbox"/>
	If additional support is required, call 911 and request for the Vancouver Fire and Rescue Services (VFRS) Technical Rescue Team.	<input type="checkbox"/>
	Reviews this Confined Space Rescue Procedure with rescue persons	<input type="checkbox"/>
Rescue Persons	Understands this Confined Space Rescue Procedure, hazards present and precautions needed, prior to rescue.	<input type="checkbox"/>
Rescue Team Lead	Determine if self rescue can be performed as first option.	<input type="checkbox"/>
	If self rescue is not possible, initiate and directs rescue person.	<input type="checkbox"/>
	Ensure rescue persons set up rescue equipment correctly and wear the appropriate rescue PPE.	<input type="checkbox"/>
	Directs rescue persons to enter the confined space only if safe to do so (e.g. verify with standby person that air monitoring results are normal) and that there is at least one additional trained rescue person located outside the space to render assistance.	<input type="checkbox"/>
	Maintains communication with rescue persons, standby person and injured worker.	<input type="checkbox"/>
Rescue Persons	Approach injured worker and perform the following: <ul style="list-style-type: none"> • Scene assessment • Primary survey, and • Transport Decision 	<input type="checkbox"/>
Rescue Team Lead	Provide direction to rescue persons based on the injury.	<input type="checkbox"/>



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5.0 SUMMONING RESCUE (cont)

Rescue Persons	Package/immobilize the injured worker into patient packaging device as directed by the Rescue Team Lead.	<input type="checkbox"/>
	Attach patient packaging device to rescue retrieval system and extricate injured worker out of space	<input type="checkbox"/>
	Reassess injured worker and provide first aid until UBC First Aid or other emergency services arrives to take over.	<input type="checkbox"/>
Rescue Team Lead	Update responsible supervisor that rescue is complete and status of injured worker.	<input type="checkbox"/>

6.0 SIGN OFF BY RESPONSIBLE SUPERVISOR

NAME	
TITLE	
CONTACT INFORMATION	
SIGNATURE	
DATE	

7.0 DISCLAIMERS

This document is to be used with the site-specific Confined Space Hazard Assessment and Entry Procedures that were identified for the space and planned work activities conducted by UBC workers at the time the assessment was conducted. Should there be any change to the space characteristics, potential hazards and/or planned work activities, all work must stop and the responsible supervisor must be notified immediately. A Qualified Person, as defined in the Occupational Health and Safety Regulation Section 9.11, must reassess the space and update the site-specific Confined Space Hazard Assessment, Entry Procedure and this Rescue Procedure accordingly.

Appendix D: Confined Space Entry Log

SPACE & WORK DETAILS						
DATE:						
RESPONSIBLE SUPERVISOR:						
SPACE TYPE:	<input type="checkbox"/> Steam	<input type="checkbox"/> Sanitary	<input type="checkbox"/> Storm	<input type="checkbox"/> Electrical	<input type="checkbox"/> Crawlspace	<input type="checkbox"/> Pit
	<input type="checkbox"/> If Other, describe space type:					
CLASSIFICATION:	<input type="checkbox"/> LOW	<input type="checkbox"/> MODERATE	HIGH (Note: UBC Workers do not enter into HIGH hazard spaces)			
LOCATION:				DEPARTMENT:		
REQUIRED WORK: (List ALL applicable work activities)						

ATMOSPHERIC TESTING & MONITORING (Test atmosphere every 20 minutes or less)

Pre-entry testing must be completed not more than 20 minutes before a worker enters confined space.

When all workers have vacated the confined space for more than 20 minutes, pre-entry testing must be repeated.

Test results must be posted at all points of entry to the confined space.

[illegible]

WORKER ENTRY/EXIT TIME LOG

[illegible]



Appendix E: Confined Space Entry Permit

This Confined Space Entry Permit must be completed before a UBC worker enters a confined space:

- ☐ that requires lockout or isolation procedures to be followed, or
- ☐ in which there is a hazard of entrapment or engulfment.

NOTE: While the Occupational Health and Safety Regulation (OHSR) also requires an entry permit to be filled when a worker enters a confined space with a high hazard atmosphere, **UBC workers do not enter confined spaces with high hazard atmospheres.**

SPACE & WORK DETAILS

SPACE TYPE:	<input type="checkbox"/> Steam	<input type="checkbox"/> Sanitary	<input type="checkbox"/> Storm	<input type="checkbox"/> Electrical	<input type="checkbox"/> Crawlspace	<input type="checkbox"/> Pit
	<input type="checkbox"/> If Other, describe space type:					
CLASSIFICATION:	<input type="checkbox"/> LOW	<input type="checkbox"/> MODERATE	HIGH (Note: UBC Workers do not enter into HIGH hazard atmospheres)			
LOCATION:				DEPARTMENT:		
START DATE/TIME:	DATE	TIME	EXPIRY DATE/TIME:	DATE	TIME	
REQUIRED WORK: (List ALL applicable work activities)						
Only planned and anticipated work activities as per the specific confined space hazard assessment and procedures prepared for the above space is permitted. Should there be ANY change to the potential hazards, space conditions and/or work activities, ALL confined space work must stop and a Qualified Person must be engaged to conduct a reassessment.						

PRECAUTIONS & REQUIREMENTS

#	VERIFICATION	Y	N	N/A	INITIALS
1	Confined space hazard assessment reviewed by all workers involved?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Confined space procedures (entry, lockout/isolation, rescue) reviewed by all?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3	All workers involved clearly understand their roles and responsibilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Required equipment (including PPE) inspected and present?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5	Hazardous energy sources locked out or isolated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6	Work area secured against unauthorized entry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7	Gas testing equipment calibrated, bump tested, present, inspected and functioning?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8	Ventilation system present, inspected and functioning?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9	Communication methods established, appropriate and functioning?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10	Standby person, rescue services and first aid services in place?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11	All workers involved properly trained in confined space?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12	Entry Permit contents reviewed with all workers involved prior to entry/work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I, _____ as the Responsible Supervisor, confirm that all involved confined space personnel have reviewed and understood the details of this permit, the written safe work procedures and required controls to safely perform the planned work.					

**THIS PERMIT MUST BE POSTED AT EACH DESIGNATED POINT OF ENTRY TO CONFINED SPACE.
THIS PERMIT EXPIRES ON THE DATE/TIME INDICATED ABOVE.
CONFINED SPACE WORK CAN PROCEED. REFER TO SPECIFIC SAFE WORK PROCEDURES.**

Appendix E: Confined Space Entry Permit (cont)

ATMOSPHERIC TESTING & MONITORING (Test atmosphere every 20 minutes or less)

Pre-entry testing must be completed not more than 20 minutes before a worker enters confined space. When all workers have vacated the confined space for more than 20 minutes, pre-entry testing must be repeated. Test results must be posted at all points of entry to the confined space.

[illegible]

WORKER ENTRY/EXIT TIME LOG

[illegible]

A COPY OF THIS ENTRY PERMIT MUST BE KEPT AND MAINTAINED ON FILE FOR A MINIMUM OF ONE (1) YEAR.