

1.0 INTRODUCTION

This standard provides a means to assess and classify the hazards associated with entry into a confined space. This standard does not replace or supersede the Provincial Occupational Health and Safety Regulations. All parties doing confined space work must be knowledgeable of and ensure compliance with all applicable regulatory requirements.

2.0 SCOPE

All employees or contractors working in or around confined spaces

3.0 REFERENCES

NB OHS General Regulation 91-191	New Brunswick Occupational Health and Safety Regulation 91-191 Part XV: Section:
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4.0 TERMS AND DEFINITIONS

Confined Space	<p>A space that is:</p> <ul style="list-style-type: none">• enclosed or partially enclosed,• not intended for continuous human occupancy,• has restricted access or egress <p>Examples of Confined Spaces include chemical storage tanks, hoppers that taper to allow entrapment, very small or congested spaces where rescue would be difficult. See the confined space assessment chart following for more detailed information. Confined Spaces that present potentially IDLH (see definition) situations require prior written approval of Total Health and Safety before work will be permitted.</p>
Assessor	<p>A person who is capable, by means of training and experience, of identifying existing and predictable hazards in the surroundings or working conditions which are hazardous or dangerous to entrants into confined spaces. The competent assessor shall be thoroughly familiar with the provisions of the Occupational Health and Safety Act and the regulations that apply to the assigned work and explanatory information contained in Appendix A. The person shall also be knowledgeable about potential or actual danger to health or safety connected with the assigned work and the specific space.</p>
Competent Tester	<p>A competent person who is capable, by means of training and experience, to test for the hazards identified by the assessment of the confined space to ensure the space is safe for entry and will remain so for the duration of the job. This is accomplished through the use of testing instruments and visual inspections. A competent tester will be familiar with the concepts of function testing,</p>

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	calibration, limitations and proper operation of the test instruments and in the interpretation of the results. While testing will always be done for identified atmospheric hazards it may also include identified physical hazards such as noise, heat or radiation.
Safety Person	A competent person stationed outside of a confined space who monitors the authorized entrants inside. The Safety Person is; <ul style="list-style-type: none"> • knowledgeable and trained in the hazards and work procedures associated with the confined space • qualified as a Competent Tester,
Emergency Response Team Leader	<ul style="list-style-type: none"> • an employee who is responsible for supervising emergency response team operations and implementing an emergency response procedure.
Rescue Person:	A competent person trained and equipped to initiate rescue in a confined space. The training shall be acceptable to NB Power Health and Safety.
Entrant	A person who has been trained on the hazards and work procedures associated with the confined space and enters the space for any purpose.
Instrument Function Test	A test performed prior to the first use of an instrument on each shift, to verify the response and function of the instrument. This involves subjecting the instrument to a certified span gas and checking the instruments reading, alarm settings and audible and visual alarms to determine if it is operating within prescribed limits. A function test has been successful if the reading is within ± 10 percent of concentration of the span gas, the alarm settings are correct and the alarm indicators are functioning correctly.
Instrument Calibration	Calibration is performed at least monthly or any time a function test of the instrument fails. Calibration physically sets the instrument zero and span as per the manufacturer's recommendations.
Group E Harness	A full body harness, as defined under CAN/CSA-Z259.10-M90. A group "E" harness is one that meets the requirements for a group "A" harness and which is designed to support the user during entry into and exiting from confined spaces, usually involving the raising and lowering of the user. These may be identified by the presence of sliding shoulder "D" rings.
IDLH	Any condition which: <ul style="list-style-type: none"> • poses an immediate threat of loss of life or • which may result in irreversible or immediate and severe health effects or • which may result in eye damage, irritation, or other conditions which could impair escape from the confined space.

L.E.L. (Lower Explosive Limit)	The lowest concentration of a flammable gas or vapor that will ignite and burn in the presence of an ignition source. This term is essentially synonymous with lower flammable limit.
Local Exhaust Ventilation	An industrial ventilation system that captures and removes emitted contaminants before dilution into the work area ambient air can occur.
General Ventilation	A ventilation system providing general air exchange for a work area. These systems are primarily intended to provide comfort ventilation and are remote from contaminant sources.
Mechanical Ventilation	A ventilation system using a mechanical means, such as a fan, to provide or supplement the ventilation for a work area.
Natural Ventilation	Ventilation relying entirely upon natural draft and infiltration to provide air exchange.

5.0 ROLES AND RESPONSIBILITIES

5.1 Employer

- Ensure confined spaces have hazards assessed,
- Ensures confined spaces have been locked out, de-energized, tested, and deemed safe prior to anyone entering

5.2 Emergency Response Team Leader

- Ensures an emergency response plan is prepared and;
 - Is adequate to protect the health and safety of employees
 - indicates the number of rescue personnel required
 - Indicates the equipment and procedures to be used
- In the event of an emergency;
 - Assumes control of all activities during the emergency response and direct the emergency response team,
 - ensure that the members of the emergency response team properly perform their duties throughout the emergency response,
 - assess the ability of the attendant and air supply system attendant to continue performing their duties, and
 - maintain two-way communication with all affected parties

5.3 Attendant

- continuously aware of the activity in the space and able to maintain verbal, visual and/or other means of contact with the occupants of the space at all times.
- provided with a suitable means for summoning the immediate assistance of personnel trained in the emergency procedures and who are fully informed of the hazards in the space (the Emergency Response Team Leader).
- responsible for the immediate evacuation in the event of any emergency outside the confined space (e.g. fire alarms etc.). If any circumstances arise such that the Safety Person feels work cannot proceed safely, he/she has the authority to evacuate the space.
- Perform air quality testing while entrants are in the confined space
- Sign the entry form and ensure the rescue person, permit holder and all entrants sign the form to signify understanding of the work to be performed, possible hazards and the safe work procedures associated with work in the space.
- maintain an entrants list, by name, of all persons entering and exiting the enclosed space. This record shall be retained and stored with the entry documentation.
- verify by inspection and the entrants list that all persons have exited the space and that the space is in a safe condition to be unattended before leaving the area unless control of the space is surrendered to another qualified attendant

5.4 Entrant

- An entrant shall exit a confined space and notify the attendant if the entrant;
 - observes a hazard that is not identified in the code of practice and for which hazard control measures are not in place, or
 - believes the atmosphere of the confined space is unsafe due to the limitations of the equipment or the hazard control measures that are in place.

6.0 STANDARD

6.1 **Confined Space Assessment and General Requirements**

6.1.1 **Assessment**

The confined space assessment flow chart supporting documentation in Appendix A should be used to assess the hazards associated with each confined space. Explanatory information for each step of the assessment is contained in the Appendix. An assessment must be done for each type of task to be performed in the space, such as

inspection, cleaning, welding, etc. to identify the hazards associated with each specific task within individual spaces. It is impossible to adequately address every possibility in a general document such as this, or the regulation. This standard and the occupational health and safety regulation must be applied with a certain degree of flexibility and common sense. The bottom line is that the work must be done in such a manner that any person working in or around a confined space will be safe. Where a deviation from the regulations is necessary, we must obtain formal approval from WorkSafe NB **in advance**. The only grounds acceptable for granting a deviation are that the proposed work procedures will provide equivalent or better protection than the procedure specified by the regulation.

The assessment shall be prepared, in writing, by a **competent assessor**. It is the responsibility of the supervisor or person in charge to ensure the assessment is done and used to plan the work. After the initial assessment of the space has been done, every effort must be made to eliminate any hazards for which a suitable control measure, other than respiratory protection, is available.

6.1.2 Inventory

A complete inventory of all confined spaces must be established. This inventory should be job specific and should include, but not be limited to:

- identification of the space
- identification of the specific job
- the hazards associated with the space and job
- types of air quality and other possible tests required (i.e. noise, heat, dust, radiation, etc.)
- what safety equipment is required in or near the space
- what shall be the frequency of monitoring
- a reference to the specific written rescue plan
- any prior unusual hazards or atmospheric problems shall be flagged with a brief description of the event

6.1.3 Multiple Workgroups

Where there are multiple work groups in a space one Safety Person may be responsible for all groups if possible and practical. Where one Safety Person cannot be responsible for all groups (if different entrances are used for example), then all safety people shall be provided with a suitable means of communication, such as radios, to allow each group to be aware of the others' activities and to facilitate emergency action. If it is necessary for one group to leave the space due to conditions in or around the space then **all** groups must leave the space. No one may return to the space until it has been determined that it is safe to do so.

6.1.4 Records

Copies of the assessment, the confined space entry form, the safety equipment checklist and any other pertinent documents or permits shall be retained together with a copy of the Work Permit or other work record for a minimum of 2 years as required by the regulations.

6.1.5 Signage

Confined spaces that are accessible during normal operating conditions must be sign posted. It is recommended that the entrances to all potential confined spaces be permanently sign posted. When a space is opened in advance of atmospheric testing the entrance must be posted to warn that testing has not yet been done. Any appropriate method may be used, including signs or the use of barricade tape. Whatever method is used must be clearly understood by all parties working in the area.

6.1.6 Tailboard Conference

A tailboard conference must be held prior to any work being carried out in confined spaces. **Part 3, Hazard Assessment Checklist, Part 4, Equipment and Methods Checklist, on the Confined Space Entry Form shall be reviewed during the tailboard.**

6.2 Confined Space Requirements

- 6.2.1** Ensure the Confined Space is isolated under the Work Permit System and obtain a Confined Space Entry Form. If the entry is for lockout or isolation purposes, such as an operator performing a valve isolation within a manhole, a Confined Space Entry Form is still required. Suitable lockouts and isolations activities shall be done as required under Sections 262.061(1), 292, 239 and 240 of the Occupational Health and Safety Regulations.
- 6.2.2** Ensure air quality test equipment is functionally tested every shift and calibrated if required. Observe any expiry date on test gas cylinders. Where there is no expiry date observe the manufacturer's or supplier's recommendation for cylinder shelf life. The expiry date for most calibration gases is one year from the date of manufacture
- 6.2.3** (a) The air quality test equipment must be operated by a competent person who has demonstrated that he/she has the knowledge to effectively conduct these tests. Prior to entry, test the air quality at a sufficient number of levels or areas to ensure the space is free of atmospheric hazards. If the area has other possible dead air spaces or is very deep, several remote tests at different levels may be required. Use a remote sampling method. **DO NOT ENTER THE SPACE TO PERFORM THESE TESTS WITHOUT AN APPROVED PLAN FROM TOTAL HEALTH AND SAFETY**
- (b) Continuous monitoring is required anytime a chemical is present or being used as part of a task in a space; atmosphere in the space could change when there is an entrant in the space (e.g. welding, grinding, painting, cleaning, etc); when there is a possibility that any liquid, free flowing solid or hazardous substance may enter into the confined space.
- (c) The air shall be monitored as close as possible to the entrant(s). Where continuous monitoring is not required, gas testing must be performed prior to workers entering the space and if the space has been vacated for more than 10 minutes.
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- 6.2.4** A **competent tester** shall perform the air quality tests and record the oxygen content (20.5% - 23% is safe), explosive level in % lower explosive limit (%LEL) and toxic levels in PPM. These results will be recorded on the Confined Space Entry Form and posted immediately outside the space. During continuous monitoring record the results on each re-entry and every 30 minutes, or any time the reading changes significantly. **If the atmosphere is changing unexpectedly, evacuate the space and make any necessary adjustments to the procedures to ensure the work can proceed safely.**
- 6.2.5** (a) The space is considered unsafe for unprotected entry if any of the following conditions exist:
- i. the oxygen content is greater than 23% or less than 20.5
 - ii. flammable or explosive dusts or gases or vapours are present at greater than 0% of the lower explosive limit (exclusive of normal instrument drift),
 - iii. toxic contaminants (dusts, gases, vapours, aerosols, microbials, etc.) are present in amounts sufficient to cause health effects with short term exposure.
- (b) When testing has shown that the atmosphere is not safe for unprotected entry, have it purged and ventilated continuously to provide a safe atmosphere.
- (c) If the space cannot be purged or ventilated, special safety requirements and planning are needed. NB Power's Health and Safety Division must authorize procedures for this type of entry.
- 6.2.6** All persons entering a Confined Space must read or be made aware of the information on the Confined Space Entry Form, the results of the air quality tests, and the rescue plan, and must be understood and acknowledged by signing this form. Signatures needed include:
- a) the Competent Tester, if initial testing is performed by someone other than the Safety Person
 - b) the Safety Person assigned outside the confined space
 - c) the Rescue Person assigned to respond to an emergency at the particular location.
 - d) All entrants shall ensure their name is recorded by the Safety Person on entering the enclosed space and ensure that the Safety Person immediately records their exit when they leave the space.
 - e) Entrants shall have their name clearly visible on their hard hat or other means of identification determined acceptable by the work site.
- If a Rescue Person is responsible for more than one space, work in all spaces must immediately cease if a rescue is required in one of the spaces.
- 6.2.7** A Safety Person must be positioned outside the Confined Space with the appropriate equipment in place that would facilitate a rescue from the confined space as prescribed on the rescue plan. This Safety Person shall be:
- a) continuously aware of the activity in the space and able to maintain verbal, visual and/or other means of contact with the occupants of the space at all times.
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- b) provided with a suitable means for summoning the immediate assistance of personnel trained in the emergency procedures and who are fully informed of the hazards in the space (the Emergency Response Team Leader).
- c) responsible for the immediate evacuation in the event of any emergency outside the confined space (e.g. fire alarms etc.). If any circumstances arise such that the Safety Person feels work cannot proceed safely, he/she has the authority to evacuate the space.
- d) be trained in performing air quality tests.
- e) Sign the entry form and ensure the rescue person, permit holder and all entrants sign the form to signify understanding of the work to be performed, possible hazards and the safe work procedures associated with work in the space.
- f) maintain an entrants list, by name, of all persons entering and exiting the enclosed space. This record shall be retained and stored with the entry documentation.
- g) verify by inspection and the entrants list that all persons have exited the space and that the space is in a safe condition *to be unattended before leaving the area unless control of the space is surrendered to another qualified attendant*

THE SAFETY PERSON WILL NOT ENTER THE SPACE TO RENDER ASSISTANCE UNLESS THEY ARE TRAINED AS A RESCUE PERSON AND THEY IS REPLACED BY A COMPETENT SAFETY PERSON BEFORE ENTERING

- 6.2.8** Workers shall be made aware of the hazards, trained in the safe work practices for this Confined Spaces and trained in the proper use of any personal protective equipment such as respirators or hearing protectors.
 - 6.2.9** Any worker entering the space must wear a Group "E" full body safety harness. The harness may be worn beneath coveralls if necessary to avoid entanglement. Where possible the worker shall use an attached lifeline unless the space or working conditions would make the use of an attached lifeline impractical or dangerous. Where there is a danger of falling, a fall arrest system and emergency retrieval equipment must be used. Where fall protection is required, ensure that a proper retrieval system is in position. An attachment point of suitable strength, tripod or davit arm must be provided outside the space if required.
 - 6.2.10** Any electrical equipment used in a solidly grounded space, a wet space or where the surrounding area is wet; must be bonded to ground and protected by a Ground Fault Circuit Interrupter (GFCI), be double insulated, be battery operated **OR** be bonded to ground and operate at less than 30 volts and 100 volt-amps.
 - 6.2.11** No compressed gas cylinders, other than breathing air, shall be taken into the space
 - 6.2.12** If welding, burning or cutting is to take place, ensure that:
 - a) the Lower Explosive Limit (LEL) remains at 0% and the oxygen level remains between 20.5% and 23%.
 - b) When operations are stopped for 10 minutes or more, all fuel/gas and oxygen supply lines are removed from the space or disconnected outside the
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space.

- c) Welding hoses and valves are periodically checked for leakage.
- d) The space is effectively ventilated to the extent possible and practicable.

6.2.13 Do not leave tools and materials around the opening to a Confined Space where they may fall, be pushed into the space or become an obstacle during an emergency escape

6.2.14 All required emergency equipment required in the event of an accident or other emergency at the Confined Space must be available as required by the rescue plan before anyone is permitted to enter the space

6.2.15 All emergency equipment and other personal protective equipment required for work in the Confined Space must be inspected by a competent person to ensure the equipment is in good working order.

6.2.16 A written description of the emergency procedures (Rescue Plan) to be followed in the event of an accident or emergency in or near the Confined Space must be prepared, signed by the emergency response team leader, and posted with the Confined Space Entry Form. The measures must include the need to evacuate the space immediately in the event of an emergency or atmospheric change, the procedure for summoning immediate assistance, the names and means of other people to be notified, and generic emergency measures as may be appropriate. It is impossible to prepare a detailed procedure that covers all eventualities but the emergency equipment selected together with the generic procedures should demonstrate that the logistics of rescue for a particular job and space have been considered

NOTE: *Leave the space immediately if there is any irritation of eyes, nose, difficulty in breathing or a ringing sensation in the ears.*

7.0 TRAINING

All persons who:

- work in confined spaces
- support work in confined spaces
- supervise work in confined spaces
- or plan work in confined spaces

shall be adequately trained to the level necessary to plan and perform the work in a safe fashion.

8.0 APPENDIX

A - Confined Space Assessment

B - Confined Space Entry Form

C - Confined Space Sign

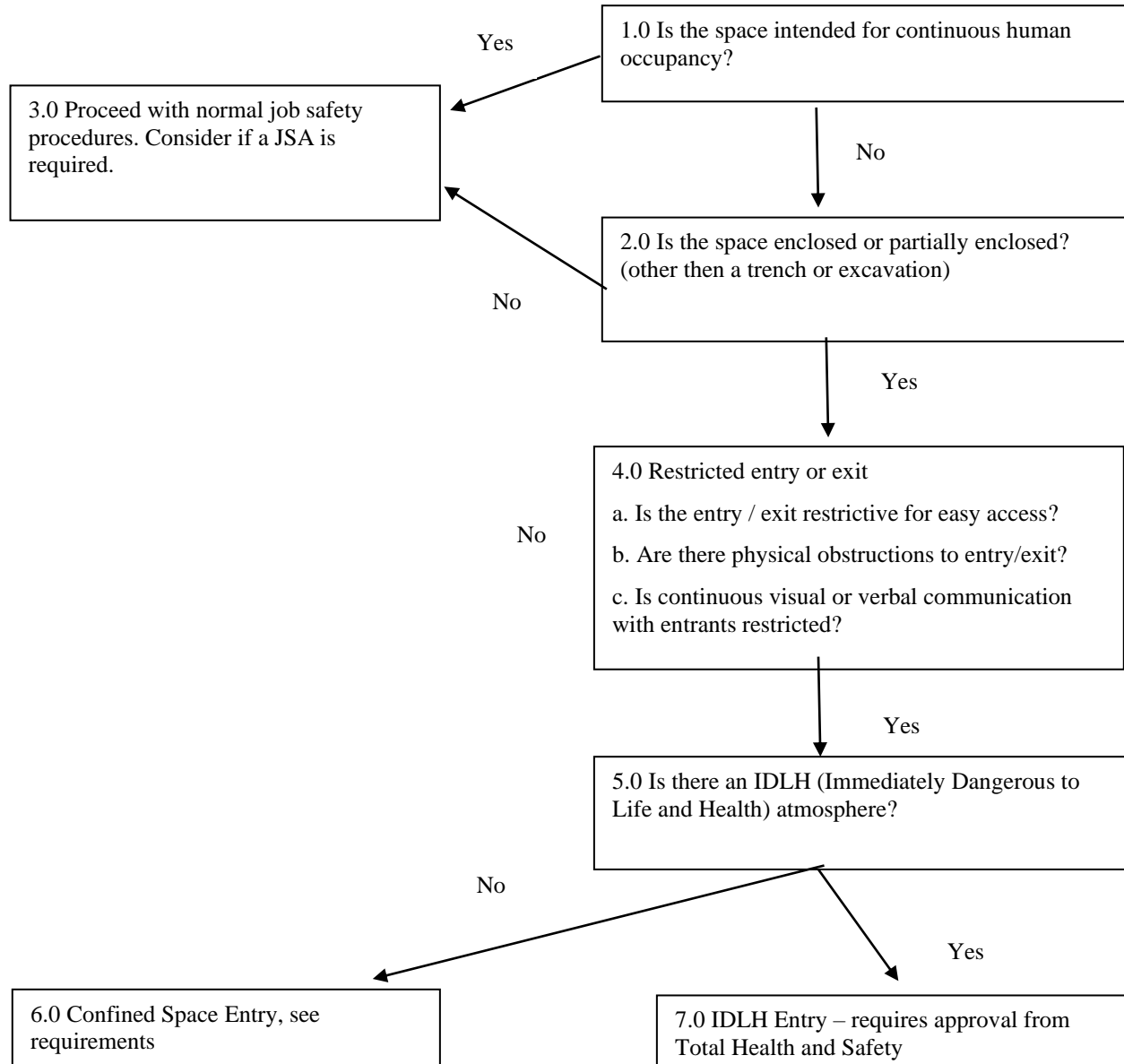


Director of Total
Health & Safety

DOCUMENT APPROVAL/REVISION RECORD

Revision #	Date	Revision Summary	Author	Reviewed By	Approved By
02	2023-03-31	All references to enclosed spaces have been removed. Aligned rescue operations with regulations by removing requirement for vicinity person and added emergency response team leader responsibilities.	M. Macfarlane	H&S Team	Roland Roy

Appendix A – Confined Space Assessment



The information in this section will assist in the use of the “Confined Space Assessment” flow diagram and will provide additional guidance. Typical examples and explanations are provided to help users interpret the diagram uniformly. Situations that fall outside the chart or where the choice is not clear should be noted and forwarded to Health and Safety so that clarification can be included in future revisions if necessary. Please recognize that in no way can this chart be considered all-inclusive as it is impossible to foresee all possible confined space entry situations. All employees are expected to approach any job with due caution and seek expert guidance where there is any question about the hazards associated with that job.

Box 1.0, Is the Space Intended for Continuous Human Occupancy?

Areas that are designed and intended for continuous human occupancy are not confined spaces by definition. Spaces such as small or crowded offices and similar spaces are not confined spaces for the purposes of this document. Tanks, vessels, underground vaults, bins, hoppers, and similar areas are clearly not intended for continuous human occupancy and would require that this question be answered **NO**

Box 2.0, Is the Space Enclosed or Partially Enclosed?

To be considered a confined space the area must be enclosed or partially enclosed. Many such spaces are obvious such as fully enclosed tanks, underground vaults and silos. A space need not be fully enclosed to contain a hazardous environment. Spaces that are partially enclosed would include areas such as sumps, open top tanks and any area such that design would inhibit airflow and allow entrapment of contaminants. The size of the space does not matter. A very small space can still contain a hazardous atmosphere. A very large partially enclosed area such as a big open top tank may inhibit air movement sufficiently to allow a hazardous atmosphere to be present in the tank.

If the confined space is a trench or excavation follow the requirements of Part 13 of the Occupational Health and Safety Regulations in lieu of this standard. At the discretion of supervision, work crews may elect to implement Confined Space entry procedures if warranted by the work conditions.

Box 3.0, Normal Job Safety Procedures Required.

If you answered **YES** to the question in box 1, and **NO** to questions 2 and 3, confined space entry procedures will not apply to work in the space under evaluation. It should not be inferred that because an area is not a confined space that no special precautions are required. As a minimum the normal requirements for safety equipment and training will apply. Where appropriate any other necessary safety precautions should be developed and implemented.

Box 4.0, Is the Space Hazardous Due to Its Design or Construction?

- a) Is the Entry/Exit Restrictive for Easy Access? Conditions to consider are doors, hatches, etc. that are too small to permit easy entry or exit. Both entry and exit should be considered. If the entrant must contort the body or use their hands for entry or exit the entrance should be considered restricted.
 - b) Are there Physical Obstructions to Entry/Exit? A number of conditions could exist that would
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make it difficult for workers to quickly exit a space in an emergency or that would make removal of an injured or unconscious worker very difficult. These include access from a ladder or small platform and physical obstructions inside or outside of the space. External obstructions to entry or exit could include walls, equipment or other structures near the entry. Inside the tank there could be turns, piping, barriers or other obstructions that would make it difficult to leave the area quickly or that would complicate rescue.

- c) **Is Continuous Visual or Verbal Communication With Worker(s) Restricted?** Spaces where a Safety Person cannot see or talk to workers in the space are considered to have restricted communication. Where it is possible to talk to workers in the spaces but not see them, due to barriers for example, communication is not considered restricted. Similarly where the Safety Person can see the workers in the space but not talk to them due to noise or the acoustics of the space communication is not considered restricted. Where special non-verbal communications systems are necessary and the workers in the space are not visible then communication is considered to be restricted

Box 5.0 Is There an IDLH Atmosphere?

Spaces that contain IDLH atmospheres will not be common at our facilities but special precautions are necessary where they do exist. We consider uncomplicated oxygen deficiency to be situations where the oxygen content is below 19.5% due to consumption of the oxygen by burning or natural processes or where the oxygen has been displaced by a non-toxic gas such as nitrogen. There is a regulatory requirement to eliminate the IDLH atmosphere, where possible, before permitting work to proceed. If a confined space with an IDLH atmosphere can be ventilated, purged or cleaned in such a way as to make the space safe for unprotected entry then Confined Space requirements may be used. If the space cannot be made safe for unprotected entry then the proposed entry procedures must be approved by Total Health and Safety. Approval for entry into IDLH spaces will not normally be given unless there is a compelling reason to enter the space.

Additional considerations:

BOX 5.0

- a) **Is the Oxygen Level < 20.5% or >23%?** When assessing a confined space the important consideration is whether or not the oxygen level is a normal 20.9% (minor variations due to instrument variation are of no significance). If the oxygen level is not normal the reason should be determined and the problem corrected. If an oxygen level of 20.9% cannot be achieved and maintained, work in the space is not advisable. If the oxygen level is below 19.5% the atmosphere must be considered as IDLH and special approval is required for entry. Similarly an enriched atmosphere where the oxygen level is above 23% represents a severe fire hazard and no entry can be permitted.
- b) **Is the Combustible Gas Level > 0% LEL?** The presence of any amount of combustible gas or vapour is cause for concern. The material safety data sheet (MSDS) is a useful source of
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information when available. Flammable gases and vapours form explosive mixtures with air over a range of concentrations of anywhere from 1 to 80% (10,000 to 800,000 parts per million). Acetylene for example has an explosive range of 2.0 to 80%. Care should be taken when measuring the concentration of explosive gas or vapour. Where explosive gases are likely, such as in manholes, the space must be tested before opening as explosions have occurred when removing the cover from an untested manhole. You must also be sure that the monitor being used will measure the gas accurately. Most sensors are calibrated using methane or a similar gas and will give a reasonably accurate reading for many common gases and vapours. Where unusual materials or mixtures are present the monitor may not respond correctly. If in doubt about the suitability of a monitor refer to the instrument manual or the supplier for assistance. In any space where combustible gases are detected special procedures are required for entry as discussed in Section 267 of the Health and Safety regulations. Since the explosive range is very much higher than the exposure limit for almost all substances, any detectable amount on the %LEL scale may indicate the potential for overexposure to a toxic gas or vapour.

- c) **Are Toxic Contaminants (Exclusive of Dusts) Present or Suspected at or Above the Exposure Limit?** Where any toxic contaminants (gases, vapours, dusts, etc.) may be present special monitoring and work procedures may be required. The safety data sheet (SDS) is a useful source of information when available. Any work space that contains or is likely to contain an IDLH concentration of any toxic material requires special approval and special work procedures. Approval will not normally be given for entry into IDLH atmosphere. Most of our newer confined space monitoring equipment can detect carbon monoxide and either sulphur dioxide or hydrogen sulphide, other toxic materials may not be reliably detected by this equipment unless modified to do so. The Industrial Hygiene Department can provide assistance when the detection of other toxic materials may be necessary. Where the concentration of a toxic chemical exceeds the TLV (exposure limit based on the 2016 Threshold Limit Values booklet) every effort should be taken to eliminate the material or to reduce the exposure potential. Where a worker's exposure cannot be reduced below the TLV, then respiratory protection or other control measures will be necessary for work in the space. The Industrial Hygiene Department may be able to provide assistance when protective equipment or control measures are required.
- d) **Are Explosive Dusts Present at > % LEL?** The presence of any amount of airborne explosive dust is cause for concern. The material safety data sheet (MSDS) is a useful source of information when available. Coal dust will normally be the only explosive dust we have to deal with but staff should be alert to any specialty material that may present an explosive hazard. Aluminum powder for example presents a severe fire and explosion hazard. Unlike explosive gases, explosive dust can be visually monitored by a person with sufficient experience but monitors are commercially available and strongly recommended to provide a real time assessment of the amount of airborne dust. The regulations place strict controls where airborne explosive concentrations above which work restrictions will apply due to the risk of fire or explosion.
- e) **Are Toxic Dust Present At Levels That Will Obscure Visibility?** The management of toxic dusts, such as boiler ash, is not substantially different in confined spaces. People working in confined spaces must be protected from toxic dusts the same as if the exposure occurs outside of the space. Exposure may be controlled by reducing the amount of material, the use of dust
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suppression, the use of ventilation and the use of respirators. Assessors should understand that exposure may be higher in spaces with limited ventilation and should select protective equipment accordingly. In confined spaces dusty operations may limit visibility and create an additional hazard. Limited visibility can interfere with the work, emergency egress and rescue and the entry should be planned accordingly

- f) **Is the Space Tapered to Allow Entrapment?** Any space that tapers down to a small diameter such as precipitators, hoppers and bins present a serious risk of entrapment should a person fall and become wedged into the taper. Any space where this may occur is a Confined Space and special precautions are necessary for work in the space.
- g) **Is There a Possibility of Heat Stress?** Heat stress is the stress imposed on the body during work in hot environments and can lead to life threatening heat illnesses. Heat Stress should be a concern for any work in a hot area and will be of particular concern during emergency entry at a thermal power plant. The WBGT (Wet-Bulb, Globe Temperature) index is used to measure the potential for heat stress. The WBGT reading is combined with information about how strenuous the work will be and what sort of clothing is worn, to determine how long a worker may remain in the hot area. The work-rest regimen varies from continuous work to 15 minutes work each hour. The exposure limit assumes that the required rest time per hour is spent in an area with similar environmental conditions. The WBGT index is explained in detail in the TLV (Threshold Limit Values) book. The WBGT index is most easily measured using an instrument such as a Windex, which combines wet-bulb, dry-bulb and black globe thermometers and automatically calculates the index. Additionally, personal monitoring equipment is available that will alarm should a worker be at risk of heat illness. Assistance is available from the Industrial Hygiene Department when dealing with heat stress.
- h) **Is the Space a Manhole or Sump?** For the purposes of this question a manhole refers to a utility type, underground manhole or similar space. Other confined spaces that are merely entered through a round hatch are not considered manholes for the purpose of this assessment.

Because manholes and sumps can contain a variety of known and unknown hazards, special precautions can apply to entry into these spaces. Sumps and manholes in municipal streets can present a variety of hazards. Toxic or flammable gases from sewers, vehicles, sludge, and seepage from the ground can be present in the space or can find their way in to the space while workers are inside. Flammable gases and hydrogen sulphide should always be checked prior to opening the space and prior to entry. Because the environment can change rapidly due to conditions outside the space or due to the disturbance of sludge or equipment in the space these areas are automatically Confined Spaces and continuous monitoring is required.

- i) **Is There a Possibility of the Atmosphere Changing due to the Use of Hazardous Chemicals, Disturbance of Sludge, Consumption of Oxygen (O₂), Lack of Ventilation or Other Work Practices (Other Than Welding, Burning or Cutting)?**

There are many things that can cause the development of a hazardous atmosphere in a confined space. The use of hazardous chemicals is one of the most obvious of these. The use of chemicals in other than very small quantities should be carefully evaluated.

The presence of either water based or chemical sludge can be particularly dangerous. Toxic gases and vapours may be trapped in sludge and can be rapidly released when the sludge is distributed. A confined space containing sludge may test safe initially only to develop a hazardous atmosphere once the sludge is disturbed in any way.

Oxygen may be displaced or consumed in the space. The use of toxic or inert gases in or around the space may displace oxygen and careful control is necessary. The biological breakdown of material in the space, fermentation and rusting can all remove and displace oxygen. These processes are normally slow but can be a problem in spaces that are empty for a prolonged period. In rare circumstances oxygen depletion by natural process can be rapid such as in some plating processes using highly active electrodes. Oxygen can also be depleted by the workers if there is insufficient ventilation to replace what they breathe. Oxygen depletion will occur more rapidly in small spaces. Any use of open flames will also deplete the oxygen and produce hazardous gases. Each type of work to be performed in a confined space should be carefully evaluated to check for any tasks that could possibly make the atmosphere in the space hazardous


Welding will be the most likely cause of a potentially hazardous atmosphere in a confined space. The process of welding, cutting or burning will consume the oxygen in the space and introduce airborne contaminants. The contaminants associated with welding are varied but the most common are inert shield gases (such as argon or carbon dioxide) which can displace oxygen, carbon monoxide, ozone, metal fumes (very fine particles of condensed metal vapour), particulate fluorides, and decomposition products from coatings and smoke. Review the safety data sheets (SDS's) for all welding gases and materials. Respiratory protection is required for all welding in confined spaces.


- j) **Is There a Possibility of Engulfment?** Engulfment means that there is loose material that could fall on the worker or shift and bury the worker. Silos, hoppers, bunkers, bins, electrostatic precipitators and similar structures or containers with loose materials all fall into this category. Material clinging to the sides of containers can become dislodged and fall onto a worker. Loose materials in storage such as coal can crust over leaving empty spaces beneath. All loose materials must be removed from the space before entry. If the materials cannot be removed special approval is required for entry (see also Section 263(1)(f) and Sections 54 and 55 of the Occupational Health and Safety Regulations). Unless there is a compelling reason to enter such a space, permission will not normally be given. Trenches greater than 1.2 meters deep also represent a possibility of engulfment and Sections 180 to 188 of the Occupational Health and Safety Regulations apply to all work in trenches
- k) **Is There a Possibility of Drowning?** If the space contains any liquid such that a person might drown then this question must be answered yes. This applies to liquid in or immediately below areas where a person will be working or present and such that a person might drown if they were to fall or slip. Piping systems delivering a liquid to the confined space must be isolated by disconnection, blanking or other effective means before entering the space and as such will not present a risk of drowning during confined space work.
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Appendix B - Confined Space Entry Form

The form is available in Microsoft Word under corporate templates. The form number is 0418 (formerly 0422)

A supplementary *entrants record* page, form 0419 (formerly 0422b), is also available where extra *name* space is needed during a work shift.

 <p>Énergie NB Power Form 0418 Rev#(Ed): 2023/03</p>		<p>Entry Form for Confined Spaces Date and Time of Issue: _____ Valid Only For the Shift Issued</p>																																																																																																				
<p>Part 1 Identification</p> <p style="text-align: center;">Work Permit No. _____ Work Order No. _____</p> <p>Safety Person: _____ Rescue Person: _____ Permit Holder: _____</p> <p>Description of space: _____</p> <p>Purpose of Entry: _____</p> <p><small>The permit holder (or person responsible where no Work Permit exists) must ensure that all those entering the confined space, the Safety Person and Rescue Persons (where applicable) understand the hazards associated with the space and understand the safe work procedures to be followed. Anyone entering the space must also be aware of and understand the results of the air quality tests.</small></p>																																																																																																						
<p>Part 2 - Air Quality Tests</p> <p>Competent Tester: _____ Test Equipment Make & Model and Serial Number: _____</p> <p>Function Test Performed By: _____ Date Last Calibrated: _____ By: _____</p> <p><small>Air quality tests must be performed at the beginning of each work shift and before re-entry after the space has been unattended for 30 minutes or more. The workplace must be retested if it is suspected that the atmosphere has changed. Specify the type of toxic gases tested in the boxes below. All entrants must print their name and sign the form on entering the space. Signing the form signifies that the air test results are understood and that the person understands the entry's safe work procedures to be followed. Use extra forms or "Form 419 Supplementary Signatures" if more signature space is needed. Air quality tests must be recorded every 20 minutes when performing continuous monitoring.</small></p> <table border="1"> <thead> <tr> <th>Sample Time</th> <th>% O₂ (Oxygen)</th> <th>% L.E.L. (Lower Explosive Limit)</th> <th>Other Gas</th> <th>Other Gas</th> <th>Entrant's Name (Please print legibly)</th> <th>Time In</th> <th>Signature</th> <th>Time Out</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> <p><small>Consider control measures if any toxic gases are present. Acceptable readings for common contaminants are 20.5 - 23 % Oxygen, 0 % L.E.L., 25 ppm Carbon Monoxide* or less, 10 ppm Hydrogen Sulphide* or less and 2 ppm Sulphur Dioxide* or less. * if no testing instrument is equipped with a sensor for this gas. If toxic gases other than those listed are present or suspected, obtain appropriate monitoring equipment by contacting the Industrial Hygiene Dept. or the Health and Safety Dept.</small></p> <p><small>This form must be retained at the issuing site with a copy of the work permit or other work records for a minimum of two years. This form must be provided to a WorkSafeNB, Health and Safety Officer on request.</small></p>				Sample Time	% O ₂ (Oxygen)	% L.E.L. (Lower Explosive Limit)	Other Gas	Other Gas	Entrant's Name (Please print legibly)	Time In	Signature	Time Out																																																																																										
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<p>Part 3 - Hazard Assessment Checklist</p>		<p><small>Check off all applicable boxes indicating the POTENTIAL hazards. Review the Confined Space Assessment flow diagram in the Confined Space Entry, Health and Safety Standard III-2. Also review the Safety Data Sheet for any materials in the tank or that will be taken into the tank.</small></p>	
	Yes	No	
Oxygen Deficiency	<input type="checkbox"/>	<input type="checkbox"/>	Explosive Dusts <input type="checkbox"/>
Enriched oxygen atmosphere	<input type="checkbox"/>	<input type="checkbox"/>	Electrical shock <input type="checkbox"/>
Change in Atmosphere	<input type="checkbox"/>	<input type="checkbox"/>	Engulfment <input type="checkbox"/>
Toxic contaminants	<input type="checkbox"/>	<input type="checkbox"/>	Drowning <input type="checkbox"/>
Combustibles	<input type="checkbox"/>	<input type="checkbox"/>	Heat or Cold Stress <input type="checkbox"/>
Falls	<input type="checkbox"/>	<input type="checkbox"/>	Burns <input type="checkbox"/>
Noise	<input type="checkbox"/>	<input type="checkbox"/>	 Radiation* <input type="checkbox"/>
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	Other: _____ <input type="checkbox"/>
<p><small>*For Bellisone only, if the space has radioactive sources also use "Confined or Enclosed Space Dosimetry Record", Form #1359</small></p>			
<p>Part 4 - Equipment and Methods Checklist</p>		<p><small>Check off all applicable equipment and/or methods to be used for job safety or rescue from this confined space.</small></p>	
1. Air monitor tests: _____ Oxygen	<input type="checkbox"/>	Combustible gases	<input type="checkbox"/>
Toxics (specify): _____	<input type="checkbox"/>		
2. Ventilation equipment	<input type="checkbox"/>	Forced general ventilation (blower)	<input type="checkbox"/>
Natural ventilation	<input type="checkbox"/>	Verification of Effective Ventilation	<input type="checkbox"/>
Local exhaust ventilation	<input type="checkbox"/>		
3. Communication	<input type="checkbox"/>	Verbal	<input type="checkbox"/>
Other(specify): _____	<input type="checkbox"/>		
4. Fall protection/ rescue equipment	<input type="checkbox"/>	Harness	<input type="checkbox"/>
Life line	<input type="checkbox"/>	Lifeline	<input type="checkbox"/>
Fall arrest (specify): _____	<input type="checkbox"/>		
Retrieval/rescue device	<input type="checkbox"/>		
5. Protective clothing	<input type="checkbox"/>	Hard Hat	<input type="checkbox"/>
Footwear	<input type="checkbox"/>	Footwear	<input type="checkbox"/>
Gloves	<input type="checkbox"/>	Gloves	<input type="checkbox"/>
Goggles	<input type="checkbox"/>	Goggles	<input type="checkbox"/>
Hearing protection	<input type="checkbox"/>	Hearing protection	<input type="checkbox"/>
Others (specify): _____	<input type="checkbox"/>		
6. Respiratory protection	<input type="checkbox"/>	Air purifying	<input type="checkbox"/>
Dust mask (specify type): _____	<input type="checkbox"/>	Cartridge (specify type): _____	<input type="checkbox"/>
Air supplied- Airline	<input type="checkbox"/>	5-minute egress bottle	<input type="checkbox"/>
Self-contained breathing apparatus (SCBA)	<input type="checkbox"/>		
7. Electric equipment	<input type="checkbox"/>	Low voltage	<input type="checkbox"/>
GFCI	<input type="checkbox"/>	Double Insulated	<input type="checkbox"/>
Other (specify): _____	<input type="checkbox"/>		
8. General	<input type="checkbox"/>	Barricades	<input type="checkbox"/>
Signs	<input type="checkbox"/>	Signs	<input type="checkbox"/>
Fire extinguisher	<input type="checkbox"/>	Fire extinguisher	<input type="checkbox"/>
First aid kit	<input type="checkbox"/>	First aid kit	<input type="checkbox"/>
Resuscitator	<input type="checkbox"/>	Resuscitator	<input type="checkbox"/>
Other (specify): _____	<input type="checkbox"/>		

Appendix C - Confined Space Sign

