

1.0 INTRODUCTION

This Standard provides the expectations and requirements to safely plan and execute work in a confined space.

2.0 SCOPE

This Standard is intended for NBP employees and contractors involved with planning, preparing, testing, approving entry, working in, and managing and maintaining work in confined spaces.

3.0 REFERENCES

NB OHS General Regulation 91-191	Section 22- extremes of temperature
NB OHS General Regulation 91-191	Section 24 – Air contaminants level of concentration
NB OHS General Regulation 91-191	Section 262 – Confined Spaces
CSA Z1006-10	Management of Work in Confined Spaces
Industrial Scientific	Guide to remote sampling
NB Power Form 645	Internal Standard Deviation Request
HSEE-03-18	Respiratory Protection (NBP Standard)
HSEE-03-01	Hazard Identification, Assessment & Mitigation for Completing a Job Hazard Analysis (JHA)
HSEE-03-16	Fall Protection Working at Heights
HSEE-03-64	Traffic Control
HSEE-03-19	Contractor Safety Management
HSEE-03-12	Lifting and Rigging
NB Power Form 646	Regulation Deviation Form

4.0 TERMS AND DEFINITIONS

Adjacent Piping	Means a device such as a pipe, line, duct or conduit, a sump or header, 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. These may include an overflow or backed into the confined space.
As Found Conditions	The conditions of the space when it is initially opened, before any improvements are made, such as ventilation or cleaning d
Aspirated Gas Monitor	A gas monitor capable of actively drawing air towards the sensors. Most aspirated gas monitors have a pump.
Asset Owner	Individual with authority and competence to establish minimum requirements for safe entry and control access to confined spaces.
Attendant	Worker who continuously monitors the status of entrants, work in and near a confined space and, if necessary, initiates the emergency response procedure

Blank Flange	A solid plate installed through the cross-section of a pipe, usually at a flanged connection.
Blind Flange	A solid plate installed at the end of a pipe that has been physically disconnected from a piping system
Breaking the Plane / Entry	Any part of the body breaks the plane of an opening into the confined space (from CSA standard)
Competent	qualified, because of such factors as knowledge, training and experience, to do assigned work in a manner that will ensure the health and safety of persons, (b) knowledgeable about the provisions of the Act and the regulations that apply to the assigned work, and (c) knowledgeable about potential or actual danger to health or safety connected with the assigned work
Competent Tester	Individual with the knowledge, training and experience to identify the contaminants to be tested, the means of testing, location of tests and number of tests to assess the space prior to entry
Confined Space	Other than a development heading in an underground mine and excavations, heating, ventilation and air conditioning (HVAC) plenums and related ventilation ductwork, crawl and attic spaces with openings to outside allowing for continuous passive ventilation and other similar structures provided that there are no factors that could lead to the presence of an atmospheric or other hazard, an area that <ul style="list-style-type: none">• is enclosed or partially enclosed,• is not designed or intended for continuous human occupancy, and• has limited or restricted means of entry or exit that may complicate providing first aid, evacuation, rescue, or other emergency response
Confined Space Code of Practice (COP)	A collection of forms to communicate the hazards, required controls, authorized work and roles of all personnel involved in confined space work. The COP must include (at a minimum) a Confined Space Permit, Emergency Response Procedure, JHA and Confined Space Entry Form
Confined Space Emergency Response Team Leader	Responsible for supervising emergency response team operations and implementing an emergency response procedure for confined space work
Confined Space Entry	Same as breaking the plane/entry

Confined Space Entry Form	A tool owned by the Confined Space Permit Holder to share critical information with all confined space entry personnel and to authorize entry into the space on a shift by shift basis
Confined Space Hazard Assessment	A documented assessment of all known or anticipated hazards that could be present inside or around each confined space and their controls.
Confined Space Minimum Isolation Points	Isolation points identified on the permit by the asset owner that are must be in place make the confined space safe for entry. There may be other isolation points on a permit that do not meet this criteria.
Confined Space Permit	A method for verifying and recording that the required steps have been taken to prepare the space for safe entry; to control when it is safe to enter the space; and to safely return the space to service
Confined Space Permit Holder	Responsible for care, custody and control of the confined space and all work within, once the Confined Space Permit is issued. They ensure all elements of the Code of Practice are developed and implemented.
Hazardous Substance	Means a substance that may, because of its harmful nature cause injury or damage to the health and safety of a person exposed to it. Any product regulated by WHMIS and on an SDS is a hazardous substance.
Immediately Dangerous to Life and Health (IDLH)	An atmosphere that poses an immediate threat to life or that will cause irreversible adverse health effects or impair an individual's ability to escape
Initial Opening of the Space	Removing entry way doors or other entry points for the purpose of performing a pre-entry assessment under the direction of the /Asset Owner
Isolate	Interrupt the supply of materials to or disconnect pipes, hoses or energy sources by applying control measures.
Isolation List	A recorded list of every item that changes state to make a space safe for entry, this include but is not limited to: Blinds, disconnects or plugs, drains, spools, electrical isolation, physical removal of equipment, etc.
Monitoring	Continuous, periodic and re-entry monitoring performed by a qualified attendant to ensure atmospheric conditions in the space remain safe
Pre-entry Testing	Mandatory assessment of the confined space atmosphere, by a Competent Tester, to determine if additional controls or requirements are needed to provide safe entry into the space.

Re-entry Monitoring	Monitoring performed anytime a confined space has been vacant for 20 minutes or more, to assess conditions before entrants are allowed to enter.
Zero-energy State	A state in which a machine or equipment is rendered incapable of spontaneous or unexpected action

5.0 **ROLES AND RESPONSIBILITIES**

Planning and executing safe work in confined spaces requires many different skillsets. The roles below establish the various responsibilities and competencies. In some cases, one person can fulfill more than one role. So long as the individual has the required competencies and the roles do not impede each other, one person can fulfill several roles.

The only clear exceptions are that one individual cannot be an asset owner cannot and a confined space permit holder at the same time; nor can one individual be an attendant and an entrant at the same time.

5.1 **Management (NB Power)**

- Ensure an inventory of confined spaces is created and maintained.
- Ensure hazards of the confined space and the work to be performed are assessed prior to starting work inside confined spaces.
- Ensure that the workers have access to the hazard identification information and all other information developed under the program.
- Ensure and document that each worker fulfilling a role in the confined space program has received and understands the training required to carry out his or her role within the program before assuming the role.
- Ensure processes for confined space isolation, lockout and perimetry are implemented and resourced.
- Ensure emergency response procedures are developed and implemented for each confined space.

5.2 **Asset Owner**

- Ensure a Confined Space Hazard Assessment is prepared or reviewed prior to each initial confined space entry (Appendix B)
 - Prepare confined spaces for safe entry:
 - Prepare or review the procedure to safely isolate each confined space. The procedure must document the identification, mode of isolation and required status for each designated isolation points for each energy source and process connection (isolation list).
 - Ensure all equipment to be entered has been isolated, de-energized and tested in accordance with Appendix A, Section 6.2.1.4, and division specific procedures.
 - Where required, ensure regulatory confined space isolation deviations are obtained, understood communicated and implemented prior to each use. Isolation and lockout deviations must be documented on the CS Permit.
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- Authorize opening of the space and establish requirements and approvals for pre-entry testing as required, through the CS Permit
- Ensure opened entry ways are flagged or signed as per section 6.3.8 until the CS Permit has been issued
- Verify hazardous energy controls were effective and assess conditions within the space.
 - Ensure pre-entry testing has been performed by a competent tester (including radiation where applicable)
 - Authorize the conditions for entry into the confined space to complete pre-entry testing as required in alignment with Section 6.2.2
 - Ensure the space has been visually inspected to assess conditions and identify any additional hazards (overhead hazards, sludge buildup, etc.).
- Use the Confined Space Permit to document pre-entry test results, visual inspection findings, requirements for safe entry before issuing the permit to the Confined Space Permit Holder.

5.3 Competent Tester

- Plan and execute pre-entry testing as per Section 6.2.2 and in accordance with the Confined Space Hazard Assessment
- Perform pre-entry testing from outside the confined space to the extent possible
- If entry into the confined space is required to complete pre-entry testing, ensure all aspects of an IDLH entry are followed (see Section 6.2.2), under authorization of the Asset Owner.
- Record pre-entry test results using the pre-entry test form (Appendix B)
- Transfer the Pre-Entry Test Form and any observations to the Asset Owner.

5.4 Confined Space Permit Holder

- The Confined Space Permit Holder (CSPH) receiving the CS Permit from the Asset Owner shall review, walkdown and confirm the confined space minimum isolation points prior to starting work The CSPH can request support from the Asset owner in reviewing, finding and understanding the confined space isolations.
 - Assumes responsibility for the confined space upon receipt of the Confined Space Permit
 - Ensures the Code of Practice is implemented, prior to allowing entry into a confined space (6.3.1.1)
 - Ensure that those entering the confined space are competent and trained to enter and have the required PPE prior to entry.
 - Ensure that acceptable conditions are maintained for the duration of the entry.
 - Implement, maintain and monitor ventilation, as required by the CS Permit or Job Hazard Assessment (JHA)
 - If permit required controls are not in place or change unexpectedly, terminate the entry and report to the Asset Owner
 - Verify that rescue services are available prior to, and for the duration of, the entry and that the means for summoning them are operable.
 - Ensure an attendant is stationed at each entryway prior to allowing entry.
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- Ensure that proven methods of communication are established between all roles involved.
- Ensures a Confined Space Entry Form (Appendix B) is completed, reviewed and understood by all parties for each shift; and as changes in work scope occur
- Ensures the entry is terminated and the Asset Owner is informed in accordance with Section 6.2.3.9
- Coordinate the work, understand the hazards, and verify the required controls are in place when multiple workgroups are working in, or around, a confined space.
- Hand over responsibility of the confined space to an incoming Confined Space Permit Holder.
- Tape off accessible entrance if the entrance inside the space falls in a line of fire hazard (e.g. pulling wire, fall hazards from above, etc.). Allow access to space only when work inside has halted and the line of fire hazard is controlled and safe for a entrant to enter.

5.5 Entrant

- Review the COP and sign the CS Entry form to indicate understanding of hazards and required training and controls.
- Initial the CS Entry Form every time they leave a confined space
- Stop and report changes in work scope, hazards, or anything unexpected to the Confined Space Permit Holder
- Use and know the limitations of the PPE.
- Identify any signs or symptoms of illnesses or injuries caused by working in confined spaces.
- Exit the space if unacceptable conditions develop or if directed to exit by the Attendant or Confined Space Permit Holder

5.6 Confined Space Emergency Response Team Leader (CSERTL)

- Assess whether each entry point is large enough to allow safe entry by Confined Space Emergency Response Team Members with planned personal protective equipment.
 - If the space is not large enough, adjust the ER procedure or notify the CSPH that rescue is not feasible, and entry is prohibited
 - Ensure that a written emergency response procedure is developed, and:
 - Is adequate to protect the health and safety of employees.
 - Indicates the number of emergency response employees required in the case of an emergency.
 - Includes the procedures to be followed and the equipment to be used in the event of an emergency.
 - Ensure the Emergency response procedure is updated as changes arise that could impact the rescue plan or the health and safety of the emergency response team (e.g., as pre-entry testing finds anything that deviates from the original plan, or as scaffold is added or modified)
 - Ensure that the ER Procedure is resourced while entrants are inside confined spaces by:
 - Sufficient personnel are on site and able to access spaces within times defined in the ER Procedure
 - Ensure ER Team members remain alert and fit for work.
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- Emergency response equipment are in place and operating properly.
- Ensure ER Team members have required training and competence to meet the specific rescue/emergency response requirements of the ER Procedure
- In the event of a confined space emergency.
 - Assume control of all activities during the confined space emergency response and direct the Confined Space Emergency Response Team.
 - Ensure that all required actions have been taken before sending rescuers into the confined space.
 - Ensure the members of the Confined Space Emergency Response Team properly perform their duties.
 - Assess the ability of the attendant and air supply system attendant (if applicable) to continue performing their duties.
 - Maintain communication with all affected parties.
 - Terminate the emergency response and ensure removal of personnel and equipment at the appropriate time.

5.7 Confined Space Emergency Response Team Members (CSERTMs)

- For each confined space they are assigned, be familiar with
 - the locations of the confined spaces, including the entry points
 - the specifics of the code of practice, and
 - the specifics of the Emergency Response Procedure
- Ensure training and competence are maintained as per Section 7

5.8 Health and Safety Representative

- May review the confined space code of practice.
- Serve as Subject Matter Experts for confined spaces.
- Help assess if the space meets the confined space definition
- Review confined space isolation deviation requests

5.9 Attendant

- Must remain stationed immediately outside their designated point of entry for the confined space and continuously observe the work in and near the confined space.
 - Review pre-entry and monitoring results, ER Procedures and sign off on the Confined Space Entry Form before allowing entry.
 - Have knowledge of the anticipated and actual hazards associated with entering the confined space.
 - Use controls as required to properly protect yourself from hazards that may exit the space or may be around the space (e.g. respirators or fall protection)
 - Ensure that the procedures and equipment to be followed and used in the event of an emergency are followed and used correctly (e.g., have radio, contact names etc.)
 - Tape off, or block, the entry way when the entry has been stopped for any period of time, including break.
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- During entry:
 - Monitor conditions and changes that could adversely affect the health or safety of the entrant.
 - Perform and record continuous or periodic gas testing as required by the CS Entry Form (as per 6.3.2.1)
 - Consider changes inside and outside of the space that may impact the safety of entrants
 - Recognize the signs and symptoms of illness, injury, and hazard exposures that may affect the entrant.
 - Maintain two-way communication with all entrants, the CSPH and the CSERTL.
 - The Attendant may be directed by the CSPH to
 - Monitor the ventilation system (without leaving their station)
 - Monitor and control access to entry ways when line of fire hazards exists
 - Maintain a log of who enters/exits the space and at what times
 - Ensure each entrant prints, dates and signs their name, on the CS Entry Form, to acknowledge they have reviewed and will comply with the Code of Practice
 - Ensure each entrant records their enter and exit times on the CS Entry Form (Appendix B)
 - Initiate emergency response procedures as per the ER Procedures
 - Only leave the space when all workers have exited and been accounted for
 - Never break the plane of the confined space

5.10 Air Supply Attendant

When an air supply system attendant is identified in the Code of Practice, the air supply system attendant shall ensure both in normal and emergency situations that:

- the air-line supply system is in proper working order and the air supply is uninterrupted,
- the airlines do not become entangled or otherwise compromised,
- They do not leave their post while supplied air work is being performed, or relied on for rescue services when applicable
- Immediately raise any concerns to the CSPH and/or CSERTL

6.0 **STANDARD**

6.1 Planning

Understanding and documenting the work scope, anticipated hazards, required controls and roles and responsibilities of all involved, is critical for safe confined space work.

During planning, the hierarchy of controls must be considered to ensure efforts are explored to eliminate or reduce risk to workers in confined spaces. Examples are using drones or cameras to perform inspections, using remote controlled machines to remove sludge, or using Tungsten Inert Gas (TIG) over other welding methods as it reduces exposures to metal fumes.

6.1.1 Confined Space Inventory

Management of each work location shall ensure:

1. All confined spaces are identified and documented in an inventory.
2. A process is established for keeping the inventory current, including updating the inventory upon
 - a change in the design, contents, or surroundings of the space; or
 - the creation of any new confined spaces not already in the inventory.
3. A process is established for reviewing the entire inventory at regular intervals (not to exceed three years).
4. Each space, where feasible, shall be signed or marked to indicate that it is, or could be, a confined space.

6.1.2 Confined Space Hazard Assessment (CSHA)

The Asset Owner is responsible for ensuring a Confined Space Hazard Assessment is prepared or reviewed prior to issuing a Confined Space Entry Permit (Appendix B).

The confined space hazard assessment is a key resource to be used for planning and executing:

1. The safe isolation and lock out of the space.
2. The pre-entry testing plan completed by a competent tester.
3. Preparing and issuing the confined space permit
4. Planning the Emergency Response Procedure
5. Planning and executing work in the space

6.1.2.1 The assessment must:

- a) Identify all possible hazards that can exist in a confined space
- b) Consider facilities and assets at the workplace that could affect the health or safety of a worker in or near the confined space (e.g., nearby chemical storage or exhaust fumes from forklift operation)
- c) Document the minimum required isolation expectations for the space
- d) Identify whether the opening of the confined space is large enough to allow the safe entry and exit of personnel wearing protective equipment (e.g. SCBA).
- e) Be dated and have the name, role and signature of the person(s) developing or reviewing the assessment.
- f) Describe the spaces subject to the assessment.
- g) Outline required and recommended control mechanisms for confined space hazards identified in the assessment.
- h) A team approach is required to create a high quality. The initial; CSHA must be prepared by the Asset Owner (operations) and reviewed by Maintenance and Safety.

6.1.2.2 CSHA Review

- a) The asset owner must ensure a completed CSHA is reviewed for completeness prior to each time a confined space is initially entered (e.g.
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- prior to each outage).
- b) The asset owner is encouraged to include at least Maintenance and Safety in the review process, as time permits
 - c) The Asset Owner must review the CSHA in its entirety to ensure it is accurate and incorporates any possible changes, before the CSHA is re-issued for use.

6.1.3 Job Hazard Analysis (JHA)

Prior to entering and performing work in any confined space, the Confined Space Permit Holder (CSPH) shall ensure that a Job Hazard Analysis (JHA) has been prepared that assess the hazards and controls for each task being performed in the space. In addition to complying with HSSE-03-01, the JHA must:

1. Consider how working in a confined space could impact the hazards and controls required for the intended work scope (e.g., welding in a confined space may require ventilation and respirators)
2. Represent all concurrent work happening in the space at a given time.
3. Consider routine and non-routine activities of all personnel having access to the confined space.
4. Be updated as required based on information shared via the confined space permit.
5. Be updated as specifics of the job change, new work is introduced or as anything else changes that could impact the risk to personnel (e.g., using a different cleaning chemical due to the planned product being unavailable).
6. Be reviewed with the attendant(s) and entrant(s) prior to entry.

6.1.4 Emergency Response Procedure

Prior to entering any confined space, the Confined Space Permit Holder shall ensure the CSERTL has approved an emergency response procedure (Appendix B) that is adequate to protect the health and safety of employees in case of an emergency. The emergency response procedure must:

1. Identify the name and location of the space.
 2. Identify entrance location(s); description of the entrance; access and egress methods; and any restrictions around the entry (outside or inside the space) that could impact access or emergency response.
 3. Consider the layout, structure and internals of the space in terms of how they may impact emergency response activities.
 4. The hazards of the space and the tasks being performed (from the CSHA and the JHA)
 5. Indicate the number of emergency response employees required to meet the requirements of the Emergency Response Procedure
 6. Indicate the specific emergency response equipment required to carry out the planned emergency response procedure(s)
 7. Indicate the forms of communication to be used between the attendant, the Confined Space Permit Holder and the Emergency Response Team Leader
 8. Indicate the risk level and required response time in accordance with Section 6.3.12
 9. Be signed and dated by the Emergency Response Team Leader
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6.1.5 Coordination of Multiple workgroups (including contractors)

1. Multiple workgroup coordination is required when:
 - a) More than one work group will work at the same time in a confined space
 - b) More than one work group will work at the same time in or on a confined space
2. The Confined Space Permit Holder is responsible to ensure all work groups clearly understand who is executing each confined space role (as per this standard)
3. The Confined Space Permit Holder must coordinate and document the work of all work groups involved, so that work is performed in a way that protects the health and safety of all workers who perform work in or near the confined space

Examples:

- a) Group A is applying coatings inside the space and group B is scaffolding a separate location in the space – all groups may require controls to prevent exposure to the coating material.
- b) Group A is inside a confined space to perform inspections and Group B is welding on piping that is connected to the space and considered part of the space (downstream of the isolation point) - the CSPH needs to determine if ventilation or respirators would be required for Group A, or if their entry can be delayed until after Group B completes their activities.

6.2 Prepare the Space for Safe Entry

The Asset Owner is responsible to identify hazards inherent to the confined space, plan and execute controlling those hazards, verify the controls are effective, assess conditions in the space and control access to the space through the confined space permit process.

This means ensuring all confined spaces are properly isolated, de-energized, locked, tested, and put in a safe state prior to allowing entry. Hazards such as electrical, mechanical, hydraulic, pneumatic, thermal, radioactive, and gravitational energy that shall be isolated and locked out in a way that eliminates or minimizes worker exposure to the hazards.

6.2.1 Confined Space Isolation and De-energization

1. The Asset Owner is responsible for identifying and documenting a comprehensive list of all isolation points for each confined space, prior to starting the isolation process (see CSHA in section 6.1.2.1)
 2. The list must identify each potential energy source; the applicable isolation point(s) and the method(s) of isolation.
 - a) The isolation list must be used for developing and executing isolation plans for each confined space.
 - b) If the list contains isolation points for other assets (e.g. a block permit) the critical isolation points to make the confined space safe must be clearly identified.
 3. Acceptable isolation for confined space process hazards is nuanced and depends on the operational status of energy sources (e.g. on the run vs plant outage), the hazards
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involved and other factors. See Appendix A for Confined Space isolation requirements.

4. Non-process energy sources inside a confined space; such as electrical, mechanical, hydraulic, pneumatic, thermal, and gravitational energy; that could present a hazard while entering, exiting or occupying the space must be put in a zero-energy state and locked out.
 - a. All non-process energy sources must be identified on the Confined Space Hazard Assessment.
 - b. Isolation requirements for non-process energy sources will be determined by the Asset Owner based on the scope of the work and potential exposure or interaction with the non-process energy sources.
 - c. All non-process energy that presents a hazard and cannot be put in a zero-energy state must be managed using Division Specific Lock Out Tag Out Code of Practice requirements in accordance with General Regulation Section 240.
5. All kinetic and potential (stored) energy must be assessed and removed prior to permitting entry.

Examples include.

 - residual electrical energy in capacitors or induction
 - stored mechanical energy in a compressed spring.
 - residual chemical in pipe or confined space
 - steam that has not been vented to relieve the pressure in the system.
6. Where process isolation and lock out are not feasibly able to meet the intent of Appendix A, other means of controlling or eliminating the hazards may be considered on an exception basis. Alternative means of controlling hazardous energy must be validated and proven to be effective before submitting a deviation request to Total Health and Safety as per Section 4 in Appendix A.
7. Where deviations are granted by WSNB, it is the responsibility of the Asset Owner to ensure the deviation is reviewed, understood and implemented prior to each application of the deviation.
8. Isolation and lock out deviations must be documented on the Isolation plan and the Confined Space Permit.

6.2.2 Pre-Entry Testing and Visual Inspection

1. Pre-entry testing and visual inspection are critical for the asset owner to verify that the confined space hazards have been adequately controlled, and to assess the space for known and unforeseen hazards.
 2. The Asset Owner must ensure that visual inspections and pre-entry testing are performed, prior to permitting entry into the confined space.
 - a) Visual inspection and pre-entry testing must be performed at all points where personnel are expected to work or travel through in a confined space
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- b) Pre-entry visual inspection findings are to be documented on the CS Permit
 - c) Competent Tester must perform pre-entry testing
 - 3. Pre-entry testing must be performed by a Competent Tester once authorized by the Asset Owner (Appendix F).
 - 4. Pre-entry testing must be performed without ventilation to properly assess the hazards of the space.
 - a) If the space was being ventilated prior to pre-entry testing, the ventilation must be turned off for at least 30 minutes before pre-entry testing is performed. Longer durations may be required depending on the volume of the space and the ventilation used.
 - 5. If pre-entry testing determines that ventilation is required to improve the atmosphere in the space, validation testing must be performed after at least 30 minutes after the ventilation has been running, or 6 air changes have occurred, to assess whether it was effective at improving the atmosphere.
 - 6. The competent tester must consult the Confined Space Hazard Assessment to determine:
 - a) The hazards (e.g. gases, heat) that need to be assessed (using the CSHA as a reference) and the appropriate test equipment used to do the testing
 - b) The location and number of tests to be performed.
 - Must consider the dimensions of the space, accessibility of test locations and the stratification of air contaminants and oxygen.
 - Including whether remote testing can adequately assess the space or whether entry is required for comprehensive testing.
 - 7. The competent tester must document the details of the tests on the Pre-entry Test Form and transfer the results to the Asset Owner (Pre-Entry Test Form - Appendix B)
 - 8. The Asset Owner will ensure pre-entry test results are included as part of the Confined Space Permit
 - 9. The Asset Owner shall not allow unprotected entry into a space where the atmosphere is not within acceptable limits (Section 6.2.2.2 – Table 1)
 - 10. Testing must always start outside the space. Every attempt should be made to complete the comprehensive testing from outside the space. However, if the competent tester determines that entry into the confined space is required to test all locations workers will access, then the Asset Owner is responsible to authorize entry into the space when all requirements for IDLH atmosphere are in place (Appendix F).
 - 11. IDLH Confined Space entry must meet all requirements of a normal confined space entry and will be considered Immediately Dangerous to Life and Health which means.
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- a) An unknown atmosphere is assumed to be potentially Immediately Dangerous to Life and Health until proven otherwise.
- b) The emergency response team will need to be at the confined space and able to reach the entrant within 3 minutes (as per 6.3.12)
- c) Gas testing must be performed at entry points to get an initial understanding of the atmosphere in the space. Acceptable or low results at entry points does not mean that the rest of the space is safe. If outside testing identifies high LEL (>10%) entry cannot happen until it is reduced.
- d) The Entrant will need to enter using a Supplied Air Respirator (10,000 Assigned Protection Factor) as per (HSEE-03-18)

6.2.2.1 Testing Instrumentation

- 1. The tester must be competent in the make and model of test instrumentation that will be used.
- 2. Standard issue 4 and 5 gas monitors must have an aspirated pump to be able to draw samples from within the space.
- 3. Management must ensure the following testing instrumentation records are maintained:
 - a) Date of purchase
 - b) Make, model and serial number.
 - c) Calibration and bump/functional test history
 - d) Sensor change schedule
 - e) Maintenance, repair and calibration history

6.2.2.2 Test Outcomes and Requirements for Entry

- 1. The Asset Owner shall not allow unprotected entry into a space where the atmosphere is not within acceptable limits.
 - 2. The target for entry is to have no measurable hazards within the space and efforts should be made to reduce the risk as low as possible
 - 3. Table 1 outlines the minimum expectations for test outcomes and expectations. If test outcomes are above acceptable levels, actions must be taken to reduce the hazard to a safe level or entry must require controls suitable to the level of the hazard. If the hazard level can be reduced (Section 6.2.2.3) to a lower risk level, a new Pre-Entry test and CS Permit must be issued.
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Table 1 - Confined Space Test Criteria and Outcomes

Hazard	Risk Level and Expectations		
	Low Risk - Safe for Entry	Moderate Risk - Controls Required for Entry	Immediately Dangerous to Life and Health (IDLH) – No Entry without Internal Deviation
Oxygen	19.5% - 23%	N/a	Less than (<)19.5% or More than (>) 23%
Lower Explosive Limit	<5%	5%-10%	>10%
Hydrogen Sulfide (H ₂ S)	<5ppm	5ppm-100ppm	>100ppm
Carbon Monoxide	<25ppm	25ppm-1200ppm	>1200ppm
Sulfur Dioxide	<2ppm	2ppm-100ppm	>100ppm
Chemical Agents	<TLV <50% of Ceiling	TLV – IDLH 50% of Ceiling - IDLH	>IDLH

***Moderate and IDLH risk conditions will require controls to be established by the Asset Owner when issuing the Permit and by the Confined Space Permit Holder when they result from work performed in the space.**

1. Oxygen

- Oxygen is expected to be as close to 20.9% as possible.
- Entry is not permitted when oxygen levels are below 19.5% and above 23% by volume.
- In simple terms, where oxygen makes up 20% of the atmosphere, it can be displaced by other contaminants at a ratio of 5:1. For example, if an oxygen sensor reads 20% Oxygen (down from 20.9%) it could mean that up to 4.5% (45,000 ppm) of another hazard is present, resulting in a displacement of 0.9% O₂. Any oxygen drift away from 20.9 must be taken seriously and investigated.

2. Lower Explosive Limit

- The LEL should be as close to 0% as possible. However, entry is permitted for specific types of work at the following percentages of LEL.
 - <5% LEL for Hot Work (cutting, welding, or any other fire or spark-producing work)
 - <10% LEL for Cold Work using non-sparking equipment and for cleaning and inspection.
- Any measurable amount of LEL could represent a potential overexposure to a chemical agent. If LEL is detected ensure efforts are taken to understand,

measure and control the source

3. Chemical and Physical Agents

- a) All chemical and physical agents linked to the space, or from the immediate vicinity, must be evaluated and assessed against their corresponding 2016 ACGIH Threshold Limit Values (TLVs).
- b) Any chemical or physical agents present at more than 100% of their TLV will require mitigation in accordance with the hierarchy of controls. Where the agent cannot be reduced below the TLV, controls will need to be documented and implemented.
 - The exception is agents with a ceiling limit as they are instantaneous limits. Agents with ceiling limits must implement controls at 50% of the TLV. *Example: H2S has a ceiling limit of 10ppm. If testing finds H2S at 5ppm then controls are required as 5ppm is 50% of the limit.*

6.2.2.3 Improving as-found conditions

If the visual inspection and/or pre-entry testing find conditions that are not acceptable for the type of work to be performed, steps must be taken to reduce the risk level.

NB Power strives to achieve a zero-hazard state for entry into confined spaces. Although it is not always possible, there are many steps that can be taken to reduce or eliminate hazards in a confined space.

1. Revisit the isolation plan to see if anything could be entering into the space that shouldn't.
 2. Ventilate the space to remove any residual fumes, vapors or particulate.
 - a) Use intrinsically safe or grounded and bonded ventilation where applicable.
 - b) Contact Total Health and Safety for recommendations on proper ventilation methods.
 3. If LELs remain elevated beyond the acceptable level for the intended type of work (see Table 1) some options below can be effective at reducing the risk of fire, explosion and exposure to personnel.
 - a) Inert the space by flooding it with an inert gas (such as nitrogen)
 - b) Purging the space with steam
 - c) Chemical cleaning
 4. Sustained IDLH conditions require the CSPH to develop a safe work plan which must be reviewed by Total Health and Safety, prior to allowing IDLH work to occur
-

6.2.3 Confined Space Permit

1. A confined space permit is a process to document and communicate that the space was properly isolated, locked out and tested. It also communicates anticipated hazards, required controls and requirements for entry from the Asset Owner to the Confined Space Permit Holder at the time the permit is issued.
2. No one shall enter into a confined space until a Confined Space Permit has been issued.
3. A CS permit must never be issued where a confined space may contain a material that has the potential for engulfing the entrant.
4. The CS permit must reference the work permit for the isolation and lockout of the space.
5. CS Permits will only be to establish and document safe parameters for entry into the confined space. The CSPH is responsible to ensure all other division or site specific work permits are obtained and adhered to. (e.g. hot work)
6. A Confined Space permit may be valid for the duration that the space will be entered, or for a specific set of conditions. At the end of the designated confined space work the Confined Space Permit Holder must surrender the permit to the Asset Owner
 - a) The Confined Space Permit Holder (CSPH) receiving the CS Permit from the Asset Owner shall review, walkdown and confirm the confined space minimum isolation points prior to starting work The CSPH can request support from the Asset owner in reviewing, finding and understanding the confined space isolations.
7. Once the Confined Space Permit Holder accepts the permit, they assume responsibility for the maintaining a safe atmosphere based on the requirements of the permit and the work that the entrants will perform.
8. The CS Permit is no longer valid, and entry must be terminated if isolations and lockout or permit required controls are missing, change or are modified.
9. If unexpected changes occur in the space that are not readily resolved by the CSPH, they must terminate entry and immediately report to the Asset Owner who will determine if the CS Permit is still valid.

Examples:

- New substances appear in the space (liquid/dust)
- Entrants or Attendant reports unexpected smell, taste, change in temperature or report not feeling well.
- Unexpected gas testing results.

6.3 Entry and Work in Confined Spaces

The following section details the expectations to work safely in confined spaces.

Upon receiving and signing off on the Confined Space Permit from the Asset Owner, the Confined Space Permit Holder assumes responsibility for the remaining scope of work and all requirements of this section.

6.3.1 Requirements to Enter a Confined Space

Table 2 - Summary of Requirements to Enter a Confined Space

Resource	Responsible	Purpose
Confined Space Permit	Asset Owner	Permission for entry and minimum requirements
Job Hazard Analysis (JHA)	CSPH	Identify and control work task hazards
ER Procedure	CSERTL	CS Emergency Response plan
Confined Space Entry Form	CSPH	Communicate critical information to all CS team members
Attendant must be present	CSPH	Ensure COP is followed, track and monitor entrants, the atmosphere and initiate emergency response
Continuous or Periodic Monitoring	CSPH	Ensure conditions in the confined space remain safe throughout the entry
ER Team must be ready to respond immediately (or meet IDLH requirements)	CSPH and CSERTL	Set up and perform emergency response as required by ER Procedure

6.3.1.1 Code of Practice

1. Prior to entering into a confined space, the Confined Space Permit Holder must ensure that a Code of Practice (COP) has been established for the confined space (Appendix B)
2. A Code of Practice is a collection of forms to communicate the hazards, required controls, authorized work and roles of all personnel involved in confined space work. The COP must include (at a minimum) a CS Permit, Emergency Response Procedure, JHA and CS Entry Form
3. The Confined Space Permit Holder may consult with the health and safety representative in developing the COP
4. Sustained IDLH conditions require the CSPH to develop a safe work plan which must be reviewed by Total Health and Safety, prior to allowing IDLH work to occur
5. The CSPH must sign the CS Entry Form to authorize that all requirements are in place and the specific work is ready to be carried out in the confined space
6. Confined Space Permit Holder shall ensure that all employees involved in confined space work are adequately instructed and trained in the code of practice and the procedures identified in the code of practice.
7. An employee entering into a confined space or who may undertake a rescue operation in a confined space shall read the code of practice and

acknowledge that the employee has received and understood the instructions in the code of practice by signing and dating a copy of the CS Entry Form. Their signature confirms they have reviewed and accept:

- a) hazards of the space,
 - b) pre-entry test results,
 - c) requirements to enter the space,
 - d) hazards and controls of the tasks to be performed; and
 - e) the emergency response procedures.
8. The code of practice (ER Procedure, JHA, CS Permit, CS Entry Form) shall be available near the entrance to the confined space
 9. The Confined Space Permit Holder must ensure a new CS Entry Form is prepared and used for each work shift
 10. The code of practice is a summary of critical documents and shall contain at least the following information:

Table 3 - COP Required Information

Required COP Information	Form where it is found
The location of the confined space to which the code of practice applies	Confined Space Permit
The name of the Confined Space Permit Holder, emergency response team leader, attendant, the entrant(s), and the air supply system attendant (if applicable)	CS Entry Form
Description of the work to be performed	CS Entry Form
Description of any possible hazards that may affect the health or safety of employees	Confined Space Permit – space specific Job Hazard Analysis – task specific
The procedures to be followed and equipment to be used to perform the work	Confined Space Permit – space specific Job Hazard Analysis – task specific Tailboard
The procedures to be followed and equipment to be used in the event of an emergency	Emergency Response Procedure

6.3.2 Maintaining a Safe Atmosphere

1. The Confined Space Permit Holder is responsible for maintaining a safe atmosphere within the confined space. This includes meeting the expectations of the confined space permit and controlling any hazards generated as a result of tasks performed in the space.
2. If the CS has been unmonitored (gas tested) for a period of 12 hours or more, the CSPH must not allow entry until a competent tester has performed pre-entry testing as per Section 6.2.2 and transfers the Pre-Entry Test form to the CSPH for review.

- a. The CSPH will determine if entry can proceed and under what conditions
- 3. The Confined Space Permit Holder must ensure no compressed gas cylinders, other than breathing air and/or fire extinguishers, are taken into a confined space.
- 4. The Confined Space Permit Holder must determine if the continuous or periodic monitoring is required.

Continuous monitoring is required:

- a) Anytime a chemical or physical agent is present in the space or is brought into the space to be used as part of a task.
- b) Work in the space could change the atmosphere (e.g., welding, grinding, cleaning, install or remove refractory, etc.)
- c) When there is a possibility that any liquid, free flowing solid or gas could enter into the confined space from internal or external routes (e.g., exhaust from a nearby compressor)
- d) As required by the confined space permit or the CSHA

Periodic monitoring is required:

- a) In all situations where continuous monitoring is not required

Personal and Area Monitoring

- a) In addition to continuous monitoring, personal monitors that serve as warning devices and/or area monitors (with visual and audio alarms) are strongly encouraged when work conditions could change suddenly or when continuous monitoring is difficult based on the size or configuration of the space

6.3.2.1 Monitoring the atmosphere:

- 1. The Confined Space Permit Holder is responsible to ensure:
 - a) Monitoring is performed as close to the workers as possible.
 - b) Monitoring is always be performed for at least LEL, O2 and CO.
 - c) Additional monitoring requirements must be clearly explained in the Confined Space Entry Form.
 - d) Monitoring is performed with an aspirated gas monitor that has been properly calibrated and bump tested in accordance with manufacturer specifications.
 - e) Monitoring complies with the test outcomes in section 6.2.2.2
 - f) Monitoring is performed by a qualified Attendant.
 - g) Monitoring is always performed prior to workers entering a CS at the start of their shift, following breaks and anytime the space is vacant for 20 minutes
 - h) Where Continuous Monitoring is required, it will be performed the entire duration of the entry and results shall be recorded before each re-entry, anytime instruments go into alarm, and every 30 minutes.
-

- i) If the space has been untested for 12 hours or more, pre-entry testing by a competent tester will be required as per 6.2.2, for the CSPH to allow entry into the space.
 - Pre-entry testing performed after a CS Permit has been issued, may not need to follow IDLH requirements for entry into the space to test. The CSPH must determine the controls required to enter into the space to perform pre-entry testing based on
 - the test results recorded while previously working in the space since CS Permit was issued
 - the confined space hazard assessment
 - the length of time the space was vacant
 - Input from the Competent Tester
2. If the atmosphere is changes unexpectedly, the Attendant must evacuate the space, notify the Confined Space Permit Holder who may make any necessary adjustments to the Code of Practice to ensure the work can proceed safely.
 - a) An emergency response may be requested by the Attendant.
 - b) Unexpected changes are triggered by:
 - Smell
 - Taste
 - Gas testing results that trigger an alarm, or abnormally quick or sudden departure in test results
 - Entrant not feeling well.

Table 4 - Monitoring Requirements

Requirement	Continuous Monitoring	Periodic Monitoring	Pre-Entry Testing
Performed by Competent Tester			X
Performed by an Attendant	X	X	
Use a calibrated, bump tested, aspirated gas monitor	X	X	X
Perform as close to workers as possible	X	X	
Monitor for at least LEL, O2 and CO	X	X	X
Required prior to each re-entry	X	X	
Required if space is vacant for 20 minutes	X	X	
Required at all times	X		
Required before CS Permit is issued			X
Required if space has been vacant or untested for 12 hours or more			X

6.3.3 Lifeline and Harness

1. Any worker entering the space must wear a Class "E" full body safety harness.
2. Where possible the worker shall be attached to a lifeline unless the space or working conditions would make the use of a lifeline impractical or dangerous.
3. Where there is a danger of falling, fall protection and emergency retrieval equipment must be used.
4. Where fall protection is required, ensure that a proper retrieval system is in position. Where required, an attachment point of suitable strength, tripod or davit arm must be provided outside the space.

6.3.4 Electrical Safety

5. Electrical equipment, atmospheric monitoring equipment, radios and accessories used in a confined space that may contain flammable dust, gases or vapours must be intrinsically safe.
 - a) Electrical equipment, atmospheric monitoring equipment and accessories used in a confined space must be approved in accordance with CSA Standard C22.1-15, "Canadian Electrical Code, Part 1", as amended from time to time, for use in hazardous locations as defined in that standard.
6. 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.

6.3.5 Lighting

1. All areas of the CS in which workers must work in or pass through, including areas of access and egress shall be adequately lit, by use of permanent, fixed temporary or portable lighting.
 2. Explosion proof lighting must be used where identified as per 6.3.4
 3. Temporary lighting shall be secured from falling and protected from accidental contact. Light bulbs shall be protected from accidental breakage by enclosure in a mechanically protective device (e.g., cage).
 4. Temporary lighting shall be regularly inspected and burned out or missing lamps replaced.
 5. Higher lighting levels shall be provided in localized areas as required for specific types of work.
 6. For some types of work (e.g., some inspection techniques), lower levels of lighting are necessary. In such cases, provision shall be made for ensuring that personnel have adequate lighting for access and egress (e.g., flashlights)
 7. Back up lighting (e.g. headlamps) shall be required in confined spaces where safe escape is dependent on temporary lighting
 8. Halogenated lights that are not intrinsically safe are not recommend inside Confined Spaces. These lights are extremely hot and known to start fires.
-

6.3.6 General

1. No compressed gas cylinders other than breathing air lines or fire-extinguishers are allowed inside confined spaces
2. Welding lines and tools that could contain hazardous materials, must be removed from the space at the end of each shift, unless the work is continuous (24 hr).
3. There is no eating or drinking inside confined spaces.

6.3.7 Communication

The CSPH must ensure a proven means of communication is established between the attendant and entrants; attendant and CSERTL; and attendant and CSPH.

Radios and cell phones are the preferred tools for two-way communication whereas air horns and other means (e.g. whistle, visual, etc) are permissible for evacuation so long as everyone is aware of the communication plan prior to starting work.

6.3.8 Signage

1. All entry points that are not actively being attended or used must be flagged or signed to indicate they must not be entered.
 - a) Signs or special confined space tape must say “Confined Space – Do Not Enter”
 - Confined Space tape does not require a tag
 - b) If red flagging tape is used, it will require a tag in accordance with HSEE-03-34
2. Once an attendant is at the entry point and all requirements of the COP have been met, the attendant may remove the flagging or sign to allow the entry to occur.
3. The attendant must replace the flagging or sign anytime the entry point is no longer in use.

6.3.9 Traffic Hazards

1. If a hazard from any form of traffic exists, the Confined Space Permit Holder shall ensure that adequate warning signs and barricades are installed to protect an entrant while inside the confined space.
2. A traffic control plan may be required in accordance with HSEE-03-64: Traffic Control

6.3.10 Ventilation

1. Where required to bring the atmosphere within the acceptable limits prior to entry, to maintain acceptable conditions while the space is occupied, or to control hazards generated from work in the space.
 - a) Ventilation must be carefully planned to ensure it is effective. Total Health and Safety can assist with ventilation planning.
 - b) When blowers or other means of introducing air into a space are used, they shall be placed in a manner that minimizes the possibility of introducing contaminants that could create a hazardous atmosphere.
-

- c) When a confined space is ventilated, consideration shall be given to ensuring that the ventilation flow is adequate and the confined space can be completely ventilated (e.g., no dead spaces).
- d) If there is a potential for atmospheric conditions in the confined space to change or become hazardous during entry, ventilation shall be maintained and monitored.
 - If ventilation fails, the space must be evacuated.
 - Monitoring ventilation means that someone has a constant means of ensuring the ventilation is still functioning, this includes:
 - Visual aids (e.g., flagging tape)
 - Audible and visual alarms
- 2. Ventilation must be exhausted so that it does not present a risk to anyone inside or outside the confined space
- 3. Ventilation devices must be properly grounded and bonded.
- 4. Ventilation guidance can be found in Appendix E

6.3.11 Line of Fire Hazards

It is the responsibility of the permit holder to ensure that all potential line of fire hazards are controlled and communicated to those entering the confined space under their permit. The following requirements must be met to ensure control of line of fire hazards within a confined space, in addition to the requirements in [HSEE-03-51 Line of Fire](#):

- 1. Establish an exclusion zone by putting up red barrier tape, and tags, at an entrance if the entrance of the confined space falls within the line of fire zone.
- 2. If an employee must enter the confined space by way of the entrance in the line of fire zone, the CSPH must ensure proper means of communication are established between the attendant and those conducting work inside to ensure all work is stopped and controlled prior to entry.
- 3. All line of fire hazards must be eliminated where possible. If not possible, ensure exclusion zones and or barriers inside the confined space are established.

6.3.12 Emergency Response Requirements

The following requirements must be considered as part of the emergency response procedure development and implementation.

1. Immediately Dangerous to Life and Health Atmosphere

The Emergency Response Team must be at the confined space entrance and able to reach the entrant(s) within three (3) minutes after the emergency response is initiated.

2. Potentially Hazardous Atmosphere

The Emergency Response Team must be ready and able to respond to an emergency in a confined space where a confined space could develop an atmospheric or other hazard or has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or by a floor which slopes downward and tapers to a smaller

cross-section.

3. Emergency Response Entry Requirements

if the CSERTL determines the space cannot be entered safely by personnel with required response equipment and PPE, then entry shall not be permitted, and the scope should go back to assessing/planning for additional planning. (i.e., remote work methods, alternate access and egress plans, etc.)

4. Equipment Inspections

Emergency response equipment must be inspected by a competent person prior to an entry beginning.

7.0 TRAINING



Anyone fulfilling any role in the standard in addition to supervising any role or planning confined space work must have Confined Space Fundamentals or equivalent.

Entrant

- Confined Space Fundamentals or equivalent.
- Fall Protection (if required)
- Respiratory Protection (if required)

Attendant:

- Confined Space Fundamentals or equivalent
- Documented understanding of regulatory and NB Power expectations
- First Aid Training (if required by code of practice)
- Competency in using and reading gas monitoring equipment

Competent Tester

- Confined Space Fundamentals (or equivalent)
- NB Power Competent Tester Training
- Testing equipment specific training
- Fall protection (if entry required)
- Respiratory protection (if required)
- Supplied Air Breathing equipment training (if required)
- Valid site orientation

Confined Space Permit Holder

- Confined Space Fundamentals (or equivalent);
 - Confined Space Permit Holder Training;
 - Job Hazard Analysis Training
 - Fall protection (if entry required)
 - Division specific LOTO training and
 - Competent Supervisor training (or equivalent)
-

Asset Owner

- Confined Space Fundamentals (or equivalent)
- Division specific LOTO training
- Confined Space LOTO training
- Fall protection (if required)
- Respiratory protection (if required)

Confined Space Emergency Response Team Leader

- Confined Space Fundamentals (or equivalent)
- Fall protection (if required)
- Respiratory protection
- Supplied Air Respiratory Protection
- Intermediate First Aid
- Emergency Response Training:
 - Retrieval systems (setup and operation)
 - Rescue Training
 - Knowledge to manage an emergency response incident
 - Annual practice of simulated rescue
 - Selecting appropriate rescue equipment
 - Atmospheric (gas) monitoring (setup, use and limitations)
 - Communication systems

Confined Space Emergency Response Team Member

- Confined Space Fundamentals (or equivalent)
- Fall protection (if required)
- Respiratory protection
 - Supplied Air Respiratory Protection
- Intermediate First Aid
- Emergency Response Training:
 - Retrieval systems (setup and operation)
 - Rescue training
 - Annual practice of simulated rescue
 - Atmospheric (gas) monitoring (setup, use and limitations)
 - Communication Systems

8.0 RECORDS:

The Confined Space Permit Holder must ensure all Confined Space Records associated with the code of practice, including an equipment calibration and maintenance log, are kept for a period of two years from the date on which the Confined Space Permit Holder signed and dated the code of practice.

9.0 APPENDIX

Appendix A: Confined Space Isolation Expectations
Appendix B: Forms and Tools
Appendix C: Confined Space Flow Chart
Appendix D: Confined Space Gas Testing Resource
Appendix E: Confined Space Ventilation Resource
Appendix F: Procedure for Pre-entry Testing



Director of Total
Health & Safety

DOCUMENT APPROVAL/REVISION RECORD

Revision #	Date	Revision Summary	Author	Reviewed By	Approved By
New		New	M. MacFarlane		R. Roy
03	2025-01-06	Complete update to align with regulatory changes	M. MacFarlane	Confined Space Project Team	R.Roy

Appendix A – Confined Space Isolation Expectations

Risk Based Isolation Approach:

1. All adjacent pipes or means of conveying material (solid, liquid or gas) into a confined space or a common system connected to a confined space must be isolated, de-energized and locked.
2. Isolations should be performed as close to the space as possible as any piping or equipment between the confined space and the point of isolation will be considered part of the confined space.
3. The expected level of isolation will be based on the level of risk presented by the hazards contained in the adjacent pipes (Appendix A)

3.1. Case A - Hazardous Gas/Vapor (HGV)

3.1.1. If piping contained a Hazardous Substance that is a gas, vapor, or liquid with sufficient volatility to produce a hazardous concentration of an air contaminant it must be controlled by:

- 3.1.1.1. Disconnecting the adjacent piping (as per section 5a), or
- 3.1.1.2. Isolating it using blanks or blinds (as per section 5b)

3.1.2. Examples include hydrogen, nitrogen, hydrazine, fuel oil, etc.

3.2. Case B - Hazardous Substance (HS)

3.2.1. If piping contained a Hazardous Substance that is not a gas, vapor, or liquid with sufficient volatility to produce a hazardous concentration of an air contaminant it must be controlled by:

- 3.2.1.1. Disconnecting the adjacent piping (as per section 5a), or
- 3.2.1.2. Isolating it using blanks or blinds (as per section 5b), or
- 3.2.1.3. Using a double block and bleed system (as per section 5c)

3.2.2. Examples include sulfuric acid, caustic, aqueous ammonia, etc.

3.3. Case C - Hazardous due to Pressure, Volume or Temperature Isolation (HPVT)

3.3.1. If piping contained a substance or material that is only harmful due to the temperature, pressure or quantity of the substance (e.g., water, steam) it must be controlled prior to entry by:

- 3.3.1.1. Disconnecting the adjacent piping (as per section 5a), or
- 3.3.1.2. Isolating it using blanks or blinds (as per section 5b), or
- 3.3.1.3. Using a double block and bleed system (as per section 5c), or
- 3.3.1.4. De-energize, lockout and depressurize the hazard such that there is no head pressure in the adjacent piping (gravity, pump or other) (as per section 5d)

3.3.2. Examples include water and steam.

4. Other means of isolation

- 4.1. In cases where systems do not allow isolation to align with the expectations above the business must explore other forms of isolation (e.g. freeze plugs, stop logs) and submit an application for [deviation](#) to Total Health and Safety.
- 4.2. Total Health and Safety will submit the request for deviation to WSNB for approval, prior to implementing the proposed means of isolation.
- 4.3. Deviations must be submitted to THS at least 12 weeks ahead of the planned outage date to ensure THS and WSNB have sufficient time to review the deviation and provide a judgement.

5. Isolation Specific Requirements

5.1. Disconnecting Adjacent Piping

- 5.1.1. Must be performed in a means that prevents the hazard from entering the confined space by.
 - 5.1.1.1. Either removing a length of the pipe at least 10 times its diameter, or
 - 5.1.1.2. The open ends must be moved out of line so that leaks/vapors will not bypass the disconnection.

5.2. Blanks and Blinds

- 5.2.1. If a line is to be opened for disconnection or to insert a blank or a blind, written safe work procedures must be prepared and followed to prevent hazardous exposure of workers to its contents.
- 5.2.2. Visual indication that a blank or blind has been installed must be provided at the point of installation (e.g., a GS 50 tag)
- 5.2.3. If required to prevent leakage, gaskets must be installed on the pressure side of blanks or blinds and flanges must be tightened to make the blanks or blinds effective.
- 5.2.4. If threaded lines are used, threaded plugs or caps must be used to blind the lines.

5.3. Double Block and Bleed

- 5.3.1. The bleed for a liquid system must be at a lower elevation than the block valves,
 - 5.3.2. All valves must be locked out in their proper open or closed position,
 - 5.3.3. The downstream block valve must be checked to ensure that it is capable of safely withstanding the line pressure,
 - 5.3.4. The bleed must be checked to ensure that it remains clear of obstructions while the confined space is occupied, either by continuous automatic monitoring or by manually checking within 20 minutes before worker entry, or before re-entry after the confined space has been vacated for more than 20 minutes, and
 - 5.3.5. In the event of discharge from the bleed line resulting from failure of the upstream block valve, all workers must immediately exit the confined space and the space must be effectively re-isolated before a worker enters the space.
-

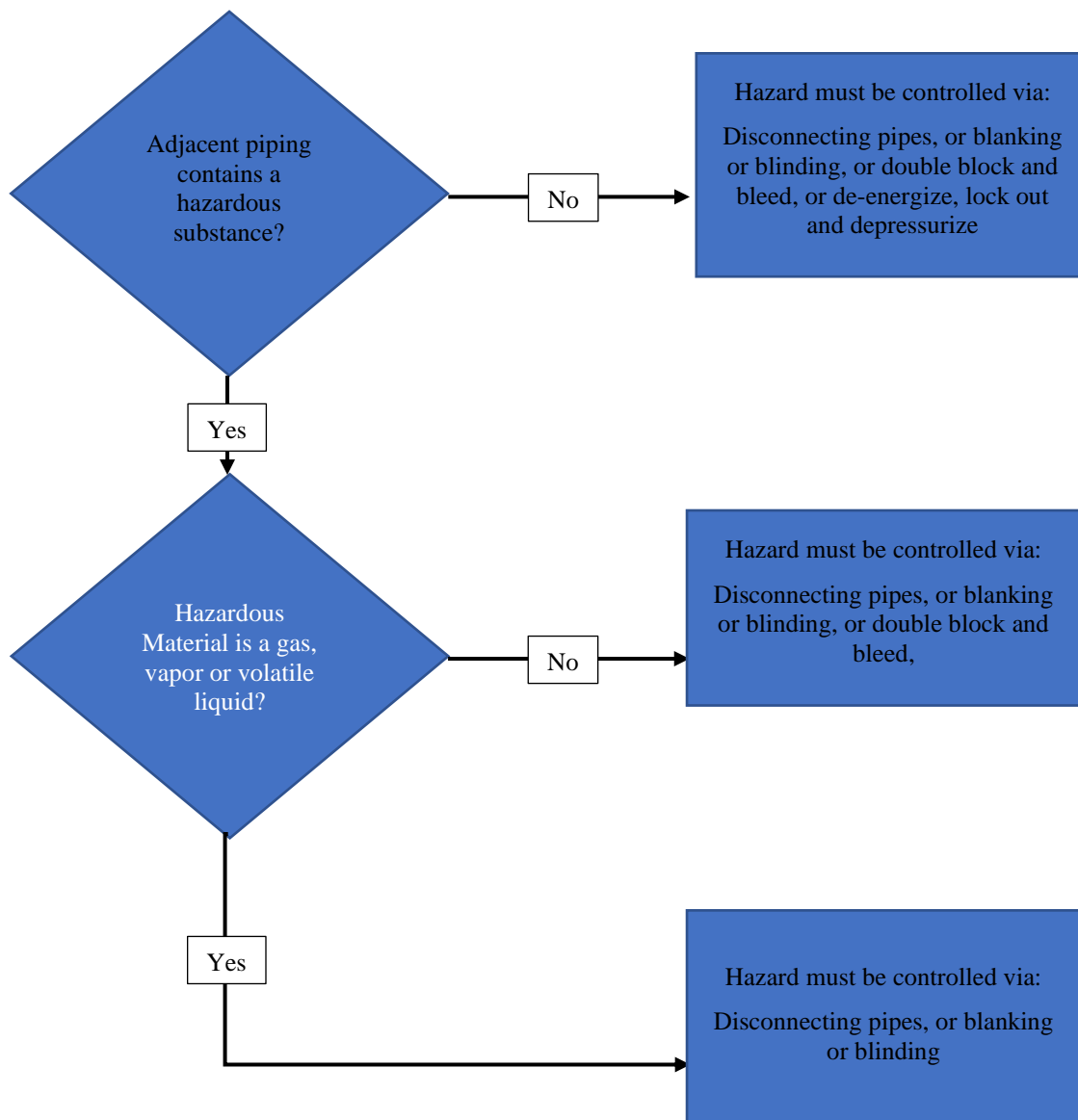
5.4. De-energize, Lockout and Depressurize

5.4.1. This control option applies if there is no head pressure in the adjacent piping (gravity, pump, or other) and is achieved by de-energizing and locking out each pressure source for the adjacent piping and depressurizing the adjacent piping.

5.4.2. For this option to apply, the layout of the adjacent piping has to be such that if all of the valves are opened with pumps locked out, fluid would not flow into the confined space. In such cases, locking out the pumps and depressurizing the line provides sufficient control.

5.4.3. Single valves are an acceptable form of isolation in only this circumstance.

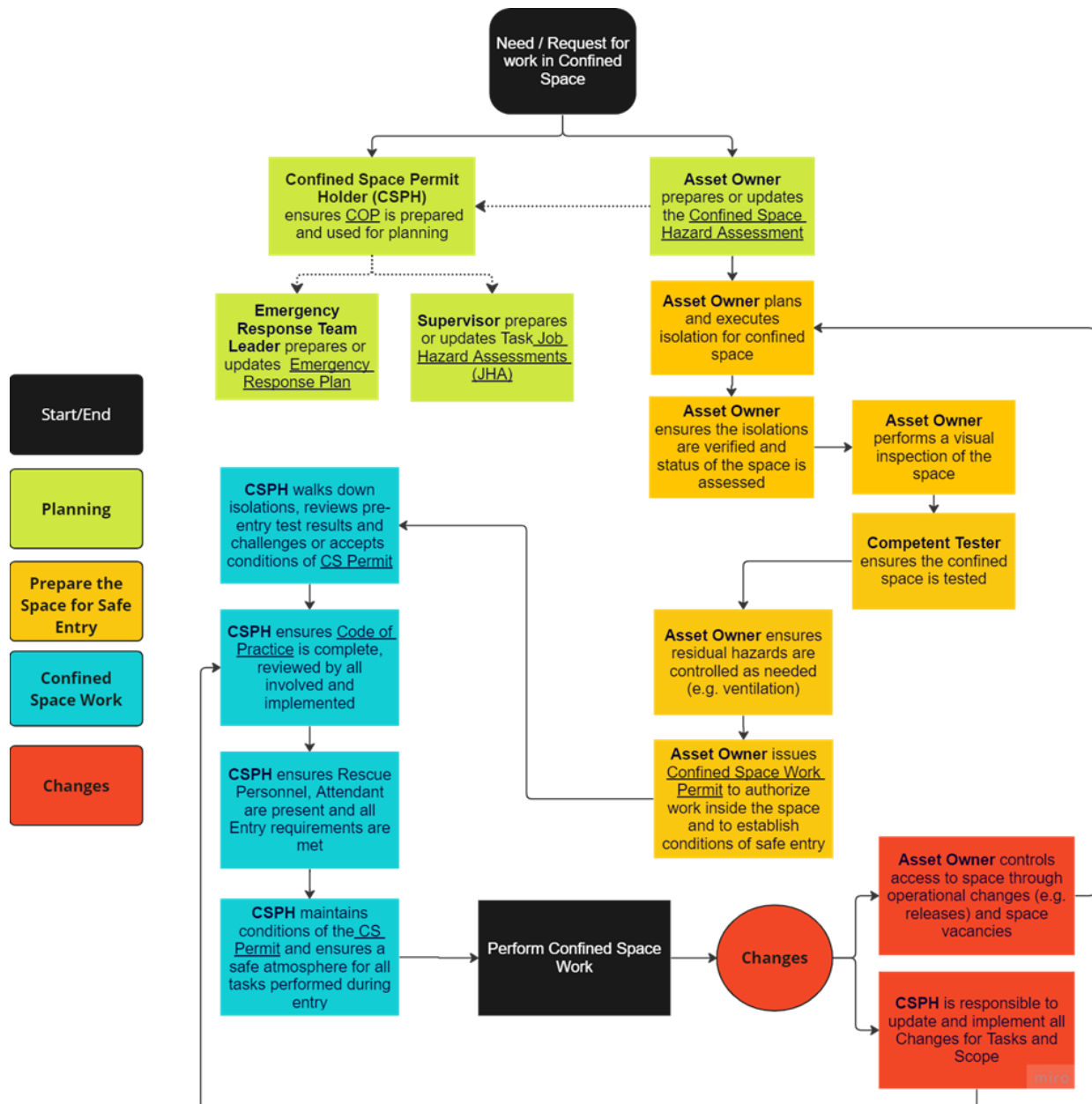
Isolation Expectation Flow Chart



Appendix B – Forms and Tools

1. [HS07 Confined Space Hazard Assessment.docx](#)
 2. [CS Isolation Worksheet - Draft.xlsx](#)
 3. [Form 0418 Confined Space Entry.docx](#)
 4. [HS06 Confined Space Pre-Entry Test Form.docx](#)
 5. [WELL Sheet Competent tester.docx](#)
 6. [HS05 Confined Space Emergency Response Plan.docx](#)
 7. [Confined Space Entry Permit \(TandD\).docx](#)
-

Appendix C – Confined Space Flow Chart



APPENDIX D – Confined Space Gas Testing Resource

1. The competent tester shall consider minimum instrument response times and minimum sample draw times, in accordance with manufacturer specifications, to account for remote samples using tubing. Robust pre-entry testing typically takes 15 minutes for a confined space.
 2. Select the appropriate wand/tubing material for the gas to be tested. Inert tubing (ie. Teflon) is required for volatile substances such as hydrocarbons and hydrogen sulfide.
 3. Each manufacturer may have a specific requirement based on the pump capability of their instrument. Typical industry guidance is 2 seconds of sample time for every foot of tubing used in addition with a minimum 2-minute sample time.
 - a. Applying this criterion to a sample using 10 feet of tubing would result in the competent tester waiting 20 seconds (2 seconds x 10 feet) for the results to appear and then an additional 2 minutes for all sensors to get an accurate reading – resulting in 2:20 of time spent taking that one sample.
-

Appendix E – Ventilation Guidance

Place Holder - To be developed

APPENDIX F – Procedure for Pre-Entry Testing

1. Asset owner issues work permit to open entry points
 2. Asset owner issues Confined Space work permit to Confined Space Permit Holder to enable Pre-entry testing to occur by Competent Tester
 3. Confined Space Permit Holder must review the CSHA with the Competent Tester prior to starting work.
 4. Competent Tester completes testing from outside the space.
 - a. If the space has high LEL, low O₂ or any IDLH levels of any kind, the Asset Owner must be notified and prevent further entry until the space has been cleaned or ventilated.
 - b. Asset owner then requests additional pre-entry testing. Once external testing determines the space is no longer IDLH, the Competent Tester can proceed with internal pre-entry testing as required (step 5)
 - c. Competent Tester must communicate any abnormal conditions or other visual observations to the CSPH
 5. If required, Competent Tester completes internal testing
 - a. The CSPH is responsible to ensure:
 - All requirements of a confined space entry are met (including having a JHA)
 - The entry is prepared for and treated as Immediately Dangerous to Life and Health:
 - The emergency response team will need to be at the confined space and able to reach the entrant within 3 minutes (as per 6.1.5.1)
 - Gas testing must be performed at entry points to get an initial understanding of the atmosphere in the space.
 - The entrant will need to enter using a Supplied Air Respirator (10,000 Assigned Protection Factor) as per (HSEE-03-18)
 - A lifeline, buddy system, lighting and other criteria must be considered.
 6. The Competent Tester returns the completed Pre-Entry Test form to the Asset Owner and relays and visual observations.
-