Confined Space

Program

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Building Operations
University of British Columbia

Health, Safety & Environment

Confined Space Program

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1. Application

All employees are expected to work in a safe and professional manner. Failure to abide by this policy and related procedures will result in appropriate corrective actions up to and including discharge.

Special precautions are required to ensure the safety of all persons entering confined spaces. Entry into a confined space such as a manhole, tunnel, sump pit or vessel may cause exposure to:

a) an oxygen deficient atmosphere
b) an explosive concentration of flammable gases
c) an excessive concentration of air contaminants, or
d) other hazards such as asbestos, heat stress, potential for engulfment or entrapment.

Building Operations employees who are required to enter and work in confined spaces must be aware of the hazards, be trained in confined space entry procedures and know how to react in emergency situations.

Building Operations is committed to the provision of a workplace where work can be carried out safely, without workers being exposed to undue or unexpected hazards. To accomplish this, it is necessary to have both a written as well as an actively practiced confined space entry program.

All confined spaces must be identified and a hazard assessment completed for each group of spaces or work processes that occurs. Responsibility for the program must be assigned and written work procedures developed to address all identified risks.

Workers must receive education in the recognition of confined spaces as well as the hazards of confined spaces. They must also receive training in the specific procedures required for confined space entry.
2. Responsibilities

Directors
- Ensure all confined spaces are identified and an inventory of the spaces prepared
- Assign responsibility for administration of the confined space program
- Ensure an annual review of confined space rescue procedures is held.

Associate Directors
- Ensure compliance with the confined space program
- Assign responsibility for supervision of confined space work to a person who is adequately trained to supervise the job, prior to any worker entering a confined space.

Managers, Heads and Sub-Heads
- Assign responsibility for supervision of confined space work to a person who is adequately trained to supervise the job, prior to delegating work assignments, which require entry to confined spaces.
- Ensure confined space work procedures are followed.
- Ensure only trained workers perform confined space work.
- Monitor work activities.
- Provide training and exercises to ensure procedures are followed.
- Ensure safety co-ordination with contractors. All contractors must complete Appendix E, UBC Utilities Confined Space Entry Permit.

Workers
- Follow all confined space work procedures.
- Wear all necessary personal protective equipment
- Contact supervisor if in doubt of any aspect of assigned work
- Report any hazards or hazardous conditions to your supervisor
- Work safely.

Health, Safety and Environment Department
- Administrate and maintain the University’s confined space program.

Note: The foregoing describes responsibilities in general terms. Specific roles are covered in the Written Safe Work Procedures section.
3. Definitions

Adjacent piping: 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.

Asphyxiates: a substance that can cause unconsciousness or death by suffocation, due to a lack of oxygen. There are two classes of asphyxiants:
- Simple asphyxiants act by replacing oxygen in the air (i.e. nitrogen or methane)
- Chemical asphyxiants act by prevent body cells from using oxygen in the blood (i.e. carbon monoxide).

Auto-ignition temperature: temperature at which a flammable gas or vapour can catch fire without a source of ignition.

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

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

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

Carbon monoxide (CO): a colourless, odourless, and tasteless gas that is a chemical asphyxiants. Carbon monoxide is created as a result of combustion processes.

Clean, respirable air: when used to describe the atmosphere inside a confined space, means an atmosphere which is equivalent to clean, outdoor air and which contains:
- about 20.9% Oxygen by volume
- no measurable flammable gas or vapour as determined using a combustible gas measuring instrument, and
- no air contaminant in concentrations exceeding either 10% of its applicable exposure limit 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 the Board, means an area, other than an underground working, that:
- is enclosed or partially enclosed,
- is not designed or intended for continuous human occupancy,
- has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service, and
- 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:** 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.

**Moderate Hazard Atmosphere:** 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:** 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.

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

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

**Double block and bleed:** 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:** a WHMIS control product, a substance referred to under section 5.48, or a substance which may have a harmful effect on a worker in a confined space.

**Hot Work:** any work that introduces an ignition source into a confined space, (i.e. welding, cutting, brazing, or soldering).

**Hydrogen Sulphide (H₂S):** a colourless gas that at low levels has the odour of rotten eggs. It is a chemical asphyxiate and its smell cannot be relied upon for adequate warning.

**IDLH Atmosphere:** 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-imparing 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:** 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.
Isolation: the protection of workers from dangerous substances that could be discharged from pipes or conduits leading to the confined space. At UBC this will generally refer to substances that are hazardous due to pressure and temperature such as the steam system.

LEL, lower explosive limit: the minimum concentration of combustible gas or vapour in air, that will ignite if a source of ignition is present. Also known as lower flammable limit (LFL)

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

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

Methane (CH₄): flammable gas produced by the decomposition of organic material.

Qualified Person: 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 or occupational hygienist
- a certified safety professional, Canadian registered safety professional, or professional engineer, provided they have practical experience
- other combination of training, education and experience acceptable to the board.

Rescue person: a person who is properly equipped and adequately trained to perform rescue duties in confined spaces

Standby person: a person stationed outside a confined space whose responsibility is to check on the well-being of workers inside the space and initiate rescue in an emergency.

SCBA (Self Contained Breathing Apparatus): provides air from a cylinder containing compressed air or a chemical containing canister that is carried by a worker.

Supplied Air Respirators: respirator, which supplies air through a hose, called an airline. The airline is attached to an air compressor that supplies air.

Supervisor: a person who instructs, directs and controls workers in the performance of their duties.

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

WBGT (Wet Bulb Globe Temperature) Index: is a heat stress indicator that considers the effects of temperature, humidity, and radiant energy and is measured by a wet-bulb globe temperature meter.
4. **Inventory and Confined Space Identification**

At UBC, the greatest number of confined spaces are steam, electrical and utility holes, tunnels and some vessels such as boilers and fuel tanks. If a worker is unsure whether a confined space procedure applies or not, their immediate supervisor should be contacted for clarification.

The Health and Safety Department at Building Operations has an inventory list of the confined spaces found at UBC. Each confined space in the inventory is assigned one of the following classifications:

- Electrical system distribution holes
- Storm utility holes
- Sanitary Sewer utility holes
- Steam Distribution utility holes
- Water Vaults
- Powerhouse
- Misc. Plant Operations

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.

**NOTE:** When work is performed in a space that has signage identifying it to be a confined space, the Building Operations - HSE Department must be contacted to obtain a hazard assessment.

The spaces that are utility holes or vaults are easily recognized as confined spaces. Training of staff ensures that they will be aware that this type of space is included in the Confined Space Program and field identification of a utility hole as “confined” is straightforward.

The Powerhouse and Miscellaneous Spaces will require that a sign be mounted at the entrance to the space warning that the space is confined and that confined space work procedures apply. Sample sign is illustrated below.

![Sample Sign Illustration]

**Danger! Confined Space**

**Special Entry Procedures Required**

**Contact your Supervisor**
In addition to confined spaces, as defined by WorkSafeBC, there are also areas that are deemed restricted. These areas require that the UBC - Building Operations Working Alone Guideline be followed when entry into these spaces occurs. These areas are marked at their entrance, with a yellow and black sign:
5. Hazard Assessments

A “qualified person” as specified in Section 9.11 of the Occupational Health and Safety Regulation must conduct hazard assessments. The assessments must be conducted for each:

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

Hazard Assessments are carried out to identify the confined space classification and the procedures to follow for that classification. The supervisor is to ensure that a qualified person has carried out a hazard assessment before any work involving entry into confined spaces. As far as is practicable the assessment shall be in writing and take into account the following:

- Nature of the confined space
- The work required to be done
- The hazards involved and the associated risks
- Methods by which the work can be safely done including control measures
- Emergency and rescue procedures.

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

Hazard Assessments must be revalidated wherever a significant change in the risk is likely to result from:

- Installation or modification of existing equipment and/or machinery in a confined space
- A change in equipment operating conditions
- A change in the atmosphere of working environment
- A change in working arrangements or procedures
- The rescue equipment and procedures to be used.

The UBC Occupational Hygienist is the designated qualified person to conduct hazard assessments. A Canadian Registered Safety Professional (CRSP) with experience in conducting hazard assessments for confined space will be considered as an alternate qualified person.

NOTE: When work is performed in a space that has signage identifying it to be a confined space, the BUILDING OPERATIONS-HSE Department must be contacted to obtain a hazard assessment.
Potential Hazards of Confined Spaces

Hazardous Atmospheres
The most common hazard in a confined space is a hazardous atmosphere. This includes

- **Oxygen deficient atmosphere**
  Has less than 19.5% oxygen by volume. Any confined space with less than 19.5% oxygen should not be entered without an approved SCBA or supplied air hose with an escape pack.

  To maintain a safe working environment in a confined space, the oxygen level must be between 19.5% and 23%. Any level below 19.5 is dangerous and will affect a worker's health and safety. Levels below 10% can cause unconsciousness and levels below 8% can quickly cause death.

- **Oxygen enriched atmosphere**
  Above 23.0% oxygen by volume will cause flammable materials, such as hair and clothing to burn violently when ignited. Consequently, pure oxygen must never be used to ventilate a confined space. Ventilation must be done with clean, respirable outside air.

- **Flammable atmospheres**
  Due to the build-up of methane or other flammable chemicals, flammable atmospheres can occur in confined spaces. Concentrations greater than 20% of the lower explosive limit (LEL) are hazardous. Exposure limits and lower explosive limits (LEL) should be consulted to determine safe levels.

- **Toxic gases and vapours**
  Come from a variety of sources. Sewage and other rotting organic materials produce hydrogen sulphide (H2S). Carbon Monoxide (CO) is produced by the incomplete combustion of fossil fuels. Other toxic substances may have been spilled or dumped into a sewer system. Exposure limits must be referred to determine safe exposure limits.

Fall hazards
If there is a risk falling 3m (10ft) or more while working in a confined space, a fall protection system must be used.

Falling Objects
Workers in confined spaces should be aware of the possibility of falling objects especially in spaces that have topside entrances and where work is being done above the worker. Extra care needs to be taken when working in existing manholes where the surrounding surface is at the same level as the opening.
Temperature extremes
Extremely hot or cold temperatures can lead to heat or cold stress problems for workers. Steam manholes must be assessed with a heat stress monitor prior to entry and allowed to cool if too hot. If the temperature cannot be reduced to an acceptable level, then other work procedures must be used such as a work/rest regime, a shut down, or specialized personal protective cooling equipment.

Noise
Noise within a confined space 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. Hearing protection devices must be worn when excessive noise levels are present.

Lock-out
Hazardous energy sources must be locked out if work in a confined space could potentially cause an accidental release of energy.

Slick or wet surfaces
Slips and falls can occur on wet surfaces causing potential injuries. Also, a wet surface will increase the likelihood and severity of electric shock in areas where electrical circuits, equipment and tools are used.

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 (i.e. clothing/skin protection) must be utilized in spaces with hot surfaces.

Awkward spaces
Many confined spaces have limited room for one to move around in (i.e. 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.

Asbestos
Asbestos-containing materials may be present in confined spaces. Contact the Asbestos Management Program at (604)822-8772 for information about a particular confined space.

Additional Hazards may be present. Please refer to Site Specific Hazard Assessment for a complete listing of potential hazards in a particular confined space.
6. Personal Protective Equipment

All workers entering a confined space must have on as a minimum, the following CSA certified Personal Protective Equipment (PPE):

- Grade 1 steel toed boots
- Safety headgear
- Protective coveralls
- Full body harness

Depending on the nature of the space, types of hazards present and type of work involved (refer to site specific hazard assessment), workers entering a confined space will need to also have on the following CSA certified PPE:

- Rubber steel toed boots
- Eye and face protection
- Limb and body protection
- Respiratory protection
- Hearing protection
- High visibility and distinguishing apparel
7. Written Safe Work Procedures

All UBC workers involved in confined space entry (including supervisors responsible for employees involved in entry) must receive training in the confined space hazards and program requirements.

Prior to Entry, the following must be completed and on site:

- Confined space hazard assessment\(^1\)
- Confined space entry written work procedure\(^2\) (as required by hazard assessment)
- Confined space entry log\(^3\)
- Confined space Entry Permit\(^4\) (if lock out or isolation is necessary or high hazard atmosphere)
- Notification of appropriate personnel (e.g. manager)

All workers involved in confined space entry must ensure that all applicable confined space entry procedures are followed. This includes the stand-by workers.

The hazard assessments have been performed on “like” spaces. Prior to relying on the prepared hazard assessment, the conditions, potential hazards and work activities must be checked to ensure that the assessment is still valid.

**Depending on the work to be performed in the space, the assessment may be voided.**

**NOTE:** Building Operations - HSE **must** be contacted to obtain confined space hazard assessments.

**Equipment Required**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Additional Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portable Blower</td>
<td>Respiratory Equipment</td>
</tr>
<tr>
<td>Flex ducts</td>
<td>Personal Protective Equipment (PPE)</td>
</tr>
<tr>
<td>Gas Testing Instruments</td>
<td>Tripod and winch (moderate hazard)</td>
</tr>
<tr>
<td>Heat Stress Monitor (steam system)</td>
<td></td>
</tr>
<tr>
<td>Safety harnesses</td>
<td></td>
</tr>
</tbody>
</table>

*See Appendix F for Confined Space Entry Written Work Procedures (samples).*

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\(^1\) Appendix B Hazard Assessments for UBC confined spaces
\(^2\) Appendix F Confined Space Entry Written Work Procedures
\(^3\) Appendix C Confined Space Entry Log
\(^4\) Appendix D Confined Space Entry Permit
\(^5\) Appendix E UBC Utilities Confined Space Entry Permit
8. Testing and Monitoring

Securing a Safe atmosphere

Prior to entering a confined space the atmosphere must be tested.

Test the atmosphere before opening hatches or starting ventilation. This will assist in identifying whether or not an explosive atmosphere exists or help prevent the venting of a hazardous atmosphere out of the space into areas occupied by workers. Where there is an explosive gas just under surface of the cover, creating a spark could cause an explosion.

Instruments used for testing the atmosphere include:
- Gas testing monitors
- Heat stress monitors

The gas testing monitors used are multi-gas or four gas monitors which test for:
- Oxygen content (deficiency or enrichment)
- Hydrogen Sulphide (H₂S)
- Carbon Monoxide (CO)
- Lower Explosive Limit (LEL, or percent concentration of flammable gases)

<table>
<thead>
<tr>
<th>Acceptable conditions</th>
<th>Unsafe conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen content between 19.5 &amp; 23.0%</td>
<td>Oxygen content above 23.0%</td>
</tr>
<tr>
<td>Hydrogen Sulphide – less than 10 ppm</td>
<td>Hydrogen Sulphide – greater than 10 ppm</td>
</tr>
<tr>
<td>Carbon Monoxide – less than 25 ppm</td>
<td>Carbon Monoxide – greater than 25 ppm</td>
</tr>
<tr>
<td>Flammable gases, less than 20% of LEL</td>
<td>Flammable gases, greater than 20% of LEL</td>
</tr>
</tbody>
</table>

Equipment must be calibrated according to manufacturers’ specifications. Before a worker enters a confined space, pre-entry testing and inspection must be conducted.
**General Gas Testing Rules**

When testing a confined space, ensure that the space is tested at all levels. Some gases are heavier or lighter than others are. Test at the manhole before opening the lid. Test just under the lid where flammable gases may collect. Test in the middle of the space, as gases such as oxygen and carbon monoxide will be throughout the space. Test at the bottom of the space, as Hydrogen Sulphide is heavier than air. Test at two-foot intervals.

*Never trust your senses to determine if the air in a confined space is safe! You can not see or smell many toxic gases and vapours, nor can you determine the level of oxygen present.*

---

**Use of the Gas Testing Monitor**

1. Qualified workers trained in the use of the testing equipment must do all atmospheric testing of confined spaces.
2. Ensure the instrument is in working order, calibrated monthly, and bump tested prior to each use.
3. No smoking or open flames near the confined space.
4. Test confined space by:
   - Holding the sample hose near the lid of the manhole, before opening it, then by feeding the sample hose into the space at two-foot intervals.
   - Test the confined space at all levels, from near the top of the manhole to the bottom.
   - If safe, open the access cover and ventilation pipes. Lower the sample hose slowly into the confined space.
5. Record all test results including, date, time, location, %O2, %LEL, H2S, CO and sign the confined space log.
6. Monitor continuously while any worker is in the confined space. The gas detector unit must be worn or in close proximity to workers.
7. Additional tests must be conducted anytime the space is vacated for 20 minutes or more.
8. If space is to be occupied all shift, record at least four readings.
9. When practicable, continuous monitoring of the atmosphere must be done.
10. If gas monitor indicates unsafe conditions exist, **DO NOT ENTER THE CONFINED SPACE!**
11. Ventilate until a safe atmosphere is achieved and continue to ventilate as long as there are workers in the confined space.
12. If a safe atmosphere cannot be achieved, **DO NOT ENTER THE CONFINED SPACE!** Immediately contact your supervisor.
Securing a Safe Temperature Level in the Work Environment

When a worker is exposed to a high external temperature, the body core temperature will rise, leading to heat exhaustion or heat stroke. To measure the effect of temperature on the worker, a special Heat Stress Monitor must be used to integrate humidity, radiant heat and regular temperature. The measurement used is in WBGT (Wet Bulb Globe Temperature) in Celsius. Please Note: The regular temperature reading does not apply to the Occupational Health and Safety regulation or to the following work procedure.

If steam manholes or other hot atmospheres will be entered, use the heat stress monitor to evaluate the confined space. If work must be done in a steam manhole and an appropriate working temperature cannot be achieved through ventilation, other measures must be used. These measures are listed in order of preference:

1. Engineering Controls
   - Shutdown of the steam system or source of heat
   - Reduce the radiant heat emission from hot surfaces
   - Insulate hot surfaces
2. Administrative Controls
   - Fluid replacement and work practices
   - Work rest cycles
   - Scheduling and organization of work
3. Personal protective equipment
   - Anti-radiant heat or reflective clothing
   - Temperature-controlled suits

Table 1: Screening Criteria for Heat Stress Exposure (WBGT values in °C)

<table>
<thead>
<tr>
<th>Work/Recovery Cycle (1)</th>
<th>TLV Light (2)</th>
<th>Moderate</th>
<th>Heavy</th>
<th>Very Heavy</th>
<th>Action Limit Light</th>
<th>Moderate</th>
<th>Heavy</th>
<th>Very Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 – 100% work</td>
<td>31</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>28</td>
<td>25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>50 – 75% work</td>
<td>31</td>
<td>29</td>
<td>27.5</td>
<td>-</td>
<td>28.5</td>
<td>26</td>
<td>24</td>
<td>-</td>
</tr>
<tr>
<td>25 – 50% work</td>
<td>32</td>
<td>30</td>
<td>29</td>
<td>28</td>
<td>29.5</td>
<td>27</td>
<td>25.5</td>
<td>24.5</td>
</tr>
<tr>
<td>0 – 25% work</td>
<td>32.5</td>
<td>31.5</td>
<td>30.5</td>
<td>30</td>
<td>30</td>
<td>29</td>
<td>28</td>
<td>27</td>
</tr>
</tbody>
</table>

1. Approximate proportion of work within an hour: 75-100% work, 50-75% work, etc., with the remaining fraction of the hour allocated to recovery or "rest".
2. Work demands (metabolic rate category for the work) – light, moderate, heavy, or very heavy.
3. Clothing correction factors may be required.
Table 2: Work Demand Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest</td>
<td>Sitting</td>
</tr>
<tr>
<td>Light</td>
<td>Sitting with light manual work with hands or hands/arms and driving. Standing with some light arm work and occasional walking.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light pushing and pulling. Normal walking.</td>
</tr>
<tr>
<td>Heavy</td>
<td>Intense arm and trunk work, carrying, shoveling, manual sawing. Pushing and pulling heavy loads. Walking at a fast pace.</td>
</tr>
<tr>
<td>Very Heavy</td>
<td>Very intense activity at fast to maximum pace.</td>
</tr>
</tbody>
</table>

Use of the Heat Stress Monitor

1. Prior to testing, the temperature in the confined space must be reduced as much as possible through ventilation or shut downs whenever possible.
2. Determine rest area or area where workers will be resting. This may be indoors or outdoors.
3. Set up the heat stress monitor, preferably on a tripod, and allow it to acclimatize for 10 minutes then record the WBGT\textsubscript{out} or WBGT\textsubscript{in} depending on where the rest area is.
4. Set the heat stress monitor inside the confined space or if using the remote sensor, feed the sample hose into the confined space. Allow the monitor to acclimatize for 10 minutes. Record the WBGT\textsubscript{in}.
5. Plot the results on the work rest chart to determine entry and work requirements, refer to Table 1 (Work/Rest Regime for Hot Environments) for the work-rest chart.
9. Ventilation

Forced ventilation using a blower fan must be used to ventilate confined spaces for all entries longer than 15 minutes or where work activities may create a hazardous atmosphere. Confined spaces must be ventilated continuously while workers are in the confined space. Ventilation is not required 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 1.8m³, per occupant.

If work activities such as welding create airborne contaminants, then additional ventilation may be required. Consult HSE for further advice. The airflow on ventilation blowers has been checked. They provide adequate ventilation for activities not creating contaminants.

Blower fan procedure

1. Position fan upwind of the entrance to the confined space. Ensure it is free of vehicle and generator exhausts.
2. Ensure the blower hose is free of kinks and has as few bends as possible.
3. Purge the hose by directing the flow of air at ground level away from the confined space.
4. Place the blower hose into the confined space. During operation, ensure the discharge end of the hose is located at 2 feet from the bottom of the confined space. (This is optimum but not always possible)
5. Blow air into the space, do not use the blower to extract air from the space.
6. If pre-entry testing indicates an air contaminant is present above acceptable levels, ventilate the space prior to entry until levels are reduced to acceptable ranges.
7. If a contaminant is generated in the confined space, a combination of general ventilation as described above and a local exhaust system to extract the contaminant may be used.
8. If ventilation fails, leave the confined space immediately.
10. Standby Persons

Any confined space entry must have a standby person stationed at or near the entrance to the space, who can respond to an emergency situation. In some cases, the response will be to summon confined space rescue personnel.

Standby Procedures:

Low hazard atmospheres.

1. Another worker must be assigned as a standby person,
2. There must be a continuous means of summoning the standby person,
3. The standby person must check on the well-being of workers inside the space at least every 20 minutes, and
4. The standby person must have a means to immediately summon confined space rescue personnel.

Moderate Hazard Atmospheres

1. Another worker or workers must be assigned as the standby person(s),
2. A standby person must be stationed at or near the entrance to the space,
3. 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,
4. There must be a continuous means of summoning the standby person from inside the space, and
5. The standby person must have a means to immediately summon confined space rescue personnel.

High Hazard Atmospheres

Building Operations employees do not enter confined spaces with high hazard atmospheres.

It is important to understand that a confined space may develop into a high hazard atmosphere even after entry. In situations where workers are in a low or moderate hazard atmosphere confined space and the atmosphere changes into a high hazard atmosphere confined space, all workers are to exit the confined space IMMEDIATELY and report to their supervisor. Building Operations workers do not enter nor perform work in high hazard atmosphere confined spaces.
Traffic Control and the Standby Person

When entering confined spaces on the travelled portion of roadways, traffic control and personal protective equipment is required. For low hazard atmosphere entries, the standby person can act as the traffic control person as well.

1. Set up traffic cones approaching the confined space.
2. Position vehicle to provide maximum protection from oncoming traffic.
3. Place barricades around the confined space
4. Standby person must wear high visibility safety vests.
11. Emergency Rescue Procedures

Rescue services and plans must be in place each time a confined space entry is made. Arrangements for rescue must take into account 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. Each person assigned rescue duties must be properly equipped and adequately trained in the 2-day Confined Space Rescue Course (Non-IDLH) to carry out rescue.

Self rescue is the preferred option and will be utilized whenever possible. Building Operations employees must wear a retrieval harness upon entry into a confined space.

During normal working hours of 7:30am to 3:30pm, Monday to Friday, the UBC Confined Space Rescue Team (CSRT) will be available on call via radio and ready to respond. The standby person will notify UBC Security at (604) 822-2222 or via radio on the University Channel, who will then summon the UBC CSRT via radio on the University Channel.

In the event that a minimum of two trained members from the UBC CSRT are not available, confined space rescue entry will be prohibited. A list of UBC employees that have taken the 2-day Confined Space Rescue Course (Non-IDLH) can be found in Appendix H.

For work outside of the hours noted above, it is the responsibility of the Manager in charge of the confined space work to ensure that at least two members from the UBC CSRT are on campus and are put on alert status.

Documentation Required Prior to Entry

The following pieces of documentation must be present at the confined space site prior to entry:

- Hazard Assessment – review and understand prior to entry
- Work Procedures – review and understand prior to entry
- Confined space entry log (see Appendix C)
- Entry Permit (if required)
- Lock out procedures (if required)

Confined Space Rescue in LOW and MODERATE Hazard Atmospheres

*See Appendix H for Confined Space Rescue Written Work Procedures for Low and Moderate Hazard Atmospheres (sample)

Confined Space Rescue in HIGH Hazard Atmospheres

Building Operations employees do not enter nor perform work in high hazard atmosphere confined spaces. The services of a rescue contractor specializing in high hazard rescue will be
retained for the duration of the entry to a high hazard space. See Building Operations - HSE for a list of contractors available for high hazard rescue.

In the event that a low or moderate risk confined space becomes a high hazard confined space, the role of the UBC CSRT is to ensure 911 has been activated, and ensure that all possible assistance is given to VFRS' Technical Rescue Team upon arrival at the scene.
12. Entry Permits

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

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

**NOTE:** UBC workers do not enter confined spaces when testing indicates a high hazard atmosphere.

An entry permit must identify the:
- confined space and the work activities to which it applies,
- workers who are inside the space,
- required precautions for the space, and
- time of expiration of the permit.

An entry permit must be posted at each designated point of entry to a confined space. This does not apply if:
- the entry permit is posted at a minimum of one designated point of entry,
- the identification at other designated points of entry includes up-to-date information on whether it is safe to enter, and
- all workers authorized to enter are informed of the location of posted entry permits.

Once an entry permit is issued, the information may only be altered by:
- the responsible supervisor who signed the permit, to:
  - review and update as necessary to ensure the ongoing safety of the workers inside the space
  - re-authorize and sign:
    - if there is a change in the work crew,
    - after each shift change, or
    - after a change of the responsible supervisor.
- the standby worker to update the list of workers inside the confined space, or
- the tester to record test results.

Every worker affected must be informed of an alteration of entry permit regarding a change in the required precautions or work activity.

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

**NOTE:** The UBC Confined Space Entry Permit is found in Appendix D.
UBC Utilities Confined Space Entry Permit

- All UBC Departments and Contractors planning to enter any confined space within the jurisdiction of UBC Utilities must complete the UBC Utilities Confined Space Entry Permit, found in Appendix E.

Isolation and Lockout
Before a worker enters a confined space it must be isolated from sources of danger and equipment must be locked out. Adjacent piping connected to a confined space but does not open into the space does not have to be isolated as long as the substance within the pipe is not able to enter the space. For example, entry to steam distribution spaces is permitted without shutdown of the steam system if the piping is not to be opened. Examples of these work activities include:

  - inspection
  - meter reading
  - minor adjustments
  - sampling
  - general housekeeping.

Isolation
Isolation is normally achieved by disconnecting piping or by blanking or blinding. In accordance with the WorkSafeBC variance, double block and bleed may be used where blanking or blinding is not practicable. Details of the appropriate isolation method must be included on the entry permit.

General Procedures for Isolation
1. Before opening any line, close and lock-out appropriate upstream valves, depressurize the line, then drain the system
2. Make disconnections as close as possible to the confined space to minimize the chance of residues in the line from entering the confined space.

Requirements for Blanks and Blinds

- Blanks and blinds must meet ANSI standards or be certified by a professional engineer.
- If a blank or blind is certified by a professional engineer, a record of its certification, location and conditions of service, must be kept.
- Blanks and blinds must be capable of withstanding anticipated line pressure and temperature. This should be stamped on the blank or blind.
- Where necessary, install gaskets on the pressure side of a blank or blind to prevent leakage.
- Provide a means of visual indication of blanks and blinds at the installation point.
• A flange bolt to which a lock can be applied is recommended to prevent unauthorized removal of the blank.
• Threaded caps and caps must be used for threaded lines.

**Lock-out**

Confined spaces often contain machinery or processes that could be dangerous to workers. Controlling hazardous energy sources controls the danger.

**General Lock-out Procedures:**
1. Before performing any work on machinery or processes, hazardous energy sources must be locked-out.
2. Work in confined spaces which require lockout also requires entry permits.
3. Written lockout procedures must be available to workers.
4. Workers must be instructed in the procedures and are expected to follow them whenever lockout is required.
5. Each worker must work under the protection of his or her own lock.
6. Each worker must personally lockout the control devices or in cases where the lock box system is used, add their personal lock onto the lock box, before beginning work. If maintenance is not complete at the end of the shift there must be continuity of lockout between shifts.
7. Valves and other control devices that could release hazardous substances must be locked-out before procedures are carried out to isolate a confined space.
8. Energy sources such as steam, compressed air and hydraulics must be de-energized.
9. If work procedures could result in movement of energized equipment, the equipment must be mechanically restrained.
10. A system of locking entryways in the open position must be provided in circumstances where inadvertent closure would endanger workers inside.

Refer to Procedure I-B-2 Isolation and Lockout Work Procedures.
13. Training Requirements

Training is required for supervisors, standby persons, workers and rescue personnel involved in confined space entry. All training received must be recorded on each individual’s personal training record and training records are kept by Building Operations.

Each person who is assigned duties or responsibilities related to entry into a confined space must be educated and trained in the:
- hazards of the space, and
- precautions identified in written procedures to properly perform their duties.

Two levels of training are required. They are as follows:

**Level One, Confined Space Entry**
This course is designed for all workers who are required to enter confined spaces as well as those workers assigned to standby duties. Level One, Confined Space training must be completed prior to commencing confined space work. The course includes:
- WorkSafeBC requirements for confined space entry
- Definition/Identification
- Hazard Identification
- Symptoms of exposure to hazards and warning signs
- Confined space equipment
- Lifelines, harnesses and lifting equipment
- Communication
- Securing a safe atmosphere, gas detection (use and care of instrument), heat stress measurement
- Isolation/lockout – methods and procedures
- Ventilation – methods
- Entry permits
- Standby person responsibilities
- Personal protective equipment
- Respiratory protection, selection, use and care of respirators
- Rescue provisions and other rescue equipment
- Practical exercise, including an emergency rescue
- Examples of fatal accidents

**Level Two, Annual Shop Talks to maintain awareness**

**Other Related Training that may be required:**
- Lockout
- Traffic Control
- Fall Protection
14. References

- Occupational Health and Safety Regulation and Guidelines:
  - Part 9, Confined Spaces
  - Lockout
  - Traffic Control
  - PPE
  - Fall Protection
  - Working Alone or In Isolation, Section 4.20-4.23
  - Temperature, Section 7.26-7.32

- UBC Building Operations Policies and Procedures:
  - I-B-02, Isolation and Lockout
  - I-B-10, Traffic Control
  - I-B-11, Personal Protective Equipment
  - I-B-24, Fall Protection
  - I-B-44, Respirators

- UBC Building Operations Guidelines:
  - Working Alone
Appendix A

Confined Space Inventory

(SEE BUILDING OPERATIONS - HSE FOR COMPLETE CONFINED SPACE INVENTORY)
Appendix B

Hazard Assessments

(SEE BUILDING OPERATIONS - HSE FOR SITE SPECIFIC HAZARD ASSESSMENTS)
Appendix C

Confined Space Entry Log
### Date: First Entry Time:

### Designated Supervisor:

### Type of Work:

### Employees Assigned:

<table>
<thead>
<tr>
<th>Type of Confined Space</th>
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</thead>
<tbody>
<tr>
<td>Steam</td>
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</tbody>
</table>

If Other, describe:

### Hazard Assessment Rating

(attach applicable Hazard assessment)

**Note:** *High Hazard Atmosphere Confined Space Entries not permitted, only lockout situation*

- [ ] Low Hazard
- [ ] Moderate Hazard
- [ ] High Hazard

### Gas Testing Results:

<table>
<thead>
<tr>
<th>Locations</th>
<th>Times</th>
<th>Initials</th>
<th>Readings</th>
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<tr>
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### Heat Stress Measurements

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<th>Work/Rest Time Cycle</th>
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<td>Work</td>
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</tbody>
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<table>
<thead>
<tr>
<th>WBGT&lt;sub&gt;in&lt;/sub&gt; or WBGT&lt;sub&gt;out&lt;/sub&gt; (rest area, inside or outside)</th>
<th>Work/Rest Time Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest</td>
<td></td>
</tr>
</tbody>
</table>
Appendix D

Confined Space Entry Permit
This permit is for all confined spaces that require lockout/isolation.

**To Be Posted On Site; Signed by Supervisor & Approved by Manager**

<table>
<thead>
<tr>
<th>Confined Space location:</th>
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</table>

<table>
<thead>
<tr>
<th>Description of work to be done:</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Lockout system used: (attach diagram and description of isolation method)</th>
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</table>

<table>
<thead>
<tr>
<th>Date of permit:</th>
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</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Expiration of permit (date and time):</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Employees Assigned:</th>
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### Gas Testing Results

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<tr>
<td></td>
<td></td>
<td>CO</td>
</tr>
<tr>
<td></td>
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<td>H₂S</td>
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<th>Temperature</th>
<th>Work/Rest Time Cycle</th>
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<td>WBGT&lt;sub&gt;in&lt;/sub&gt; (inside manhole)</td>
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<tr>
<td>WBGT&lt;sub&gt;in&lt;/sub&gt; or WBGT&lt;sub&gt;out&lt;/sub&gt; (rest area, inside or outside)</td>
<td>Rest</td>
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</table>

#### Designated Supervisor:

#### Comments:

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<tr>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Date:</th>
<th></th>
</tr>
</thead>
</table>

Manager

**Distribution:**
- Posted on site
- Central Confined space file
- Building Operations - HSE

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Appendix E

UBC Utilities Confined Space Entry Permit
## Part 1. Confined space information
Confined Space Number (if applicable): ______________________
Location of Confined Space (nearest landmark): ______________________

## Part 2. Applicant Information
It is understood that only qualified workers may enter any confined space within UBC’s jurisdiction. Contractor is responsible for training individual workers and conforming to Part 9 of WorkSafeBC Occupational Health and Safety (OH&S) Regulations. UBC reserves the right to refuse entry to any person that appears unqualified for confined space work. The decision of a qualified representative of UBC shall be final.

Company Name: __________________________________________
Telephone: ______________________
Fax: ______________________

Names of workers entering manhole:
_________________________________________________________________

Phone number (or pager) of workers entering the manhole (**required**)
_________________________________________________________________

## Part 3. Confined Space Entry Information
The following confined space entry equipment must be available, on site, and within calibration dates for this permit to be valid. If, upon inspection by a qualified UBC representative, the appropriate equipment is not in place, the permit may be revoked and future permits may be withheld.
- 4 gas analyzer
- Ventilation system
- Communication device
- Tripod, lifeline, safety harness

Entry date(s): __________________________________________
Purpose of entry:

Expected length of time (per day):

## Part 4. Permit Application
Applicant Signature

UBC Representative Signature

On site Supervisor’s Signature

Approval Date
Appendix F

Written Work Procedures

(SEE BUILDING OPERATIONS - HSE FOR SPECIFIC WRITTEN WORK PROCEDURES)

1. Low Risk - SAMPLE
2. Moderate Risk - SAMPLE
1. Application
This procedure applies to all low hazard atmospheres and low hazard spaces. This includes confined spaces with walk-in access, or access by manhole or hatch, having no direct exposure to contaminants or other potentially hazardous substances and/or conditions, generally considered a Low Hazard Atmosphere. In addition to the conditions in the space, any work activities in the confined space must not generate contaminants beyond acceptable levels or create hazardous conditions of any kind.

Low Hazard Confined Spaces include:

- Confined Spaces such as Steam Manholes, Electrical Vaults and Storm drains which are entered to perform inspections, meter reading, minor adjustments, sampling or general housekeeping. Note: where work procedures require steam services to be shut down, additional requirements apply. See Utilities steam distributions vault procedure.
- These entries may be limited to less than 15 minutes without ventilation or more than 15 minutes with ventilation provided the low hazard conditions do not change.

2. Responsibilities

Directors and Associate Directors

- Ensure all confined spaces are identified and an inventory of the spaces prepared
- Assign responsibility for administration of the confined space entry program
- Ensure annual review of confined space rescue procedures is held.
- Assign responsibility for supervision of confined space entries to a person who is adequately trained to supervise the job, prior to any worker entering a confined space.
Managers, Heads and Sub-Heads

- Assign responsibility for supervision of confined space entry to a person who is adequately trained to supervise the job, prior to delegating work assignments, which require entry to confined spaces.
- Ensure confined space entry procedures are followed.
- Ensure only trained workers perform confined space entry.
- Monitor work activities

Workers

- Follow all confined space entry procedures.
- Wear all necessary personal protective equipment
- Contact supervisor if in doubt of any aspect of assigned work
- Report any hazards or hazardous conditions to your supervisor
- Work safely

Health, Safety and Environment Department

- Administerate and maintain the universities confined space entry program
- Ensure an agreement is made with any agency providing rescue services

3. Hazards

As outlined in the Confined Space Hazard Assessment. Attach hazard assessment for the confined space to be entered to work procedure.

4. Entry Procedure

1. Ensure a qualified person has done a hazard assessment and that a copy of the assessment is available at the confined space site.
2. Written safe work procedures and emergency procedures must be on site and understood by all workers involved in the confined space entry.
3. Test the atmosphere at the confined space before opening the lid and also prior to entry. The pre-entry testing must include testing for:
   - Oxygen levels (O₂ deficiency or enrichment)
   - Flammable gases (%LEL)
   - Carbon Monoxide (CO)
   - Hydrogen Sulphide (H₂S)
4. Record test results and all other pertinent information in the confined space log.
5. Workers entering the confined space **must wear a safety harness** that will keep them in a position to permit rescue.
6. Continue to monitor while the confined space is occupied. If the alarm goes off at any time, evacuate the confined space immediately.
7. Re-test the atmosphere prior to subsequent entries if the space is unoccupied for 20 minutes or more.
8. Record readings for at least 4 intervals if the space is to be occupied for a full shift.
9. Provide continuous ventilation if the confined space is to be occupied for more than 15 minutes. If the ventilation fails at any time, evacuate the space immediately.
10. Have a standby person stationed near the entrance to the confined space check the well being of the worker(s) in the confined space at least every 20 minutes. If the standby person detects any unusual conditions they must order the worker to leave the confined space immediately.
11. Workers in the confined space must have the means to continuously communicate with the standby person.
12. Stand by person must have the means to immediately summon rescue personnel if necessary.
13. Rescue provisions are outlined in the Confined Space Program on page 20.
14. Should conditions, real or perceived, deteriorate during the work process, all workers must evacuate the confined space immediately. No worker shall re-enter the space until conditions have returned to normal and atmospheric testing has shown the space to be safe for re-entry and all other confined space requirements have been satisfied.

5. References
Occupational Health & Safety Regulation, Part 9: Confined Spaces
Confined Space Entry, A Reference Manual, WorkSafeBC pamphlet BK84
Building Operations Welding Procedure
Building Operations Lock-out Procedures

6. Work Restrictions
Only trained workers may enter and work in a confined space. No unauthorized entries are permitted
1. Application

This procedure applies to confined spaces which have walk-in access, or access by manhole or hatch and which have no direct exposure to contaminants or other potentially hazardous substances or conditions, generally considered low hazard atmospheres but which have the potential for developing a moderate hazard atmosphere.

Activities or work performed, or the nature of the space will or may generate air contaminants, which may exceed exposure limits.

Atmospheric conditions will not approach IDLH limits.

Moderate Hazard Confined Space Classifications include activities that generate air contaminants such as welding, painting, cleaning or the use of controlled products.

2. Responsibilities

Directors and Associate Directors

- Ensure all confined spaces are identified and an inventory of the spaces prepared
- Assign responsibility for administration of the confined space entry program
- Ensure annual review of confined space rescue procedures is held.
- Assign responsibility for supervision of confined space entries to a person who is adequately trained to supervise the job, prior to any worker entering a confined space.
Managers, Heads and Sub-Heads

- Assign responsibility for supervision of confined space entry to a person who is adequately trained to supervise the job, prior to delegating work assignments, which require entry to confined spaces.
- Ensure confined space entry procedures are followed.
- Ensure only trained workers perform confined space entry.
- Monitor work activities

Workers

- Follow all confined space entry procedures.
- Wear all necessary personal protective equipment
- Contact supervisor if in doubt of any aspect of assigned work
- Report any hazards or hazardous conditions to your supervisor
- Work safely

Health, Safety and Environment Department

- Administrate and maintain the universities confined space entry program
- Ensure an agreement is made with any agency providing rescue services

3. Hazards
   As outlined in the Confined Space Hazard Assessment. Attach hazard assessment for the confined space to be entered to work procedure.

4. Procedure
   1. Ensure a qualified person has done a hazard assessment and that a copy of the assessment is available at the confined space site.
   2. Written safe work procedures and emergency procedures must be on site and understood by all workers involved in the confined space entry.
   3. Test the atmosphere at the confined space before opening the lid and also prior to entry. The pre-entry testing must include testing for:
      - Oxygen levels (O₂ deficiency or enrichment)
      - Flammable gases (%LEL)
      - Carbon Monoxide (CO)
      - Hydrogen Sulphide (H₂S)
   4. Record test results and all other pertinent information in the confined space log.
   5. Workers entering the confined space must wear a safety harness that will keep them in a position to permit rescue.
   6. Continue to monitor while the confined space is occupied. If the alarm goes off at any time, evacuate the confined space immediately.
7. Re-test the atmosphere prior to subsequent entries if the space is unoccupied for 20 minutes or more.
8. Record readings at least 4 intervals if the space is to be occupied for a full shift.
9. Provide continuous ventilation while workers are in the confined space. If the ventilation fails at any time, evacuate the space immediately.
10. Have a standby person stationed at the entrance to the confined space visually check the well being of the worker(s) in the confined space at least every 20 minutes. If the standby person detects any unusual conditions they must order the worker to leave the confined space immediately.
11. Workers in the confined space must have the means to continuously communicate with the standby person.
12. Stand by person must have the means to immediately summon rescue personnel if necessary.
13. Rescue provisions are outlined in the Confined Space Program on page 20.
14. Should conditions, real or perceived, deteriorate during the work process, all workers must evacuate the confined space immediately. No worker shall re-enter the space until conditions have returned to normal and atmospheric testing has shown the space to be safe for re-entry and all other confined space requirements have been satisfied.

5. References
   Occupational Health & Safety Regulation, Part 9: Confined Spaces
   Confined Space Entry, A Reference Manual, WorkSafeBC pamphlet BK84
   Building Operations Welding Procedure
   Building Operations Lock-out Procedures

6. Work Restrictions
   Only trained workers may enter and work in a confined space. No unauthorized entries are permitted.
Appendix G

Confined Space Entry Check list
## CONFINED SPACE ENTRY CHECK LIST

<table>
<thead>
<tr>
<th>REQUIREMENT</th>
<th>✔ IF DONE</th>
<th>REMARKS</th>
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<tbody>
<tr>
<td>Confined Space Entry Permit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation (dangerous substances, heat, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy source(s) locked out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment secured against movement</td>
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<td></td>
</tr>
<tr>
<td>Space ventilated</td>
<td></td>
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</tr>
<tr>
<td>Space cleaned out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition sources eliminated</td>
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<tr>
<td>Electrical equipment checked for defects</td>
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<tr>
<td>Standby Workers (names):</td>
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</tr>
</tbody>
</table>

## PROTECTIVE EQUIPMENT

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<thead>
<tr>
<th>PROTECTIVE EQUIPMENT</th>
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<th>✔ IF IN PROPER CONDITION</th>
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<td>Fire Extinguisher</td>
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</tr>
<tr>
<td>Communication Devices</td>
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<td></td>
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<tr>
<td>Other:</td>
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<td></td>
</tr>
</tbody>
</table>
Appendix H

Confined Space Rescue Procedures

(SEE BUILDING OPERATIONS - HSE FOR SPECIFIC WRITTEN WORK PROCEDURES)
1. Application

This procedure applies to confined space rescue of Building Operations employees working in low and moderate hazard confined spaces.

2. Hazards

See attached copy of confined space hazard assessment for full details about space type and configuration.

3. Rescue Team Personal Protective Equipment

The Team Leader, Rigger and Rescuer(s) must each be equipped with the following rescue personal protective equipment:

- NFPA and/or CSA Z259.10-M90 Life Safety Harness
- WSBC approved Helmet with Chinstrap
- WSBC approved footwear
- WSBC approved eye protection
- WSBC approved half-face respirator
- Knee Pads
- Coveralls
- Personal tandem prussic
- Personal lock-out kit
- 2 sources of intrinsically safe lights
- Rope Gloves
- 2 rescue rated carabineers

4. Rescue Equipment

The UBC CSRT must be equipped with the following rescue equipment:

- Cell Phone
Radio
One – three hundred foot static twelve point seven millimeter rescue rope
One – one hundred foot static twelve point seven millimeter rescue rope
A safety line rope arresting system (ie load release hitch and tandem prussic)
A lowering device
Four – single sheaved prussic minding pulley’s
Two – double sheaved prussic minding pulley’s
Ten – Carabiners
Four – Anchor straps
Six – Tandem prussic
First Aid Level 2 kit
Oxygen tank with mask and tubing
Four gas detector with remote sensor tubing and bump tested before use
Spine board with straps
SKED
Wrap EVAC
Edge protection
Tripod
Confined space blower fan

5. Procedure
Date Developed (MM/DD/YY): (___/___/___)

Date of Use (MM/DD/YY): (___/___/___)

Number of rescuers for this specific site (2 unless otherwise noted): ________

Space Type: ________________________________

Location (building address or nearest crossroad): ________________________________

Hazard Classification (low, moderate, high): ________________________________
*Building Operations employees are prohibited from entry into high hazard spaces.

Confined Space Rescue in Low and Moderate Hazard Atmospheres

1. Rescue from the outside whenever possible.
2. Standby person to contact UBC Security at (604) 822-2222 or via radio on the University Channel and communicate the following:
   - Confined space rescue is required
   - Location and number of injured workers in space
   - What happened
   - Nature of injuries.
3. UBC Security will summon the UBC CSRT via radio, on the University channel.
4. Upon receiving notification from UBC Security, Rescue Team Leader will:
   - Obtain all rescue equipment and proceed immediately to the work area
- Ensure that UBC Wide First Aid Services (604) 822-4444 has been notified
- Ensure that Vancouver Fire and Rescue Services’ (VFRS) Technical Rescue team has been activated.

5. Upon receiving notification from UBC Security, all members of the UBC CSRT will proceed immediately to the confined space site.

6. Rescue Team Leader must review this Confined Space Rescue Procedure and Confined Space hazard assessment with all members of the UBC CSRT prior to the start of the confined space rescue.

7. Each member of UBC CSRT must print and sign their names below to indicate they have reviewed and understood the Confined Space Rescue Plan:

<table>
<thead>
<tr>
<th>Team Position</th>
<th>Full Name (print)</th>
<th>Reviewed &amp; Understood</th>
<th>Signature</th>
<th>Date (MM/DD/YY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible Supervisor</td>
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<tr>
<td>Team Leader</td>
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<td></td>
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<tr>
<td>Rescuer</td>
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<tr>
<td>Rescuer</td>
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<tr>
<td>Rigger</td>
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</table>

8. If entry is required by the designated rescuer, the rescuer will:
   - Enter the space as deemed safe by the Team Leader
   - Assess the injured worker and report findings to Rescue Team Leader
   - RESCUE
   - Inform if more than one Rescuer is required to perform rescue.

6. References
   Occupational Health & Safety Regulation, Part 9: Confined Spaces
   Building Operations Lock-out Procedures
7. **Work Restrictions**

Only workers who are trained in the 2-day Confined Space Rescue Course (Non-IDLH) may enter and rescue in a confined space. No unauthorized entries are permitted. A list of trained workers is listed below:

**Members of the UBC Confined Space Rescue Team (CSRT)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Crew</th>
<th>Emergency Contact Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branko Radmilovic</td>
<td>19 - Locksmiths</td>
<td>604-987-6815</td>
</tr>
<tr>
<td>Jose Faria</td>
<td>27 - Gardeners</td>
<td>Radio</td>
</tr>
<tr>
<td>Bill Gorby</td>
<td>26 – UME</td>
<td>604-690-4303</td>
</tr>
<tr>
<td>Valery Shevchuk</td>
<td>26 - UME</td>
<td>Radio</td>
</tr>
<tr>
<td>Bill Cooke</td>
<td>26 – Powerhouse</td>
<td>778-877-4055</td>
</tr>
<tr>
<td>Stan Takenaka</td>
<td>71E – Utilities Electrical</td>
<td>604-961-0631</td>
</tr>
<tr>
<td>Ray Connell</td>
<td>71E – Utilities Electrical</td>
<td>604-803-7862</td>
</tr>
<tr>
<td>Calvin Reiss</td>
<td>71E – Utilities Electrical</td>
<td>604-916-0630</td>
</tr>
<tr>
<td>Corey Turnquist</td>
<td>71E – Utilities Electrical</td>
<td>604-250-8778</td>
</tr>
<tr>
<td>Robert Schwarz</td>
<td>71E – Utilities Electrical</td>
<td>604-454-7853</td>
</tr>
<tr>
<td>Brennan Sekora</td>
<td>71ST – Utilities Steam</td>
<td>604-868-4207</td>
</tr>
<tr>
<td>Steve Blackett</td>
<td>71ST – Utilities Steam</td>
<td>Radio</td>
</tr>
<tr>
<td>Wayne McCoy</td>
<td>71ST – Utilities Steam</td>
<td>Radio</td>
</tr>
<tr>
<td>Francis Collier</td>
<td>71ST – Utilities Steam</td>
<td>Radio</td>
</tr>
<tr>
<td>Thomas Shields</td>
<td>71ST – Utilities Steam</td>
<td>Radio</td>
</tr>
<tr>
<td>Bruce Villman</td>
<td>71ST – Utilities Steam</td>
<td>Radio</td>
</tr>
<tr>
<td>Norman Esplana</td>
<td>71ST – Utilities Steam</td>
<td>Radio</td>
</tr>
<tr>
<td>Mike Carroll</td>
<td>71ST – Utilities Steam</td>
<td>604-290-8060</td>
</tr>
<tr>
<td>David Holbrook</td>
<td>71W - Utilities Plumbing</td>
<td>Radio</td>
</tr>
<tr>
<td>Tariq Din</td>
<td>43 – Safety Resource</td>
<td>604-209-7854</td>
</tr>
<tr>
<td>Lori Takenaka</td>
<td>43 – Safety Resource</td>
<td>604-838-4004</td>
</tr>
</tbody>
</table>